



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

August 11, 2016

EA-16-146
EA-16-160

William R. Gideon
Site Vice President
Brunswick Steam Electric Plant
8470 River Rd. SE (M/C BNP001)
Southport, NC 28461

**SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED INSPECTION
REPORT NOS.: 05000325/2016002 AND 05000324/2016002 AND EXERCISE
OF ENFORCEMENT DISCRETION**

Dear Mr. Gideon:

On June 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Brunswick Steam Electric Plant Units 1 and 2. The enclosed integrated inspection report documents the inspection findings, which were discussed on August 1, 2016, with you and other members of your staff.

One NRC-identified violation and one self-revealing violation are documented in this report. These findings were determined to involve a violation of NRC requirements. The NRC is treating these findings as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

In addition, a violation of Technical Specification 3.6.4.1, Secondary Containment, was identified. Because the violation was identified during the discretion period described in Enforcement Guidance Memorandum 11-003, Revision 3, the NRC is exercising enforcement discretion in accordance with Section 3.5, "Violations Involving Special Circumstances," of the NRC Enforcement Policy and, therefore, will not issue enforcement action for this violation, subject to a timely license amendment request being submitted.

The enclosed report also documents noncompliances for which the NRC is exercising enforcement discretion in accordance with Section 9.1 of the NRC Enforcement Policy, "Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)." The noncompliances are associated with your implementation of the requirements and standards of your technical specifications, as well as 10 CFR Part 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979." The inspectors have screened the violation and determined that it warrants enforcement discretion per the Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues, and Section 11.05.b of Inspector Manual Chapter 0305.

W. Gideon

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If you contest the violations or the significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Brunswick Steam Electric Plant.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at the Brunswick Steam Electric Plant.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," 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 System (PARS) component of NRC's Agencywide Documents Access and Management 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/

George T. Hopper, Chief
Reactor Projects Branch 4
Division of Reactor Projects

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

Enclosure:
IR 05000325, 324/2016002
w/Attachment: Supplemental Information

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If you contest the violations or the significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Brunswick Steam Electric Plant.

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W. Gideon

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Letter to William R. Gideon from George T. Hopper dated August 11, 2016

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED INSPECTION
REPORT NOS.: 05000325/2016002 AND 05000324/2016002 AND EXERCISE OF
ENFORCEMENT DISCRETION

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.: 50-325, 50-324

License Nos.: DPR-71, DPR-62

Report No.: 05000325/2016002, 05000324/2016002

Licensee: Duke Energy Progress, Inc.

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: Southport, NC

Dates: April 1, 2016 through June 30, 2016

Inspectors: M. Catts, Senior Resident Inspector
M. Schweg, Resident Inspector
B. Collins, Reactor Inspector (Section 4OA3.4)
J. Panfel, Senior Health Physicist (Sections 2RS7, 4OA1)
W. Pursley, Health Physicist (Section 2RS6)
D. Jones, Senior Reactor Inspector (Section 4OA3.5)

Approved by: George T. Hopper, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Enclosure

SUMMARY

IR 05000325/2016002, 05000324/2016002; April 1, 2016 through June 30, 2016; Brunswick Steam Electric Plant, Units 1 and 2; Operability Determinations and Functionality Assessments and Post-Maintenance Testing.

This report covered a three-month period of inspection by resident inspectors and regional inspectors. One NRC-identified violation and one self-revealing violation are documented in this report. The significance of inspection findings are indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP) dated April 29, 2015. The cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated February 4, 2015. The NRC's program for overseeing the safe operations of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Rev. 6.

NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. An NRC-identified Green non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, was identified because the licensee failed to promptly identify and correct a condition adverse to quality (CAQ) on emergency diesel generator (EDG) 1. Specifically, from February 7, 2016, until March 5, 2016, the licensee failed to promptly identify and correct a broken auto start control relay (ASCR) which resulted in reduced capacity of EDG 1 due to load oscillations and inoperability of EDG 1 due to oscillating between droop and isochronous mode. The oscillations could cause the EDG to not meet Technical Specification (TS) frequency and load requirements. The licensee replaced the ASCR and entered this issue into the corrective action program (CAP) as nuclear condition report (NCR) 2007720.

The licensee's failure to promptly identify and correct the broken ASCR, which resulted in reduced capacity and inoperability of EDG 1 due to load oscillations, was a performance deficiency. The finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to identify and correct the malfunctioning ASCR resulted in reduced capacity of EDG 1 due to load oscillations, and could cause EDG 1 to not meet TS frequency and load requirements. Using IMC 0609, Appendix A, issued June 19, 2012, The Significance Determination Process (SDP) for Findings At-Power, the inspectors determined the finding screened to a more detailed risk evaluation because it represented a loss of system and/or function, and the finding represented an actual loss of a function of a single train for greater than the TS allowed outage time. The regional Senior Reactor Analyst evaluated the finding and determined it to be Green. The risk was low because of the diverse sources of AC power available, and the long duration of some of the sequences allowed a greater potential for recovery of a failed AC power source. The dominant risk sequences contained common cause failure of the diesel generators, with the supplemental EDG aligned to the other unit, and non-recovery of offsite power or of an EDG.

The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the identification attribute because the licensee failed to implement a CAP with a low threshold for identifying issues completely, accurately, and in a timely manner in accordance with the program. Specifically, the licensee failed to write a timely NCR and identify the load oscillations as a CAQ. [P.1] (Section 1R15)

- Green. A self-revealing Green NCV of 10 CFR Part 50, Appendix B, Criterion III, Design Control, was identified for the licensee's failure to verify or check the adequacy of design of the EDG 3 emergency auto-start circuitry. Specifically, on October 24, 2011, the licensee failed to verify or check the adequacy of design of the fuse block holder modification to the EDG auto-start circuitry. This resulted in the fuse block holder connection becoming loose, a loss of continuity through the circuit, and the inoperability of EDG 3. The licensee replaced the fuse block holder, performed a continuity check, and plans to implement a design change to install continuity indication for continuous verification of continuity. The licensee entered this issue into the CAP as NCR 2007449.

The licensee's failure to verify or check the adequacy of design of the EDG 3 emergency auto-start circuitry fuse block holder modification was a performance deficiency. The performance deficiency was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This resulted in the fuse block holder connection becoming loose, a loss of continuity through the circuit, and the inoperability of EDG 3. Using IMC 0609, Appendix A, issued June 19, 2012, The Significance Determination Process (SDP) for Findings At-Power, the inspectors determined the finding screened to a more detailed risk evaluation because it represented a loss of system and/or function, and the finding represented an actual loss of a function of a single train for greater than the TS allowed outage time. The regional SRA performed a detailed risk review for the finding. The finding was determined to be Green. The limited duration of the EDG's failure of the auto start, the ability to manually recover the EDG, and the availability of the other EDGs and of the supplemental EDG contributed to the low risk value. The dominant risk sequences were of low value, and were Station Blackout with failure to recover offsite power or the EDGs.

The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the identification attribute because the licensee failed to implement a CAP with a low threshold for identifying issues completely, accurately, and in a timely manner in accordance with the program. Specifically, the licensee failed to identify EDG 3 was inoperable on February 7, 2016, when the indications were apparent. [P.1] (Section 1R19)

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 53 percent rated thermal power (RTP) for one condenser water box isolated to repair main condenser tube leakage. The unit was returned to near RTP on April 7, 2016. On May 5, 2016, the unit was reduced to 22 percent power for the 1B reactor recirculation pump lower bearing oil level low investigation. The unit was returned to near RTP on May 6, 2016. On May 20, 2016, the unit was reduced to 70 percent power for a control rod sequence exchange. The unit was returned to near RTP on May 21, 2016. On May 23, 2016, the unit was reduced to 80 percent power for a control rod improvement. The unit was returned to near RTP on May 24, 2016. On June 2, 2016, the unit was reduced to 80 percent power due to loss of the Weatherspoon transmission line. The line was restored and the unit was returned to near RTP on June 2, 2016. The unit remained at or near RTP for the remainder of the inspection period.

Unit 2 began the inspection period at or near RTP. On April 20, 2016, the unit was reduced to 86 percent power due to the loss of the Whiteville 230 kV transmission line. The line was repaired and the unit was returned to near RTP on April 21, 2016. On June 10, 2016, the unit was reduced to 70 percent power for a control rod exchange and main steam valve testing. The unit was returned to near RTP on June 11, 2016, and remained at or near RTP for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (711111.01 – 2 samples)

a. Inspection Scope

.1 Seasonal Extreme Weather Conditions

The inspectors conducted a detailed review of the station's adverse weather procedures written for extreme high temperatures. The inspectors verified that weather-related equipment deficiencies identified during the previous year had been placed into the work control process and/or corrected before the onset of seasonal extremes. The inspectors evaluated the licensee's implementation of adverse weather preparation procedures and compensatory measures before the onset of seasonal extreme weather conditions. Documents reviewed are listed in the Attachment. The inspectors evaluated the following risk-significant systems:

- service water system
- transformers

.2 Impending Adverse Weather Conditions

The inspectors reviewed the licensee's preparations to protect risk-significant systems from Tropical Storm Bonnie on May 26, 2016. The inspectors evaluated the licensee's implementation of adverse weather preparation procedures and compensatory measures, including operator staffing, before the onset of and during the tropical storm conditions. The inspectors reviewed the licensee's plans to address the ramifications of potential sustained high winds, continual rainfall or flash flooding conditions. The inspectors verified that operator actions specified in the licensee's adverse weather procedure maintain readiness of essential systems. The inspectors verified that required surveillances were current, or were scheduled and completed, if practical, before the onset of anticipated adverse weather conditions. The inspectors also verified that the licensee implemented periodic equipment walkdowns or other measures to ensure that the condition of plant equipment met operability requirements. Lastly, the inspectors toured the switchyard and walked down other outside protected areas to verify the licensee removed or properly secured any potential tornado missile hazards. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04 – 4 samples)

a. Inspection Scope

Partial Walkdown

The inspectors verified that critical portions of the selected systems were correctly aligned by performing partial walkdowns. The inspectors selected systems for assessment because they were a redundant or backup system or train, were important for mitigating risk for the current plant conditions, had been recently realigned, or were a single-train system. The inspectors determined the correct system lineup by reviewing plant procedures and drawings. Documents reviewed are listed in the Attachment.

The inspectors selected the following systems or trains to inspect:

- Unit 1, alternate decay heat removal
- Unit 1 and 2, FLEX Diesels
- Unit 2, core spray train A
- Unit 2, reactor core isolation cooling (RCIC)

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05Q/A – 6 samples)

a. Inspection Scope

.1 Quarterly Inspection

The inspectors evaluated the adequacy of selected pre-fire plans by comparing the pre-fire plans to the defined hazards and defense-in-depth features specified in the fire protection program. In evaluating the pre-fire plans, the inspectors assessed the following items:

- control of transient combustibles and ignition sources
- fire detection systems
- water-based fire suppression systems
- gaseous fire suppression systems
- manual firefighting equipment and capability
- passive fire protection features
- compensatory measures and fire watches
- issues related to fire protection contained in the licensee's CAP

The inspectors toured the following fire areas to assess material condition and operational status of fire protection equipment. Documents reviewed are listed in the Attachment.

- 0PFP-CB, Units 1 and 2, Control Building, 70-ft elevation
- 0PFP-CB-23 and 14, Control Room and Computer Rooms, 49-ft elevation
- 0PFP-SDG, Security Uninterruptible Power Supply and Diesel Building
- 1PFP-DG-11-14, Units 1 and 2, E1-E4 Switchgear Rooms, 50-ft elevation
- 2PFP-RB2-01B, Unit 2, Northwest Core Spray, 17-ft elevation

.2 Annual Inspection

The inspectors evaluated the licensee's fire brigade performance during a drill on April 15, 2016 and assessed the brigade's capability to meet fire protection licensing basis requirements. The inspectors observed the following aspects of fire brigade performance:

- capability of fire brigade members
- leadership ability of the brigade leader
- use of turnout gear and fire-fighting equipment
- team effectiveness
- compliance with site procedures

The inspectors also assessed the ability of control room operators to combat potential fires, including identifying the location of the fire, dispatching the fire brigade, and sounding alarms. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)a. Inspection ScopeUnderground Cables

The inspectors reviewed related flood analysis documents and inspected the areas listed below containing cables whose failure could disable risk-significant equipment. The inspectors directly observed the condition of cables and cable support structures and, as applicable, verified that dewatering devices and drainage systems were functioning properly. In addition, the inspectors verified the licensee was identifying and properly addressing issues using the CAP. Documents reviewed are listed in the Attachment.

- Unit 1, manhole 1SW
- Unit 2, manholes MH-MW2, MH-3SW, MH-4NW, MH-7SW

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program and Licensed Operator Performance (71111.11 – 2 samples)a. Inspection Scope.1 Resident Inspector Quarterly Review of Licensed Operator Regualification

On May 10, 2016, the inspectors observed a simulator scenario including an inoperable jet pump, an unisolable steam leak, and an anticipated transient without SCRAM for training of an operating crew.

The inspectors assessed the following:

- licensed operator performance
- the ability of the licensee to administer the scenario and evaluate the operators
- the quality of the post-scenario critique
- simulator performance

Documents reviewed are listed in the Attachment.

.2 Resident Inspector Quarterly Review of Licensed Operator Performance

The inspectors observed licensed operator performance in the main control room during the Unit 1 downpower on May 5, 2016, for the 1B reactor recirculation pump lower bearing oil level low investigation.

The inspectors assessed the following:

- use of plant procedures
- control board manipulations
- communications between crew members
- use and interpretation of instruments, indications, and alarms

- use of human error prevention techniques
- documentation of activities
- management and supervision

Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12 – 2 samples)

a. Inspection Scope

The inspectors assessed the licensee's treatment of the issues listed below to verify the licensee appropriately addressed equipment problems within the scope of the maintenance rule (10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"). The inspectors reviewed procedures and records to evaluate the licensee's identification, assessment, and characterization of the problems as well as their corrective actions for returning the equipment to a satisfactory condition. The inspectors also interviewed system engineers, and attended maintenance rule expert panels to assess the accuracy of performance deficiencies and extent of condition. Documents reviewed are listed in the Attachment.

- work order (WO) 20030188, EDG 2 temperature controller failure
- WO 20055628, residual heat removal (RHR) 1B room cooler discharge damper bound

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 samples)

a. Inspection Scope

The inspectors reviewed the maintenance activities listed below to verify that the licensee assessed and managed plant risk as required by 10 CFR 50.65(a)(4) and licensee procedures. The inspectors assessed the adequacy of the licensee's risk assessments and implementation of risk management actions. The inspectors also verified that the licensee was identifying and resolving problems with assessing and managing maintenance-related risk using the CAP. Additionally, for maintenance resulting from unforeseen situations, the inspectors assessed the effectiveness of the licensee's planning and control of emergent work activities. Documents reviewed are listed in the Attachment.

- Elevated risk condition due to the downpower and containment entry to investigate the 1B reactor recirculation pump lower bearing oil level low alarm on May 5, 2016
- Elevated risk condition due to trip of 1A reactor protection system motor generator set on May, 9, 2016
- Elevated risk condition due to Tropical Storm Bonnie on May 27, 2016

- Elevated risk condition due to Unit 1 A loop RHR and RHR service water out of service on June 1, 2016
- Elevated risk condition due to the loss of 230 kV Weatherspoon line on June 2, 2016

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 7 samples)

a. Inspection Scope

.1 Operability and Functionality Review

The inspectors selected the operability determinations or functionality evaluations listed below for review based on the risk-significance of the associated components and systems. The inspectors reviewed the technical adequacy of the determinations to ensure that TS operability was properly justified and the components or systems remained capable of performing their design functions. To verify whether components or systems were operable, the inspectors compared the operability and design criteria in the appropriate sections of the TSs and updated final safety analysis report to the licensee's evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment.

- Units 1 and 2, EDG 1 kW swings, February 7, 2016
- Units 1 and 2, EDG 3 output breaker failed to close, March 3, 2016
- Unit 1, thermal limits higher than predicted during power ascension, May 24, 2016
- Unit 2, secondary containment operability with gap in railroad door, May 31, 2016
- Unit 1, 1A RHR heat exchanger low differential pressure, June 2, 2016
- Unit 2, secured venting of drywell due to rise in stack radiation levels, June 27, 2016

.2 Operator Work-Around Review

The inspectors performed a detailed review of the licensee's operator work-around, operator burden, and control room deficiency lists for the station in effect on April 4, 2016, to verify that the licensee identified operator workarounds at an appropriate threshold and entered them in the CAP. The inspectors verified that the licensee identified the full extent of issues, performed appropriate evaluations, and planned appropriate corrective actions. The inspectors also reviewed compensatory actions and their cumulative effects on plant operation. Documents reviewed are listed in the Attachment.

b. Findings

Introduction. An NRC-identified Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, was identified because the licensee failed to promptly identify and correct a CAQ on EDG 1. Specifically, from February 7, 2016, until

March 5, 2016, the licensee failed to promptly identify and correct a broken ASCR which resulted in reduced capacity of EDG 1 due to load oscillations and inoperability of EDG 1 due to oscillating between droop and isochronous mode. The oscillations could cause EDG 1 to not meet TS frequency and load requirements.

Description. On February 7, 2016, an electrical fault occurred on a 4 kV BOP bus which initiated an auto start of all four EDGs. The inspectors performed a walk down of the EDGs and EDG 1 was running loaded, but the fuel racks were cycling excessively and the kW and bus frequency were oscillating. Specifically, the kW loading was oscillating between 2000 kW to 2600 kW or a 600 kW swing. EDG 2 was running at the same load but there was no observed oscillations. EDG 3 and EDG 4 had started but they were not loaded, as expected, since site power was available for Unit 2. Inspectors reported the issue to the licensee; however, the licensee concluded the oscillations were an expected response for a lightly loaded EDG.

On February 11, 2016, the inspectors challenged the licensee for not issuing a NCR since the oscillations did not occur on EDG 2, which was running at the same load. On February 12, 2016, the licensee wrote NCR 2000871 for the EDG 1 fuel rack cycling and performed an immediate determination of operability. Operations personnel determined EDG 1 was operable, the kW swings were not unexpected, and that no degraded condition existed. The licensee concluded the governor tuning adjustments made the governor very responsive. The condition report was closed with no corrective actions performed.

The inspector challenged the determination for not considering the oscillations as a degraded condition. The EDG 1 governor was last tuned on March 28, 2008, per WO 192085. Governor tuning procedure OPM-GOV003, Diesel Generator Speed/Load Control Calibration, adjusts the electrical governor actuator so that no engine oscillations occur. On the contrary, excessive engine oscillations were observed by the inspectors. Moreover, the procedure adjusts the governor to maintain frequency between 60.0 to 60.2 HZ or a 0.2 HZ swing. The maximum observed swings were 59.7 to 60.5 HZ or a 0.8 HZ swing which is four times allowed by procedure. The inspectors determined this condition should have been considered a degraded condition since the oscillations would not be expected for a properly tuned governor.

On March 2, 2016, following the auto voltage regulator modification, a loss of offsite power (LOOP)/loss of coolant accident (LOCA) test was performed on EDG1 to restore operability. The same level of oscillations were observed but licensee did not issue an NCR.

On March 5, 2016, during the EDG 1 governor replacement, the licensee identified a broken ASCR and NCR 2007720 was issued. The licensee believed the broken ASCR occurred during the governor replacement maintenance. The ASCR was replaced and EDG 1 was returned to service following completion of the governor replacement. The NCR was closed to a WO to replace the ASCR, and no additional corrective actions were taken. On March 8, 2016, a LOOP/LOCA test was successfully performed and EDG 1 was declared operable.

In mid-May 2016, during an engineering review of NCR 2007720, the licensee determined the broken ASCR had caused the EDG 1 oscillations. The broken ASCR contact caused EDG 1 to cycle between droop and isochronous modes. However, the licensee did not issue a condition report to evaluate the cause of failure.

The inspectors challenged the EDG 1 load capacity and capability of the EDG with the 600 kW load swings. The maximum diesel generator loading is defined in plant procedure 0AOP-36.1, Loss of any 4160 buses or 480V E-Buses, as 3850 kW. The 600 kW swing would reduce the average load capacity by 300 kW (or 3550 kW) to stay below the maximum load limit.

The inspectors identified an adverse trend in the frequency and load oscillations. As load was added, the frequency and load oscillations increased. The adverse trend indicated the steady state frequency could be outside the two percent limit defined in TS Surveillance Requirement (SR) 3.8.1.14 and EDG capacity could be below the TS SR 3.8.1.11 load requirements.

Analysis. The licensee's failure to promptly identify and correct the broken ASCR, which resulted in reduced capacity and inoperability of EDG 1 due to load oscillations, was a performance deficiency. The finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to identify and correct the malfunctioning ASCR resulted in reduced capacity of EDG 1 due to load oscillations, which could cause EDG 1 to not meet TS frequency and load requirements. Using IMC 0609, Appendix A, issued June 19, 2012, The Significance Determination Process (SDP) for Findings At-Power, the inspectors determined the finding screened to a more detailed risk evaluation because it represented a loss of system and/or function, and the finding represented an actual loss of a function of a single train for greater than the TS allowed outage time. The regional Senior Reactor Analyst evaluated the finding and determined it to be Green. The risk was low because of the diverse sources of AC power available, and the long duration of some of the sequences allowed a greater potential for recovery of a failed AC power source. The dominant risk sequences contained common cause failure of the diesel generators, with the supplemental EDG aligned to the other unit, and non-recovery of offsite power or of an EDG. The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the identification attribute because the licensee failed to implement a CAP with a low threshold for identifying issues completely, accurately, and in a timely manner in accordance with the program. Specifically, the licensee failed to write a timely NCR and identify the load oscillations as a CAQ. [P.1]

Enforcement. 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, requires, in part, that measures shall be established to ensure that a CAQ, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, from February 7, 2016, to March 5, 2016, the licensee failed to promptly identify and correct a broken ASCR which resulted in reduced capacity and inoperability of EDG 1 due to load oscillations. The licensee replaced the ASCR. The licensee entered this issue into the CAP as NCR 2007720. This violation is being treated as a NCV consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000325;324/2016002-01, Failure to Identify Broken Auto Start Control Relay on Emergency Diesel Generator 1.

1R18 Plant Modifications (71111.18 – 3 samples)a. Inspection Scope

The inspectors verified that the plant modifications listed below did not affect the safety functions of important safety systems. The inspectors confirmed the modifications did not degrade the design bases, licensing bases, and performance capability of risk significant structures, systems and components. The inspectors also verified that modifications performed during plant configurations involving increased risk did not place the plant in an unsafe condition. Additionally, the inspectors evaluated whether system operability and availability, configuration control, post-installation test activities, and changes to documents, such as drawings, procedures, and operator training materials, complied with licensee standards and NRC requirements. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with modifications. Documents reviewed are listed in the Attachment.

- Engineering Change (EC) 279468, EDG 1 governor replacement
- EC 81326, installation of EDG 3 emergency control relay (ECR) fuse
- EC 276098, emergency bus undervoltage logic changes

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 6 samples)a. Inspection Scope

The inspectors either observed post-maintenance testing or reviewed the test results for the maintenance activities listed below to verify the work performed was completed correctly and the test activities were adequate to verify system operability and functional capability.

- Units 1 and 2, WO 20061937 , March 8, 2016, EDG 3 ECR fuse block replacement
- Unit 2, WO 20061305, April 22, 2016, RCIC over speed trip device repair
- Unit 2, WO 13480577, May 10, 2016, average power meter memory chip replacement
- Unit 2, WO 20028625, May 18, 2016, 2B nuclear service water pump strainer shear pin replacement
- Units 1 and 2, WO 13398942, June 9, 2016, EDG 2 overspeed trip test after EDG maintenance
- Unit 1, WO 13485826, June 27, 2016, 1B conventional service water pump packing replacement

The inspectors evaluated these activities for the following:

- Acceptance criteria were clear and demonstrated operational readiness
- Effects of testing on the plant were adequately addressed
- Test instrumentation was appropriate
- Tests were performed in accordance with approved procedures

- Equipment was returned to its operational status following testing
- Test documentation was properly evaluated

Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with post-maintenance testing. Documents reviewed are listed in the Attachment.

b. Findings

Introduction. A self-revealing Green NCV of 10 CFR Part 50, Appendix B, Criterion III, Design Control, was identified for the licensee's failure to verify or check the adequacy of design of the EDG 3 emergency auto-start circuitry. Specifically, on October 24, 2011, the licensee failed to verify or check the adequacy of design of the fuse block holder modification to the EDG start circuitry. This resulted in the fuse block holder connection becoming loose, a loss of continuity through the circuit, and the inoperability of EDG 3.

Description. On October 24, 2011, EC 281685 installed a dummy fuse between the EDG3 lockout relay (LOCR) and ECR in the diesel auto start circuitry. A fuse block with a dummy fuse was selected to alleviate the need to lift wires between the ECR and LOCR during maintenance.

On February 7, 2016, the Brunswick site declared an Alert in accordance with Emergency Action Level HA 2.1 due to an explosion/fire in the Unit 1 BOP 4 kV switchgear bus area. A manual reactor SCRAM was initiated due to loss of both recirculation system variable speed drives as a result of an electrical fault. The startup auxiliary transformer (SAT) experienced a lockout fault, interrupting offsite power to emergency buses 1 and 2. EDGs 1, 2, 3, and 4 automatically started and EDGs 1 and 2 synchronized to emergency buses 1 and 2 per design. The licensee initiated NCR 1998726 to address this event. EDG 3 and EDG 4 had started but were not loaded, as expected. EDG 3 successfully auto-started on the SAT lockout, however, approximately two hours into the event, when preparing to establish unit auxiliary transformer backfeed, operators observed that the auto-start indications for EDG 3 (annunciator and lights) had cleared without operator action. On February 10, 2016, the licensee wrote NCR 1999745 for the adverse condition on EDG 3, however, the licensee determined the EDG was operable.

On March 2, at 1458, EDG 1 was declared inoperable in support of modifications and planned maintenance. Emergency bus E1 and BOP bus 1D were de-energized and unavailable during this maintenance. On March 3, 2016, work was ongoing to restore power to the BOP 1D bus when an error in the restoration sequence resulted in an invalid auto-start of the EDGs. EDG 3 was expected to start, but failed to start. On March 4, 2016, at 1235, the licensee determined during troubleshooting, that continuity was lost across the dummy fuse block in the auto-start circuitry for EDG 3. This failure prevented the TS required auto-actuation of EDG 3, and EDG 3 was declared inoperable. Unit 1 was shut down for a refueling outage. Unit 2 entered TS 3.8.1, Condition I, for one or more offsite circuits and two or more diesel generators inoperable, which required immediate entry into TS 3.0.3. The EDG 3 fuse holder was replaced, a continuity check was performed, and EDG 3 was restored to operable at 1834.

The inspectors reviewed the root cause evaluation which identified the direct cause to be a loss of continuity in the 2-DG3-FU-1-ECR dummy fuse at the EDG 3 ECR disconnect, due to loose fuse clamp fingers on the dummy fuse block holder. The licensee determined there was firm evidence this condition existed since February 7, 2016, when

EDG 3 annunciators and lights cleared without operator action indicating a loss of electrical continuity. The root cause was determined to be a design vulnerability in the EDG 3 fuse holder due to lack of circuit continuity indication that was not mitigated by design or testing. The corrective action to preclude repetition was to approve and install a continuity light indication for all EDG fuse blocks to ensure continuous continuity verification. The inspectors reviewed engineering change (EC) 281685, EDG 3 Dummy Fuse Installation. The inspectors determined that from October 24, 2011, when the licensee performed the modification to install the dummy fuse holder in the EDG 3 auto-start circuitry, through March 4, 2016, when EDG 3 was determined to be inoperable, that the licensee failed to verify or check the adequacy of design through a design review or a suitable testing program. The loose fuse holder fingers was a known failure mode during the development of the EC to install the dummy fuse holder; however, no strategy was developed for testing the design adequacy. The inspectors determined operating experience existed on how fuse block clips may become loose during fuse removal/replacement and affect circuit integrity, as discussed in operating experience 23967 from 2006.

Analysis. The licensee's failure to verify or check the adequacy of design of the EDG 3 emergency auto-start circuitry fuse block holder modification was a performance deficiency. The performance deficiency was more than minor because it was associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This resulted in the fuse block holder connection becoming loose, a loss of continuity through the circuit, and the inoperability of EDG 3. Using IMC 0609, Appendix A, issued June 19, 2012, The Significance Determination Process (SDP) for Findings At-Power, the inspectors determined the finding screens to a more detailed risk evaluation because it represented a loss of system and/or function, and the finding represented an actual loss of a function of a single train for greater than the TS allowed outage time. The regional SRA performed a detailed risk review for the finding. The finding was determined to be Green. The limited duration of the EDG's failure of the auto start, the ability to manually recover the EDG, and the availability of the other EDGs and of the supplemental EDG contributed to the low risk value. The dominant risk sequences were of low value, and were Station Blackout with failure to recover offsite power or the EDGs.

The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the identification attribute because the licensee failed to implement a CAP with a low threshold for identifying issues completely, accurately, and in a timely manner in accordance with the program. Specifically, the licensee failed to identify EDG 3 was inoperable on February 7, 2016, when the indications were apparent. [P.1]

Enforcement. Appendix B to 10 CFR Part 50, Criterion III, Design Control, states in part, measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, from October 24, 2011, to March 4, 2016, the licensee failed to adequately verify or check the adequacy of design of the fuse block holder modification to the EDG auto-start circuitry. This resulted in the fuse block holder connection becoming loose, a loss of continuity through the circuit, and the inoperability of EDG 3. The licensee took immediate corrective action and replaced the fuse block

holder, performed a continuity check, and plans to implement a design change to install a continuity indication for continuous verification of continuity. The licensee entered this issue into the CAP as NCR 2007449. This violation is being treated as a NCV consistent with Section 2.3.2.a of the NRC Enforcement Policy: NCV 05000325; 324/2016002-02, Failure to Verify or Check the Adequacy of Design of the EDG 3 Auto-Start Circuitry.

1R22 Surveillance Testing (71111.22 – 6 samples)

a. Inspection Scope

The inspectors reviewed the surveillance tests listed below and either observed the test or reviewed test results to verify testing activities adequately demonstrated that the affected SSCs remained capable of performing the intended safety functions (under conditions as close as practical to design bases conditions or as required by TSs) and maintained their operational readiness.

The inspectors evaluated the test activities to assess for preconditioning of equipment, procedure adherence, and equipment alignment following completion of the surveillance. Additionally, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with surveillance testing. Documents reviewed are listed in the Attachment.

Routine Surveillance Tests

- Unit 1, WO 20071960, Sump Pump Flow Test, April 12, 2016
- Units 1 and 2, OPT-34.13.4.0, Train A and B Control Room Emergency Ventilation System Thermal Fire Detector Functional Test, April 14, 2016
- Unit 1, OPT-20.3C, Personnel Airlock Interior and Exterior Doors Leak Rate Test, May 5, 2016
- Unit 1, OPT-09.2, Unit 2 HPCI System Operability Test, June 15, 2016

In-Service Tests (IST)

- Unit 1, OPT-09.7, High Pressure Coolant Injection System Valve Operability Test, May 13, 2016

Reactor Coolant System Leak Detection

- Unit 2, OOI-02.3, Drywell Leakage Control, May 18, 2016

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06 – 1 sample)

a. Inspection Scope

The inspectors observed the simulator scenario conducted on May 10, 2016, including an inoperable jet pump, an un-isolable steam leak, and an anticipated transient without

SCRAM. The inspectors observed licensee activities in the simulator to evaluate implementation of the emergency plan, including event classification, notification, and protective action recommendations. The inspectors evaluated the licensee's performance against criteria established in the licensee's procedures. Additionally, the inspectors attended the post-exercise critique to assess the licensee's effectiveness in identifying emergency preparedness weaknesses and verified the identified weaknesses were entered in the CAP. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

2. RADIATION SAFETY

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06 – 6 samples)

a. Inspection Scope

Radioactive Effluent Treatment Systems

The inspectors walked-down selected components of the gaseous and liquid radioactive waste (radwaste) processing and effluent discharge systems. To the extent practical, the inspectors observed and evaluated the material condition of in-place waste processing equipment for indications of degradation or leakage that could constitute a possible release pathway to the environment. Inspected components included plant stack support building, auxiliary off gas building, reactor building ventilation system, radwaste control room and salt water release tank and associated piping and valves. In addition, the inspectors observed a monthly source check of the turbine building wide range gas monitor. The inspectors interviewed licensee staff regarding equipment configuration and effluent monitor operation. The inspectors also walked down the turbine building ventilation system and standby gas treatment system and reviewed surveillance test records for the standby gas treatment system.

For the main stack wide-range noble gas monitor and the Unit 1 plant vent exhaust radiation monitor, the inspectors reviewed calibration and functional test records and evaluated traceability of radioactive calibration sources to National Institute of Standards and Technology standards. The inspectors also evaluated the licensee's capability to collect high-range post-accident effluent samples from these monitoring systems. The inspectors reviewed and discussed with licensee staff the methodology for determining vent and stack flow rates and compared current vent flows to design values in the Offsite Dose Calculation Manual (ODCM).

Effluent Monitoring and Discharge

The inspectors observed the collection and processing of liquid and gas effluent samples from the plant stack, unit one reactor building and salt water release tank. Technician proficiency in collecting, processing, and preparing the applicable release permits was evaluated. The inspectors reviewed recent liquid and gaseous release permits including pre-release sampling results, effluent monitor alarm setpoints, and public dose calculations. For the radwaste liquid effluent monitor, the unit one and unit two turbine building vent monitors and the plant stack monitor the inspectors reviewed calibration and functional test records and evaluated traceability of radioactive calibration sources to National Institute of Standards and Technology standards. The inspectors also

evaluated the licensee's capability to collect high-range post-accident effluent samples from these monitoring systems. The inspectors reviewed and discussed with licensee staff methodology for determining selected vent and stack flow rates and compared current vent flows to design values in the ODCM.

The inspectors reviewed the 2014 and 2015 Annual Radioactive Effluent Release Reports to evaluate reported doses to the public, to review any anomalous events and to review ODCM changes. The inspectors also reviewed compensatory sampling data for time periods when selected radiation monitors were out of service. The inspectors reviewed the results of interlaboratory cross-checks for the labs performing plant effluents. The inspectors also reviewed effluent source term evaluation and changes to effluent release points. In addition, the inspectors evaluated recent land use census results.

Problem Identification and Resolution

The inspectors reviewed and discussed selected CAP documents associated with gaseous and liquid effluent processing and release activities including licensee sponsored assessments. The inspectors evaluated the licensee's ability to identify and resolve issues.

Inspection Criteria

Radwaste system operation and effluent processing activities were evaluated against requirements and guidance documented in the following: 10 CFR Part 20; 10 CFR Part 50 Appendix I; ODCM; Updated Final Safety Analysis Report Section 11; Regulatory Guide (RG) 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants"; RG 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50 Appendix I"; and TS Section 5.0. Documents reviewed during the inspection are listed in the report Attachment.

b. Findings

No findings were identified.

2RS7 Radiological Environmental Monitoring Program (REMP) (71124.07 – 3 samples)

a. Inspection Scope

Environmental Program Review

The inspectors reviewed the 2015 and 2014 Annual Radiological Environmental Operating Reports to verify the REMP was implemented in accordance with the ODCM and TS. Additionally, the 2015 Annual Radioactive Effluent Release Report and the 10 CFR 61 report were reviewed to determine if the licensee is sampling for appropriate radionuclides. Any changes to the ODCM, Land Use Census, or environmental program processes were discussed with licensee staff.

REMP Implementation and Site Inspection

The inspectors observed routine airborne sample collection and surveillance at selected locations as required by the licensee's environmental monitoring program. The inspectors noted the material condition of these airborne sample and environmental dosimeter stations. Operability of these sample stations was confirmed through review of calibration and maintenance records.

Environmental sample counting was evaluated for precision and accuracy through review of interlaboratory cross-check program results. Selected environmental measurements were reviewed for consistency with licensee effluent data, evaluated for radionuclide concentration trends, and compared with detection level sensitivity requirements as described in the ODCM. The inspectors also assessed licensee response to missed or anomalous environmental samples.

Meteorological Monitoring Program

The inspectors observed the physical condition of the meteorological tower and its instrumentation and discussed equipment operability and maintenance history with licensee staff. The inspectors evaluated transmission of locally generated meteorological data to other licensee groups such as emergency operations personnel and main control room operators. Calibration records for the meteorological measurements of wind speed, wind direction, and temperature were reviewed. The inspectors also discussed with licensee staff measurement data recovery for 2015 and 2016.

Ground Water Protection

The inspectors reviewed the licensee's continued implementation of the industry's Ground Water Protection Initiative (Nuclear Energy Institute 07-07). Ground water sampling results obtained since the last inspection were reviewed and discussed. This review included verifying that the licensee has implemented a sufficient program to monitor structures, systems, and components that have a higher risk of leaking to ground water. Licensee response, evaluation, and follow-up to spills and leaks since the last inspection were reviewed in detail. In addition, entries made into the 10 CFR 50.75(g) decommission records for identified leakage and spills were reviewed.

Problem Identification and Resolution

The inspectors reviewed CAP documents in the areas of radiological environmental monitoring and meteorological tower maintenance. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with applicable procedures. The inspectors also evaluated the scope of the licensee's corporate audit program and reviewed recent assessment results.

Inspection Criteria

The inspectors evaluated REMP implementation and meteorological monitoring against the requirements and guidance contained in: 10 CFR Part 20; Appendices E and I to 10 CFR Part 50; TS Section 5.0; ODCM, Rev. 37; RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment; Branch Technical Position, "An Acceptable Radiological Environmental

Monitoring Program” – 1979; Safety Guide 23, “Onsite Meteorological Programs”; and approved licensee procedures. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

40A1 Performance Indicator Verification (71151 – 8 samples)

a. Inspection Scope

Cornerstone: Mitigating Systems

The inspectors reviewed a sample of the performance indicator (PI) data, submitted by the licensee, for the Unit 1 and Unit 2 PIs listed below. The inspectors reviewed plant records compiled between April 1, 2015, through March 31, 2016, to verify the accuracy and completeness of the data reported for the station. The inspectors verified that the PI data complied with guidance contained in Nuclear Energy Institute 99-02, “Regulatory Assessment Performance Indicator Guideline,” and licensee procedures. The inspectors verified the accuracy of reported data that were used to calculate the value of each PI. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with PI data. Documents reviewed are listed in the Attachment.

- safety system functional failures
- emergency AC power system
- cooling water system

Cornerstone: Occupational Radiation Safety

The inspectors reviewed the Occupational Exposure Control Effectiveness PI results for the Occupational Radiation Safety Cornerstone from January to December 2015. For the assessment period, the inspectors reviewed electronic dosimeter alarm logs and condition reports related to controls for exposure significant areas. Documents reviewed are listed in the Attachment.

Cornerstone: Public Radiation Safety Cornerstone

The inspectors reviewed the Radiological Control Effluent Release Occurrences PI results for the Public Radiation Safety Cornerstone from January to December 2015. For the assessment period, the inspectors reviewed cumulative and projected doses to the public contained in liquid and gaseous release permits and condition reports related to Radiological Effluent TSs/ODCM issues. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 2 samples)

.1 Routine Review

The inspectors screened items entered into the licensee's CAP to identify repetitive equipment failures or specific human performance issues for follow-up. The inspectors reviewed condition reports, attended screening meetings, or accessed the licensee's computerized corrective action database.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors reviewed issues entered in the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors focused their review on maintenance of plant equipment but also considered the results of inspector daily condition report screenings, licensee trending efforts, and licensee human performance results. The review nominally considered the 6-month period of January 1, 2016, through June 30, 2016, although some examples extended beyond those dates when the scope of the trend warranted. The inspectors compared their results with the licensee's analysis of trends. Additionally, the inspectors reviewed the adequacy of corrective actions associated with a sample of the issues identified in the licensee's trend reports. The inspectors also reviewed corrective action documents that were processed by the licensee to identify potential adverse trends in the condition of structures, systems, and/or components as evidenced by acceptance of long-standing non-conforming or degraded conditions. Documents reviewed are listed in the Attachment.

b. Findings and Observations

No findings were identified.

The inspectors evaluated a sample of CRs generated over the course of the past two quarters by departments that provide input to the quarterly trend reports. The inspectors determined that, in most cases, the issues were appropriately evaluated by licensee staff for potential trends and resolved within the scope of the CAP. However, the inspectors noted on the following occasions that inadequate maintenance was performed:

- Unit 1, inadequate maintenance on the 1B variable frequency drive cabling resulted in a fault on the cable and contributed to a loss of offsite power in February 2016 as discussed in IR 2016008 and as described in NCR 1998726.
- Unit 1, inadequate maintenance on the 1A reactor recirculation pump due to loose fittings resulted in an oil leak and a downpower to repair as described in NCR 2016142.
- Unit 1, inadequate maintenance resulted in scaffold parts left in water box 1B-South after plant startup as described in NCR 2016718.
- Unit 2, RHR service water booster pump loop B pressure switches inadvertently isolated resulted in the inoperability of the RHRSW loop as described in NCR 2037920. The final disposition has not been determined.
- Units 1 and 2, EDG 3 wrong size dummy fuse used during maintenance contributed to a loss of electrical continuity, the inoperability of EDG 3, and a loss of safety function since EDG 1 was inoperable for planned maintenance as discussed in Section 1R19 described in NCR 2007449.

The inspectors also noted on the following occasions that inadequate preventative maintenance (PM) was performed:

- Unit 1, inadequate PM in 2014 on the startup auxiliary transformer non-segregated bus duct resulted in a fault and contributed to a loss of offsite power in February 2016 as discussed in IR 2016008 and as described in NCR 1998726.
- Unit 1, although galvanic corrosion was identified in 2013 on the RHR 1B room cooler damper, no increase in PM schedule frequency was implemented, resulting in bound damper linkage, and the inoperability of the loop of RHR as discussed in NCR 1998597. The inspectors determined there was no violation of regulatory requirements since the 1A RHR room cooler has 100 percent capacity to supply cooling to both RHR rooms.
- Units 1 and 2, although identified in 2013 that the EDG 2 temperature controller (TC) had exceeded its expected lifespan, the TC was not replaced, resulting in the temperature controller failing in October 2015, and operations personnel declared EDG 2 inoperable as described in NCR 1970576. The inspectors determined there was no violation of regulatory requirements since the EDG 2 discharge damper would have repositioned to the fail-safe open position on a loss of offsite power.

The inspectors considered that, while the trend was negative, it was also an opportunity for the licensee to identify a trend in maintenance performed on plant equipment. The licensee entered this issue into the CAP as NCR 2041616.

.3 Annual Follow-up of Selected Issues

a. Inspection Scope

The inspectors conducted a detailed review of the following condition reports:

- NCRs 2026986, 2026995, 2027093, 2027094, Operating Experience, Susceptibility of Some Boiling Water Reactor Directional Control Valve Cap Screws to Stress Corrosion Cracking

The inspectors evaluated the following attributes of the licensee's actions:

- complete and accurate identification of the problem in a timely manner
- evaluation and disposition of operability and reportability issues
- consideration of extent of condition, generic implications, common cause, and previous occurrences
- classification and prioritization of the problem
- identification of root and contributing causes of the problem
- identification of any additional condition reports
- completion of corrective actions in a timely manner

Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA3 Follow-up of Events (71153 – 5 samples).1 (Closed) Licensee Event Report 05000325/2016-002-00, Emergency Diesel Generator 3 Inoperable Due to Failure to Auto-Starta. Inspection Scope

On March 3, 2016, work was ongoing to restore power to BOP 1D bus when an error in the restoration sequence resulted in an invalid auto-start of all four EDGs. EDG 3 failed to auto-start due to a loss of continuity across a fuse block in the emergency auto-start circuitry. After the licensee identified the failed EDG 3 component was a safety-related component, on March 4, 2016, the licensee declared EDG 3 inoperable. At the time, EDG 1, emergency bus E1, and BOP bus 1D were inoperable due to planned maintenance. Two inoperable EDGs represents a loss of safety function, for the onsite standby power sources. The fuse block was replaced and EDG 3 was restored to operable. The licensee's root cause was the EDG 3 fuse holder had a design vulnerability due to a lack of circuit continuity indication that was not mitigated by design or testing. The corrective action to prevent reoccurrence is to implement a design change that ensures continuity is maintained or a loss of circuit continuity is detected. The licensee entered this issue into the CAP as NCR 2007449. The inspectors reviewed the cause evaluation and the licensee event report (LER). Documents reviewed are listed in the Attachment.

b. Findings

A self-revealing violation was documented in Section 1R19 of this report. No additional findings were identified during the review of this LER. This LER is closed.

.2 (Closed) Unresolved Item 05000324/2016001-04 Notice of Enforcement Discretion for Replacement of EDG 3 Broken Fuse Block Connectiona. Inspection Scope

The inspectors completed a review of unresolved item (URI) 05000324/2016001-04 Notice of Enforcement Discretion for Replacement of EDG 3 Broken Fuse Block Connection. On March 3, 2016, work was ongoing to restore power to BOP 1D bus when an error in the restoration sequence resulted in an invalid auto-start of all four EDGs. EDG 3 failed to auto-start due to a loss of continuity across a fuse block in the emergency auto-start circuitry. After the licensee identified the failed EDG 3 component was a safety-related component, on March 4, 2016, the licensee declared EDG 3 inoperable. At the time, EDG 1, emergency bus E1, and BOP bus 1D were inoperable due to planned maintenance. Two inoperable EDGs represent a loss of safety function, for the onsite standby power sources. The fuse block was replaced and EDG 3 was restored to operable. The licensee's root cause was the EDG 3 fuse holder had a design vulnerability due to a lack of circuit continuity indication that was not mitigated by design or testing. The corrective action to prevent reoccurrence is to implement a design change that ensures continuity is maintained or a loss of circuit continuity is detected. The licensee entered this issue into the CAP as NCR 2007449. The inspectors reviewed the cause evaluation. Documents reviewed are listed in the Attachment.

b. Findings

A self-revealing violation was documented in Section 1R19 of this report. No additional findings were identified during the review of this URI. This URI is closed.

.3 (Closed) LER 05000325/2016-003-00, Implementation of Enforcement Guidance Memorandum 11-003, Revision 3

a. Inspection Scope

On March 9, 2016, Unit 1 implemented the guidance of Enforcement Guidance Memorandum (EGM) 11-003, Revision 3, Enforcement Guidance Memorandum on Dispositioning Boiling Water Reactor Licensee Noncompliance with TS Containment Requirements During Operations with a Potential for Draining the Reactor Vessel. Consistent with this EGM, secondary containment operability was not maintained during operations with the potential for draining the reactor vessel activities. The EGM guidance was implemented four additional times during the Unit 1 refueling outage. The activities are discussed in Section 4OA5. Inspectors verified compliance with the guidelines of EGM 11-003 prior to and during these activities. The licensee plans to submit a license amendment request to adopt TS Task Force traveler associated with generic resolution of this issue within 12 months after the issuance of the Notice of Availability. The licensee entered this issue into the CAP as NCR 2009068. Documents reviewed are listed in the Attachment.

b. Findings

The enforcement actions associated with this LER are documented in Section 4OA5. No additional findings were identified during the review of this LER. This LER is closed.

.4 (Closed) Unresolved Item 05000325/2016001-01, ASME Section IX Weld Procedure Qualification

a. Inspection Scope

In Inspection Report 05000325/2016001, the inspectors identified a URI associated with the qualification of the weld procedure specification (WPS) used for replacement of a portion of nuclear service water piping.

While conducting buried piping inspections in support of license renewal, the licensee identified pitting on the exterior wall of a portion of the Unit 1 nuclear service water supply header (1-SW-103-30-157). The licensee chose to address this by replacing the section of pipe (WO 12274010-08). The licensee's repair/replacement plan for this activity identified that the requirements of ASME Section III, 1986 Edition, Subsection ND were applicable for the repair. By reference (ND-4320), several ASME Section IX Subsection QW requirements also applied. First, QW-200.2(f) allowed the use of multiple Procedure Qualification Records (PQRs) to produce a single WPS, provided that each essential variable is addressed by at least one PQR. Second, QW-403.8 and QW-404.30 established the requirements for two essential variables (base metal thickness qualified and filler metal thickness qualified, respectively) and referred to QW-451, which established the limits for both. The URI was opened to allow the inspectors to review whether the licensee's use of PQRs 1, 5, 193A and 193B to

qualify the base metal and filler metal thickness ranges identified in WPS 01-1-04 and WPS 01-3-04 in accordance with Code was appropriate, and if a performance deficiency existed.

The inspectors reviewed these items and discussed them with staff in the NRC Office of Nuclear Reactor Regulation. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

5. (Closed) Licensee Event Report 05000325;324/2014-004-00, Fire Related Unanalyzed Condition that Could Impact Equipment Credited in Safe Shutdown Analysis

a. Inspection Scope

On May 16, 2014, the licensee submitted an LER documenting the discovery of a condition of non-compliance with the site's fire protection program. These conditions could adversely affect components relied on to achieve safe shutdown condition during postulated fire events.

The inspectors reviewed documents, performed walk-downs, interviewed plant personnel, and assessed the licensee's compensatory measures and corrective actions to determine their adequacy. The completion of the LER review was performed in the Region II office. The initial review of the LER was documented in inspection report 05000324;325/2014008. Documents reviewed are listed in the Attachment.

b. Findings

Introduction. The licensee identified a noncompliance of Units 1 and 2, TS 5.4.1, Procedures, for failing to maintain adequate written procedures for combating plant fires in the control building, reactor buildings, and diesel generator building.

Description. The licensee documented six deficiencies in LER 2014-004-00. On March 20, 2014, the licensee identified credited fire safe shutdown equipment that could be adversely affected during postulated fire events. The deficiencies were identified while performing a circuit analysis review for the site's transition to NFPA 805. The licensee determined that the existing fire safe shutdown procedures were inadequate to mitigate the adverse consequences caused by a plant fire. These issues were applicable to Units 1 and 2, documented in LER 2014-004-00, dated May 16, 2014, and entered into the licensee's CAP as NCR 676576. Upon discovery, the licensee implemented, or continued, hourly roving fire watches for the affected fire areas as compensatory measures.

1) A fire event could result in a spurious start of a reactor building closed cooling water (RBCCW) pump(s) such that the containment atmosphere would be adversely affected. A spurious pump start would remove heat energy and thus result in a lower containment pressure. NCR 676576 stated that containment over-pressurization must be maintained to ensure that the minimum net positive suction head (NPSH) requirements for the RHR pumps were met. The licensee's corrective actions included an action to revise applicable fire safe shutdown (FSSD) procedures such that operators would be directed to locally open RBCCW supply breakers in the event the pumps cannot be secured from

the main control room. The impacted fire areas for this concern included the control building (CB-23E) and the Unit 1 reactor building north (RB-N) and reactor building south (RB-S).

2) A fire event could adversely affect Diesel Generator Building supply fans. NCR 676576 stated that the fans were credited for diesel generator building heat removal from the 480V switchgear rooms. The licensee's corrective actions included an action to revise applicable FSSD procedures such that operators would be directed to open exterior doors in the diesel generator building. This action would be required should three of the four emergency buses be adversely affected by fire. The impacted fire areas for this concern included the Unit 1 RB-S and turbine building.

3a) A fire event at bus E6 (480V) could result in the spurious actuation of the under voltage circuitry such that a breaker would not operate as required. The actuation of the under-voltage circuitry would result in an inability to provide power from bus E1 to bus E3 or E4. The licensee's corrective actions included an action to revise applicable FSSD procedures such that operators would remove a control power fuse to de-energize the circuitry. The impacted fire area for this concern was DG-07 in the diesel generator building.

3b) A fire event could adversely affect bus E6 (480V) control power circuits such that load shedding would not occur. The failure of bus E6 to load shed would inhibit the capability to cross-tie buses E2 and E4 (4KV). The licensee's corrective actions included an action to revise applicable FSSD procedures such that operators would be directed to transfer the control power to the alternate source via a normal/alternate disconnect switch. The impacted fire area for this concern was DG-07 in the diesel generator building.

4) A fire event could adversely affect the supply air plenum and exhaust fans that provide cooling that ensures long term control power Division I switchgear. The licensee's corrective actions included an action to revise applicable FSSD procedures such that operators would be directed to open exterior doors in the diesel generator building and to confirm that the E3 switchgear area exhaust fan was running within eight hours of the fire event. The impacted fire area for this concern was DG-16E in the diesel generator building.

5a) A fire event could adversely affect control power cables such that a breaker(s) on bus E1 (4KV) would not open during load shedding. Sequencing of equipment onto the bus would not occur if the required breakers failed to open during load shedding. The licensee's corrective actions included an action to revise applicable FSSD procedures such that operators would be directed to locally open breakers as required. The impacted fire area for this concern was Unit 2, RB-N, but adversely affected Unit 1.

5b) A fire event could adversely affect control power cables such that breaker(s) on bus E4 (4KV) would not load shed as required. This would prevent the loads from being sequenced onto the bus when powered by the emergency diesel generators. The loads that could be impacted included the alternate fire pump, 2B conventional service water pump, 2B nuclear service water pump, 2B control rod drive pump, 2B core spray pump, and the 2B RHR pump. The licensee's corrective actions included an action to revise applicable FSSD procedures such that operators would be directed to locally open breakers as required. The impacted fire area for this concern was Unit 2, RB-N and adversely affected Unit 2.

6) Same as item #1, however for Unit 2 RB-N and RB-S.

Analysis. The licensee's failure to develop and maintain adequate fire safe shutdown procedures was a performance deficiency. This finding was more than minor because it is associated with the protection against external event (i.e., fire) attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Because this issue was related to fire protection and this non-compliance was identified as a part of the site's transition to NFPA 805, this issue is being dispositioned in accordance with Section 9.1, "Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" of the NRC Enforcement Policy.

In order to verify that this non-compliance was not associated with a finding of high safety significance (Red), inspectors performed a bounding Phase 2 SDP risk analysis for items 1, 3, 5, and 6 using the guidance from NRC Inspection Manual Chapter 0609 Appendix F and NUREG/CR 6850, Revision 0 and Supplement 1. The results of these analyses were reviewed by a regional Senior Risk Analyst (SRA).

Items 1 and 6 - Concerning the reactor building fire scenarios that could cause a spurious start of a RBCCW pump which adversely affected NPSH available for a RHR pumps, the dominant sequence was a self-ignited cable fire. Phase 2 analysis assumptions included:

- a one-year exposure period
- conditional core damage probability of 1.0 with no recovery considered
- probability of non-suppression of 0.1 based on detection with manual suppression
- a spurious probability of 0.6

The bounding Phase 2 analysis, at step 2.3.5 of the Phase 2 Worksheet, determined that the finding represented an increase in core damage frequency of less than 1E-4 (Red).

Item 3 - Concerning the reactor building fire scenario that could adversely affect load shedding on bus E4 (4KV), the dominant sequence was a self-ignited cable fire. Phase 2 analysis assumptions included:

- a one year exposure period
- conditional core damage probability of 1.0 with no recovery considered
- probability of non-suppression of 0.1 for areas that credit detection with manual suppression
- probability of non-suppression of 0.05 for areas that credit detection with automatic suppression

The bounding Phase 2 analysis, at step 2.3.5 of the Phase 2 Worksheet, determined that the finding represented an increase in core damage frequency of less than 1E-4 (Red).

Item 5 - Concerning the reactor building fire scenarios that could result in the failure of emergency buses to provide power to credited equipment, the dominant sequence was a self-ignited cable fire. Phase 2 analysis assumptions included:

- a one-year exposure period
- conditional core damage probability of 1.0 with no recovery considered
- probability of non-suppression of 0.1 based on detection with manual suppression

The bounding Phase 2 analysis, at step 2.3.5 of the Phase 2 Worksheet, determined that the finding represented an increase in core damage frequency of less than 1E-4 (Red).

In order to verify that this non-compliance was not associated with a finding of high safety significance (Red), inspectors performed a Phase 1 SDP risk analysis for items 2 and 4 using the guidance from NRC Inspection Manual Chapter 0609 Appendix F.

Items 2 and 4 - Concerning the fire scenarios that could result in the loss of ventilation in the diesel generator building; the inspectors qualitatively determined the risk significance to be Green (i.e. less-than-Red) because the plant would have been able to reach and maintain a stable plant condition within the first 24 hours of a fire event (Phase 1 Worksheet, step 1.4.5.b). It was determined that the loss of room ventilation would not adversely affect the functionality of an emergency distribution bus during the initial stages of a fire event.

Additionally, concerning items 1 and 6, Regional SRAs reviewed information provided by the licensee that demonstrated that a lack of containment over-pressurization would not result in the RHR pumps having insufficient NPSH. Based on this information, SRAs determined that the delta risk associated with items 1 and 6 was zero. (i.e., less than 1E-4).

The inspectors determined that a cross-cutting aspect was not applicable to these non-compliances and that it met the criteria for enforcement discretion in accordance with Section 9.1 of the NRC Enforcement Policy.

Enforcement. TS 5.4.1, Procedures, for Units 1 and 2, states, in part, that written procedures shall be established, implemented, and maintained covering activities in Regulatory Guide 1.33 (Safety Guide 33), Appendix A, dated November 1972. Safety Guide 33, Section F.23, included plant fires as a listed procedure for combating emergencies and other significant events.

Contrary to the above, on March 20, 2014, the licensee identified that the site failed to adequately maintain written procedures for combating plant fires. Specifically, fire safe shutdown procedures did not include appropriate guidance to ensure the availability of credited equipment during fire events. This issue was entered into the licensee's CAP as NCR 676576, and the licensee credited previously established fire watches and implemented procedure changes.

Because the licensee committed to adopt NFPA 805 and change their fire protection licensing bases to comply with 10 CFR 50.48(c), the NRC is exercising enforcement discretion for this issue in accordance with the NRC Enforcement Policy, Section 9.1, "Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)." Specifically, these issues were identified and addressed during the licensee's transition to NFPA 805, was entered into the licensee's CAP, immediate corrective action and compensatory measures were taken. Additionally, this issue was not likely to have been previously identified by routine licensee efforts, was not willful, and it was not associated with a

finding of high safety significance (i.e., Red). The licensee identified and addressed the issues prior to NRC's approval and issuance of Brunswick's NFPA 805 license amendment (ADAMS Accession No. ML14310A808).

40A5 Other Activities

.1 Implementation of EGM 11-003, Revision 3, Enforcement Guidance Memorandum on Dispositioning Boiling Water Reactor Licensee Noncompliance with Technical Specification Containment Requirements During Operations with a Potential for Draining the Reactor Vessel

a. Inspection Scope

The inspectors reviewed the plant's implementation of NRC EGM 11-003, Revision 3, during Unit 1 maintenance activities which had the potential to drain the reactor vessel during the Unit 1 refueling outage. Inspectors verified that, for all dates, all other TS requirements were met during operations with the potential for draining the reactor vessel (OPDRVs) with secondary containment inoperable. Documents reviewed are listed in the Attachment.

b. Findings

Description. During the Unit 1 refueling outage, the activities which had the potential to drain the reactor vessel included:

- March 9, 2016: 312 gallons per minute leakage for establishing a clearance for draining B Loop RHR piping.
- March 10, 2016: 82 gallons per minute leakage for establishing a clearance for reactor instrumentation valve testing.
- March 14, 2016: 148 gallons per minute leakage for establishing a clearance for manually draining the scram discharge volume.
- March 15, 2016: 247 gallons per minute leakage for restoration for B Loop RHR piping.
- March 18, 2016: 11 gallons per minute leakage for establishing a clearance for testing reactor water cleanup inboard and outboard suction valves.

These activities took place without secondary containment being operable.

Enforcement. TS 3.6.4.1, Secondary Containment, requires that secondary containment be operable and is applicable during OPDRVs. The required action if secondary containment is inoperable in this condition is to initiate actions to suspend OPDRVs immediately. Contrary to the above, on March 9, 2016, March 10, 2016, March 14, 2016, March 15, 2016, and March 18, 2016, the licensee failed to maintain secondary containment operable while performing OPDRVs.

However, because the violations were identified during the discretion period described in EGM 11-003, Revision 3, and the licensee met the criteria established in the EGM prior to and during these activities, the NRC exercised enforcement discretion (Enforcement Action-16-160) for the dates of March 9, 2016, March 10, 2016, March 14, 2016, March 15, 2016, and March 18, 2016, in accordance with Section 3.5, "Violations Involving Special Circumstances," of the NRC Enforcement Policy and, therefore, will not

issue enforcement action for this violation, subject to a timely license amendment request being submitted. The licensee entered this issue into the CAP as NCR 2009068.

.2 Operation of an Independent Spent Fuel Storage Installation (ISFSI) (60855.1)

a. Inspection Scope

The inspectors performed a walkdown of the onsite ISFSI and monitored the activities associated with the dry fuel storage campaigns on April 16, 2016, and May 4, 2016. The inspectors reviewed changes made to the ISFSI programs and procedures, including associated 10 CFR 72.48, "Changes, Tests, and Experiments," screens and evaluations to verify that changes made were consistent with the license or certificate of compliance. The inspectors reviewed records and observed the loading activities to verify that the licensee recorded and maintained the location of each fuel assembly placed in the ISFSI. The inspectors also reviewed surveillance records to verify that daily surveillance requirements were performed as required by TSs. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

On August 1, 2016, the resident inspectors presented the inspection results to Mr. Randy Gideon, Brunswick Nuclear Plant Site Vice President, and other members of the licensee's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

On July 20, 2016, the resident inspectors presented the LER 05000325;324/2014-004-00, inspection results to Lee Grzeck, Brunswick Nuclear Plant Manager, Nuclear Regulatory Affairs. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report

On June 30, 2016, the resident inspectors presented the inspection results of the EDG 3 finding to Mr. Randy Gideon, Brunswick Nuclear Plant Site Vice President, and other members of the licensee's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

W. Gideon	Vice President
K. Moser	Plant Manager
K. Allen	Director, Design Engineering
B. Bagwell	Environmental & Chemistry
A. Baker	Supervisor, Environmental & Chemistry
A. Brittain	Director, Nuclear Plant Security
P. Brown	Manager, Nuclear Performance Improvement
J. Bryant	Regulatory Affairs
R. Carpenter	Radiation Monitor Engineer
C. Dunsmore	Manager, Nuclear Work Management
J. Ferguson	Manager, Nuclear Oversight
L. Grzeck	Manager, Nuclear Regulatory Affairs
J. Hicks	Manager, Nuclear Training
B. Houston	Manager, Maintenance
F. Jefferson	Director, Nuclear Engineering
J. Johnson	Manager, Nuclear Chemistry
J. Kalamaja	Manager, Nuclear Operations
E. Neil	Manager, Nuclear Rad Protection
J. Nolin	General Manager, Nuclear Engineering
W. Orlando	Superintendent, E/I&C
A. Padleckas	Assistant Ops Manager, Training
D. Petrusic	Superintendent, Environmental & Chemistry
A. Pope	Director, Nuclear Organization Effectiveness
M. Regan	Project Manager, Major Projects
M. Smiley	Manager, Nuclear Ops Training
R. Wiemann	Director, Electrical/Rx Systems
E. Williams	Superintendent, Nuclear Maintenance

State of North Carolina

P. Cox	Department of Health and Human Services
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NRC Personnel

G. Hopper	Chief, Reactor Projects Branch 4
T. Fanelli	Senior Reactor Inspector, Region II

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000325;324/2016002-01 NCV Failure to Identify Broken Auto Start Control Relay on Emergency Diesel Generator 1 (Section 1R15)

05000325;324/2016002-02 NCV Failure to Verify or Check the Adequacy of Design of the EDG 3 Auto-Start Circuitry (Section 1R19)

Closed

05000325/2016-002-00 LER Emergency Diesel Generator 3 Inoperable Due To Failure to Auto-Start (Section 4OA3.1)

05000324/2016001-04 URI Notice of Enforcement Discretion for Replacement of EDG 3 Broken Fuse Block Connection (Section 4OA3.2)

05000325/2016-003-00 LER Implementation of Enforcement Guidance Memorandum 11-003, Revision 3 (Section 4OA3.3)

05000325/2016001-01 URI ASME Section IX Weld Procedure Qualification (Section 4OA3.4)

05000325;324/2014-004-00 LER Fire Related Unanalyzed Condition that Could Impact Equipment Credited in Safe Shutdown Analysis (Section 4OA3.5)

LIST OF DOCUMENTS REVIEWED

Common Documents Reviewed

Updated Final Safety Analysis Report
Individual Plant Examination
Individual Plant Examination of External Events
Technical Specifications and Bases
Technical Requirements Manual
Control Room Narrative Logs
Plan of the Day

Section 1R01: Adverse Weather Protection

Procedures

AD-WC-ALL-0230, Seasonal Readiness, Rev. 0
0A1-68, Brunswick Nuclear Plant Response to Severe Weather Warnings, Rev. 49
0AOP-13.0, Operation During Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 064
0AOP-36.1, Loss of Any 4160V Buses or 480V E-Buses, Rev. 069
0AP-062, Seasonal Preparations, Rev. 004
0PEP-02.6, Severe Weather, Rev. 019
0PEP-02.6.26, Activation and Operation of the Technical Support Center (TSC), Rev. 010
0PEP-02.6.27, Activation and Operation of the Emergency Operations Facility (EOF), Rev. 037
0PEP-02.6.30, Alternate Emergency Facility Operation, Rev. 009
0PLP-37, Equipment Important to Emergency Preparedness and Emergency Response
Organization Response, Rev. 008
AD-WC-ALL-0230, Seasonal Readiness, Rev. 0

Condition Reports

1999809 1999814

Work Orders

13440462 20009409 13541808

Section 1R04: Equipment Alignment

Procedures

2OP-18, Core Spray System Operating Procedure, Rev. 72
2OP-16, RCIC System Operating Procedure, Rev. 120
0OP-39.2, FLEX Diesel Generator Operating Procedure, Rev. 3
1OP-21, Reactor Building Closed Cooling Water System Operating Procedure, Rev. 74

Condition Reports

2005883

Drawings

D-25024, Reactor Building Core Spray System Piping Diagram Sheet 1, Rev. 042
D-25024, Reactor Building Core Spray System Piping Diagram Sheet 2, Rev. 038
LL-09047, Unit No.2 RCIC Turbine Remote Trip Cable Diagram Sheet 97, Rev. 2

Miscellaneous

SD-18, Core Spray System, Rev. 006
SD-16, RCIC System, Rev. 12

Section 1R05: Fire ProtectionProcedures

0PFP-CB, Control Building Pre-Fire Plans, Rev. 12
 0PFP-CB, Control Building Pre-Fire Plans, Rev. 12
 0PFP-DG, Diesel Generator Building PreFire Plan, Rev. 22
 0PFP-MBPA, Miscellaneous Building Pre-Fire Plans - Protected Area, Rev. 27
 0PFP-PBAA, Power Block Auxiliary Areas Pre-Fire Plans, Rev. 29
 0PFP-CB, Control Building Prefire Plans, Rev. 12
 2PFP-RB, Reactor Building PreFire Plans, Rev. 18

Miscellaneous

LightGuard product specification
 LightGuard operating Instruction

Section 1R06: Flood Protection MeasuresProcedures

EGR-NGGC-0351, Condition Monitoring of Structures, Rev. 022
 0AOP-13.0, Operation during Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 64

Condition Reports

1993835 2019353 1993002

Work Orders

13519427 13496628

Miscellaneous

DBD-144, External and Internal Flooding, Rev. 0

Section 1R11: Licensed Operator RequalificationProcedures

LORX-051, LOR Simulator Evaluation Guide, Rev. 3
 0ENP-24.5, Reactivity Control Planning, Rev. 009
 2AOP-04.0, Low Core Flow, Rev. 038
 0AOP-23.0, Condensate/Feedwater System Failure, Rev. 043
 0GP-05, Unit Shutdown, Rev. 180
 0AOP-05.0, Radioactive Spills, High Radiation, and Airborne Activity, Rev. 32
 2EOP-01-RSP, Reactor Scram Procedure, Rev. 016
 2EOP-01-ATWS, ATWS Procedure, Rev. 001
 0EOP-01-LEP-02, Alternate Control Rod Insertion, Rev. 029
 2EOP-01-RVCP, Reactor Vessel Control Procedure, Rev. 010
 0EOP-03-SCCP, Secondary Containment Control Procedure, Rev. 010
 0EOP-04-RRCP, Radioactivity Release Control Procedure, Rev. 021
 AD-OP-ALL-0101, Event Response and Notifications, Rev. 005
 0PEP-02.1, Initial Emergency Actions, Rev. 053
 0PEP-02.1.1, Emergency Control - Notification of Unusual Event, Alert, Site Area Emergency,
 and General Emergency, Rev. 027
 0OI-01.07, Notifications, Rev. 038
 AD-WC-ALL-0410, Work Activity Integrated Risk Management, Rev. 1
 0GP-05, Unit Shutdown, Rev. 179

Condition Reports
2025072

Miscellaneous
Downpower schedule, May 5, 2016

Section 1R12: Maintenance Effectiveness

Procedures

OPT-08.20.L, South Residual Heat Removal Vent Fan B Local Control Operability Test, Rev. 008

Condition Reports

1998597	572119	607986	629677	131023	1975402
1970576	711396	580111	583778	593920	

Work Orders

20055628	20021315	13393865	20035133	13441123
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Drawings

D-04101, Unit 1 & 2 Ventilation System Diesel Generator Building Air Flow Diagram, Rev. 013
D-03056, Normal and Accident Conditions Service Environment Chart, Rev. 13

Miscellaneous

DBD-37.4, Diesel Generator Building Ventilation Air System, Rev. 10
7453-101-6-VAD-53F, Temperature Zones in the Diesel Generator Cells Due to Outside Air Temperatures, Rev. 2
9527-6-VAD-3F, Diesel Generator Building Ventilation Requirements, Rev. 2

Section 1R13: Maintenance Risk Assessment and Emergent Work Control

Procedures

0AOP-22.0, Grid Stability, Rev. 27
BNP-PSA-041, BNP On-Line Equipment Out of Service Probabilistic Safety Assessment Model, Rev. 016
AD-WC-ALL-0250, Work Implementation and Completion, Rev. 00
AD-WC-ALL-0410, Work Activity Integrated Risk Management, Rev. 001
AD-WC-ALL-0200, Online Work Management, Rev. 006
AD-OP-ALL-0201, Protected Equipment, Rev. 001
AD-WC-ALL-0430, Outage Risk Review, Rev. 001
0AP-025, BNP Integrated Scheduling, Rev. 053

Condition Reports

2027653	2034734	2025072
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Miscellaneous

EOOS Risk Assessments

Section 1R15: Operability Evaluations

Procedures

0PM-GOV003, Diesel Generator Speed/Load Control Calibration, Rev. 18
OPT-08.1.4A, RHR Service Water System Operability Test - Loop A, Rev. 84

Condition Reports

2008253	2012638	2000871	2034412	2040751	1958330
2000963	2033516				

Work Orders

12222576	20034966
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Drawings

LL-09111, Emergency Diesel Generator No. 1 Breaker Control Diagram Sht 12A, Rev. 14
 LL-09111, Emergency Diesel Generator No. 1 Breaker Control Diagram Sht 12, Rev. 13

Miscellaneous

Diesel Generator 1 Load Performance Improvement Data
 DBD-43, Service Water System, Rev. 15

Section 1R18: Plant ModificationsProcedures

OSP-EC79468, Integrated Testing of DG-1 following Governor Replacement, Rev. 2
 OPS-NGGC-1301, Equipment Clearance, Rev. 38

Condition Reports

2007720	458655	2008253
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Drawings

F-09345, Diesel Generator No. 1 Control Wiring Diagram, Rev. 42

Miscellaneous

EC 279468, EDG Governor Replacement Modification
 EC 81326, Evaluation of Acceptability of Installing an Intermediate Clearance Point Between the
 EDG Lockout Relays and Emergency Control Relays, Rev. 4
 EC 276098, 4 kV Emergency Bus Undervoltage Protection Logic Changes, Rev. 20

Section 1R19: Post Maintenance TestingProcedures

OPT-10.1.1, RCIC SYSTEM Operability Test, Rev. 104
 2MST-APRM21R, APRM CH-1 Calibration Test, Rev. 4
 1OP-43, Service Water System Operating Procedure, Rev. 124
 2PT-24.1-2, Service Water Pump Discharge Valve Operability Test, Rev.

Condition Reports

2005883	2007449	2019802	2019794	2007449
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Work Orders

20061305	13480577	20061937	13485826	20028625
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Miscellaneous

SD-16, RCIC System, Rev. 12
 EC 400616, APRM EPROM Upgrade to Support Mello Plus, Rev. 1

Section 1R22: Surveillance TestingProcedures

OPT-34.13.4.0, Train A and B Control Room Emergency Ventilation System Thermal Fire Detector Functional Test, Rev. 3
 OPT-09.2, Unit 2 HPCI System Operability Test, Rev. 146
 OOI-02.3, Drywell Leakage Control, Rev. 6
 OE&RC-1005, Collection of Routine and Non-Routine Aqueous Samples, Rev. 44
 OPT-09.7, High Pressure Coolant Injection System Valve Operability Test, Rev. 33

Condition Reports

2018356 1983394 20071960 2030200 2029071

Work Orders

20071960 20029483 20032938 20080460

Miscellaneous

Morning Status Report

Section 1EP6: Drill EvaluationProcedures

LORX-051, LOR Simulator Evaluation Guide, Rev. 3
 OENP-24.5, Reactivity Control Planning, Rev. 009
 2AOP-04.0, Low Core Flow, Rev. 038
 0AOP-23.0, Condensate/Feedwater System Failure, Rev. 043
 0GP-05, Unit Shutdown, Rev. 180
 0AOP-05.0, Radioactive Spills, High Radiation, and Airborne Activity, Rev. 32
 2EOP-01-RSP, Reactor Scram Procedure, Rev. 016
 2EOP-01-ATWS, ATWS Procedure, Rev. 001
 0EOP-01-LEP-02, Alternate Control Rod Insertion, Rev. 029
 2EOP-01-RVCP, Reactor Vessel Control Procedure, Rev. 010
 0EOP-03-SCCP, Secondary Containment Control Procedure, Rev. 010
 0EOP-04-RRCP, Radioactivity Release Control Procedure, Rev. 021
 AD-OP-ALL-0101, Event Response and Notifications, Rev. 005
 0PEP-02.1, Initial Emergency Actions, Rev. 053
 0PEP-02.1.1, Emergency Control - Notification of Unusual Event, Alert, Site Area Emergency, and General Emergency, Rev. 027
 OOI-01.07, Notifications, Rev. 038

Section 2RS6: Liquid and Gaseous EffluentsProcedures

Offsite Dose Calculation Manual, Rev. 37
 OE&RC-2002, Sampling of Radioactive Airborne Effluent Releases, Rev. 54
 OE&RC-2003, Reporting of Radioactive Airborne Effluent Releases, Rev. 35
 OE&RC-2020, Setpoint Determination for Gaseous Radiation Monitors, Rev. 28
 MST-RGE24R, RGE Main Stack Eff Flow Rate Monitoring Sys Chan Cal, Rev. 25
 AD-PI-ALL-0100, Corrective Action Program, Rev. 5

Condition Reports

1958330 682318 702202 711335 1985551

Miscellaneous

Annual Radioactive Effluent Release Report, 2014 & 2015
 Annual Radioactive Environmental Operating Report, 2014
 Annual Radioactive Environmental Operating Report, 2015 (Draft)
 10 CFR 50.75(g) File
 10 CFR 61 Analysis DAW, 06-11-2014
 Station Health Reports, Radiation Monitoring (7005/7015), 4th quarter 2015 & 1st & 2nd quarter 2016.
 List of Effluent Monitors Out of Service since March 2014
 Main Plant Stack Effluent Flow Calibration, 05-20-2015
 Work Order 13388790, RLE22R – RW Liquid Radiation Monitor Channel Calibration, 11-19-2015.
 Work Order 2236772-04, Plant Stack Radiation Monitor Calibration (2-D12-RM-23S), 04/30/2015
 Work Order 13305094, U1 Turbine Building Radiation Monitor (D12-RM-23) Calibration, 10/22/2015
 Work Order 13348186-02, U2 Turbine Building Radiation Monitor (D12-RM-23) Calibration, 01/28/2016
 Certificates of Calibration, Standard Radionuclide Sources 45903-10 (AM-241), 90282 (Cd-109), 94436 (Co-57) and 45906-10 (Ba-133)
 Certificates of Calibration, Standard Radionuclide Sources 9766-5 (Cl-36), 9474-4 (Cs-137), and 4904-E-45 (Am-241)
 Standby Gas Treatment Train 1A Filter Test, 06/19/2012
 Standby Gas Treatment Train 1A Filter Test, 05/05/2014
 Standby Gas Treatment Train 1B Filter Test, 02/02/2014
 Standby Gas Treatment Train 1B Filter Test, 05/05/2016
 Standby Gas Treatment Train 2A Filter Test, 06/18/2012
 Standby Gas Treatment Train 2A Filter Test, 07/10/2014
 Standby Gas Treatment Train 2B Filter Test, 09/23/2013
 Standby Gas Treatment Train 2B Filter Test, 02/01/2016
 Gaseous Radioactive Waste Release Permit #G-2016-0157
 Liquid Radioactive Waste Release Permit #L-2016-0088
 Liquid Radioactive Waste Release Permit #L-2016-0071
 Liquid Radioactive Waste Release Permit #L-2016-0072
 Results of Radiochemistry Interlaboratory Cross-Check Program, 2014 – 2015
 Focused Self-Assessment Report #664337, 08-07-2014
 Quick Hitter Self-Assessment Report #675959, 04-15-2024

Section 2RS7: Radiological Environmental Monitoring Program (REMP)Procedures

0E&RC-3101, Radiological Environmental Monitoring Program, Rev. 34
 0E&RC-3107, Calibration and Use of Environmental Air Samplers, Rev. 7
 0E&RC-3250, Groundwater Monitoring Program, Rev. 38
 0PLP-37, Equipment Important to Emergency Preparedness and ERO Response, Rev. 7
 MWO 35864/PMID-RQ 6818-01, Work Order Task Instructions – Met Tower Bi-weekly Testing, Rev. 1
 Offsite Dose Calculation Manual, Rev. 37
 OPM-MET001, Meteorology Tower Equipment Calibration and Functional Test, Rev.5

Condition Reports

2018306	2020368	2025604	2028921	683540	707720
715447	748640	1962757	1993835	2009993	

Miscellaneous

Annual Radiological Environmental Operating Report, 2014 and 2015
 Annual Radioactive Effluent Release Report, 2014 and 2015
 B-CP-15-01, NOS Assessment Report – Environmental Assessment, 06/11/15
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-1, 2/24/15 and 2/1/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-2, 11/25/14 and 2/1/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-3, 2/24/15 and 1/17/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-4, 2/24/15 and 1/17/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-5, 12/22/14 and 2/1/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-6, 12/22/14 and 2/1/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-7, 2/24/15 and 1/17/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-8, 2/24/15 and 1/17/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-9, 12/22/14 and 1/20/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-10, 12/22/14 and 2/1/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-11, 11/25/14 and 2/4/16
 Environmental Air Sampler Dry Gas Calibration Form, Sampler BNP-12, 11/25/14 and 2/4/16
 Meteorological Tower Instrument Data Recovery Results, 2014 and 2015
 Nuclide Distribution Report, 2014 DAW Sample ID 350704001, 05/02/2016
 EnRad Cross Check Performance Summary – Eckert & Ziegler, ERA, and FSS, 2014 and 2015
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2042292	682424	738774	739045	747696
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2012638	1994959	2019696	2019794	2020124	2020209
2021056	2020369	2021338	2021274	2021923	2021979
2023698	2024792	2028805	2036938	2034923	2039800
2012628	2026986	2027094	2027093	2026995	1991308
1994959	2000372				

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