



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

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

April 28, 2016

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.: 05000325/2016001 AND 05000324/2016001**

Dear Mr. Gideon:

On March 31, 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 April 13, 2016, with you and other members of your staff.

One NRC-identified finding of very low safety significance (Green) was identified during this inspection. This finding was determined to involve a violation of NRC requirements. The NRC is treating this finding as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

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

If you disagree with the 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, 324/2016001
w/Attachment: Supplementary Information

cc Distribution via ListServ

W. Gideon

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Letter to William R. Gideon from George T. Hopper dated April 28, 2016

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED INSPECTION
REPORT NUMBERS: 05000325/2016001 AND 05000324/2016001

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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.: 05000325/2016001, 05000324/2016001

Licensee: Duke Energy Progress, Inc.

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: Southport, NC

Dates: January 1, 2016 through March 31, 2016

Inspectors: M. Catts, Senior Resident Inspector
M. Schwieg, Resident Inspector
B. Collins, Reactor Inspector (Section 1R08)
W. Loo, Senior Health Physicist (Section 2RS8)
J. Rivera, Health Physicist (Section 2RS1)

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

Enclosure

SUMMARY

IR 05000325/2016001, 05000324/2016001; January 1, 2016 through March 31, 2016; Brunswick Steam Electric Plant, Units 1 and 2; Problem Identification and Resolution.

This report covered a three-month period of inspection by resident inspectors and regional inspectors. One NRC-identified violation is 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 June 19, 2012. 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. 5.

NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green non-cited (NCV) of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, because the licensee failed to identify and correct a condition adverse to quality associated with the 2B nuclear service water (NSW) pump strainer. Specifically, the licensee did not ensure the spacers/shims were filed down or seated appropriately, which resulted in the 2B NSW pump strainer shear key failures, and the unavailability of the 2B NSW pump on three separate occasions. As corrective actions, the licensee ensured the spacers/shims were filed down and seated appropriately for the 2B NSW pump strainer and changed the procedure to ensure these steps were performed in the future. The licensee entered this issue into the corrective action program (CAP) as nuclear condition report (NCR) 1988423.

The inspectors determined the licensee's failure to ensure the 2B NSW pump strainer spacers/shims were filed down or seated appropriately 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 to ensure the availability of systems that respond to initiating events to prevent undesirable consequences. Specifically, this resulted in the failure of 2B NSW pump strainer shear key, and unavailability of the 2B NSW pump during repairs to the strainer. Using IMC 0609, Appendix A, issued June 19, 2012, the SDP for Findings At-Power, the inspectors determined the finding was of very low safety significance (Green) because the finding did not affect the design or qualification of a mitigating SSC, the finding did not represent a loss of system and/or function, the finding did not represent an actual loss of a function of a single train for greater than the technical specification (TS) allowed outage time, the finding did not represent an actual loss of a function of one or more non-TS trains of equipment, and did not screen as potentially risk-significant due to a seismic, flooding, or severe weather initiating event.

The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the evaluation attribute because the licensee failed to thoroughly evaluate issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. Specifically, the licensee failed to evaluate the cause of the 2B NSW pump strainer shear pin failures to ensure the appropriate repair. [P.2] (Section 4OA2.2)

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at or near rated thermal power (RTP). On February 7, 2016, the unit was manually scrammed due to loss of all recirculation flow. The unit was restarted on February 13, 2016, following repairs to the 4 kV switchgear and startup auxiliary transformer (SAT) non-segmented bus. The unit was returned to near RTP on February 15, 2016. On February 16, 2016, the unit was reduced to 80 percent power for a control rod improvement. The unit was returned to near RTP on February 18, 2016. On February 26, 2016, the unit was shut down for a refueling outage. On March 23, 2016, the unit was restarted. The unit was returned to near RTP on March 25, 2016. On March 26, 2016, the unit was reduced to 83 percent power for a control rod improvement. The unit was returned to near RTP on March 27, 2016. On March 30, 2016, the unit was reduced to 22 percent power for a drywell entry to repair an oil leak on the 1A reactor core recirculation (RCR) pump. On March 31, 2016, the unit was increased to 53 percent power to inspect and repair main condenser tube leaks and remained at this level for the remainder of the inspection period.

Unit 2 began the inspection period at or near RTP. On March 5, 2016, the unit was reduced to 22 percent power to allow for a drywell entry to add oil to the 2B RCR pump. The unit was returned to near RTP on March 6, 2016. On March 7, 2016, the unit was reduced to 75 percent power for a control rod improvement. The unit was returned to near RTP on March 8, 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 (71111.01 – 2 samples)

a. Inspection Scope

.1 Summer Readiness of Offsite and Alternate AC Power System

The inspectors reviewed the material condition of offsite and onsite alternate AC power systems (including switchyard and transformers) by performing a walkdown of the switchyard. The inspectors reviewed outstanding work orders and assessed corrective actions for degraded conditions that impacted plant risk or required compensatory actions. Documents reviewed are listed in the Attachment.

.2 Impending Adverse Weather Conditions

The inspectors reviewed the licensee's preparations to protect risk-significant systems from severe winter weather on February 24, 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 adverse weather conditions. The inspectors reviewed the licensee's plans to address the ramifications of potentially lasting effects that may result from adverse weather 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. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04 – 5 samples)

a. Inspection Scope

.1 Partial Walkdown (71111.04 – 4 samples)

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 and 2, control room emergency ventilation system
- Unit 1, standby gas treatment system
- Unit 1, division I DC electrical power
- Unit 1, residual heat removal (RHR) Loop A

.2 Complete Walkdown (71111.04 – 1 sample)

The inspectors verified the alignment of the Unit 1 core spray system A train on March 8-10, 2016. The inspectors selected this system for assessment because it is a risk-significant mitigating system. The inspectors determined the correct system lineup by reviewing plant procedures, drawings, the Updated Final Safety Analysis Report (UFSAR), and other documents. The inspectors reviewed records related to the system outstanding design issues, maintenance work requests, and deficiencies. The inspectors verified that the selected system was correctly aligned by performing a complete walkdown of accessible components.

To verify the licensee was identifying and resolving equipment alignment discrepancies, the inspectors reviewed corrective action documents, including NCRs and outstanding work orders (WOs). The inspectors also reviewed periodic reports containing information on the status of risk-significant systems, including maintenance rule reports and system health reports. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05Q – 6 samples)

a. Inspection Scope

Quarterly Inspection

The inspectors evaluated the adequacy of selected pre-fire plans and fire protection procedures 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 areas to assess material condition and operational status of fire protection equipment. Documents reviewed are listed in the Attachment.

- 1PFP-RB1-01M, Unit 1, refueling floor, 117' elevation
- 1PFP-RB-02, Unit 1, high pressure coolant injection (HPCI) room, -17' elevation
- 0PFP-SW-1a and 1b, Units 1 and 2, service water building, -13'4", 4', and 20' elevations
- 1PFP-TB1-08A, 08B, 08C, 08D, 08E, and 08F, Unit 1, condenser areas, 20' and 45' elevations
- 1PFP-TB1-09B, Unit 1, electrohydraulic control and lube oil room, 45' elevation
- 1PFP-TB1-01M and 01N, Unit 1, main turbine, 70' elevation

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

a. Inspection Scope

Internal Flooding

The inspectors reviewed related flood analysis documents and performed a walkdown of the area listed below containing risk-significant SSCs susceptible to flooding. The inspectors verified that plant design features and plant procedures for flood mitigation were consistent with design requirements and internal flooding analysis assumptions. The inspectors also assessed the condition of flood protection barriers and drain systems. 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 reactor building

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07 – 2 samples)

a. Inspection Scope

Annual Review

The inspectors verified the readiness and availability of the 1B RHR heat exchanger and 1B RHR room cooler heat exchanger to perform their design functions by observing the licensee's heat exchanger inspection. Additionally, the inspectors verified that the licensee had entered any significant heat exchanger performance problems into the CAP and that the licensee's corrective actions were appropriate. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08 – 1 Sample)

a. Inspection Scope

Non-Destructive Examination Activities and Welding Activities

From March 7 through March 10, 2016, the inspectors conducted an onsite review of the implementation of the licensee's inservice inspection (ISI) program for monitoring degradation of the reactor coolant system boundary, risk-significant piping and component boundaries, and containment boundaries in Unit 1.

The inspectors directly observed or reviewed the following non-destructive examinations (NDEs) mandated by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code of Record: 2001 Edition with 2003 Addenda) to evaluate compliance with the ASME Code, Section XI and Section V requirements and, if any indications or defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement. The inspectors also reviewed the qualifications of the NDE technicians performing the examinations to determine whether they were current and in compliance with the ASME Code requirements.

- Ultrasonic Testing (UT) examination of weld 1B11-N8A-JPI-FWRI-22-1, ASME Class 1, Reactor Coolant system, 4" safe end-to-nozzle weld (observed)
- Magnetic Particle Testing (MT) examination of welds 1B21-1394 through -1401, ASME Class 1, Reactor Coolant system, 1 ½" pipe-to-pipe welds (reviewed)
- Penetrant Testing (PT) examination of welds 1-SW-5584 through -5586, ASME Class 3, Nuclear Service Water system, 30" pipe-to-pipe welds (reviewed)
- Enhanced Visual Testing (EVT) examination of welds on Steam Dryer Lifting Eye LE-145 (observed)

The inspectors reviewed the following welding activities, qualification records, and associated documents in order to evaluate compliance with procedures and the ASME

Code, Section XI and Section IX requirements. Specifically, the inspectors reviewed the WO, repair and replacement plan, weld data sheets, welding procedures, procedure qualification records, welder performance qualification records, and NDE reports.

- WO 1882400-01, Cut Out and Replace Piping 1-B21-50-1 1/2-600, ASME Class 1, Reactor Coolant system, 1 1/2" pipe-to-pipe welds (1B21-1394 through -1401)
- WO 12274018-08, Cut Out and Replace Piping 1-SW-103-30-157, ASME Class 3, Nuclear Service Water system, 30" pipe-to-pipe welds (1-SW-5584 through -5586)

During non-destructive surface and volumetric examinations performed since the previous refueling outage, the licensee did not identify any relevant indications that were analytically evaluated and accepted for continued service; therefore, no NRC review was completed for this inspection procedure attribute.

Identification and Resolution of Problems

The inspectors reviewed a sample of ISI-related issues entered into the CAP to determine if the licensee had appropriately described the scope of the problem and had initiated corrective actions. The review also included the licensee's consideration and assessment of operating experience events applicable to the plant. The inspectors performed this review to ensure compliance with 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, requirements.

b. Findings

Introduction: The inspectors identified an unresolved item (URI) associated with the qualification of the weld procedure specification (WPS) used for replacement of a portion of nuclear service water piping.

Description: 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 inspectors are opening a URI 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 exists. The licensee wrote NCR 2009571 to address this issue. The issue is being tracked as a URI: URI 05000325/2016001-01, ASME Section IX Weld Procedure Qualification.

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 February 8, 2016, the inspectors observed a simulator scenario including inadvertent HPCI initiation, main steam line break and stuck open safety relief valve 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 manual shutdown on February 7, 2016, the Unit 1 startup on February 13, 2016, the Unit 1 shutdown for refueling outage B121R1 on February 26, 2016, the Unit 2 downpower to 22 percent power to add oil to the 2B RCR pump seal on March 5, 2016, and the Unit 1 startup on March 23, 2016.

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. Documents reviewed are listed in the Attachment.

- WO 20052910, [Emergency Diesel Generator] EDG 1 lube oil bypass filter lid nuts loose
- WO 20046520, 1C RHR booster pump bearing replaced due to high vibrations

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 Unit 2 performance of 2MST-RHR28BR B loop RHR channel calibration on January 5, 2016
- Elevated risk condition due to Unit 2 steam jet air ejector radiation monitors out of service on January 20, 2016
- Elevated risk condition due to Unit 1 manual reactor SCRAM on February 7, 2016
- Elevated risk condition due to Unit 1 refueling outage B121R1 starting on February 26, 2016
- Elevated risk condition due to Unit 2 downpower and drywell entry to add oil to the B RCR pump on March 5, 2016

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 6 samples)

a. Inspection Scope

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 TS and UFSAR 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.

- Unit 2, feedwater line B flow transmitter 2-C32-FT-N002B failed on January 11, 2016
- Unit 1, safety relief valve G leaking by on January 14, 2016
- Unit 2, HPCI drain pot high level alarm sealed in on January 19, 2016
- Unit 1, main steam line radiation recorder small step changes on January 27, 2016
- Units 1 and 2, EDG 4 lube oil flow control valve failed on February 1, 2016
- Unit 2, roof drain piping leakage in the reactor building on February 25, 2016

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

a. Inspection Scope

The inspectors verified that the plant modification listed below did not affect the safety functions of important safety systems. The inspectors confirmed the modification did not degrade the design bases, licensing bases, and performance capability of risk significant SSCs. The inspectors also verified the modification 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) 297229, Replace EDG 1 Exciter/Voltage Regulator

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.

- Unit 1, WO 20011263, January 15, 2016, HPCI governor actuator replacement
- Units 1 and 2, WO 13488830, January 21, 2016, EDG 4 air compressor filter replacement
- Units 1 and 2, WO 12229991, January 27, 2016, EDG 1 sequential timing relay 1A-5 replacement

- Unit 1, WO 13487959, closed May 26, 2015, HPCI m-coil replacement
- Unit 1, WO 20055939, February 11, 2016, SAT non-segmented bus repair
- Units 1 and 2, WO 20061937, March 4, 2016, EDG 3 fuse block 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

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20 - 2 samples)

a. Inspection Scope

.1 Unit 1 Maintenance Outage B120F1 (71111.20 – 1 sample)

a. Inspection Scope

For the Unit 1 maintenance outage and reactor trip to repair the 1B variable frequency drive cables and the SAT non-segmented bus cables, from February 7, 2016, through February 14, 2016, the inspectors evaluated the following outage activities:

- shutdown, cooldown, refueling, heatup, and startup
- reactor coolant system instrumentation and electrical power configuration
- reactivity and inventory control
- decay heat removal and spent fuel pool cooling system operation

The inspectors verified that the licensee:

- controlled plant configuration in accordance with administrative risk reduction methodologies
- developed work schedules to manage fatigue
- developed mitigation strategies for loss of key safety functions
- adhered to operating license and TS requirements

Inspectors verified that safety-related and risk-significant SSCs not accessible during power operations were maintained in an operable condition. The inspectors also reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with outage activities. Documents reviewed are listed in the Attachment.

.2 Unit 1 Refueling Outage B121R1 (71111.20 – 1 sample)

For the Unit 1 refueling outage, from February 26, 2016, through March 24, 2016, the inspectors evaluated the following outage activities:

- outage planning
- shutdown, cooldown, refueling, heatup, and startup
- reactor coolant system instrumentation and electrical power configuration
- reactivity and inventory control
- decay heat removal and spent fuel pool cooling system operation
- containment closure

The inspectors verified that the licensee:

- considered risk in developing the outage schedule
- controlled plant configuration in accordance with administrative risk reduction methodologies
- developed work schedules to manage fatigue
- developed mitigation strategies for loss of key safety functions
- adhered to operating license and TS requirements

Inspectors verified that safety-related and risk-significant SSCs not accessible during power operations were maintained in an operable condition. The inspectors also reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with outage activities. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 8 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

- 0LP-DPR006, Digital Feedwater Control System Feedwater Flow Loop Calibration, January 13, 2016
- 1MST-RCIC21R, Reactor Core Isolation Cooling (RCIC) Steam Line Break High Differential Pressure Instrument Channel Calibration, January 21, 2016

- OPT-02.3.1, Unit 1 Suppression Chamber to Drywell Vacuum Breakers, February 9, 2016
- OPT-40.2.6, Turbine Overspeed Trip Test, February 26, 2016
- OPT-80.1, Reactor Pressure Vessel American Society of Mechanical Engineers (ASME) Section XI Pressure Test, March 22, 2016

Containment Isolation Valve

- OPT-20.3-E11, Local Leakrate Testing For RHR System F015A, March 2, 2016
- OPT-20.3-E11, Local Leakrate Testing For RHR System F017A, March 2, 2016

In-Service Tests (IST)

- OPT-09.2, HPCI Operability Test, February 23, 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 February 9, 2016. 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

Cornerstones: Occupational Radiation Safety and Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01 – 1 sample)

a. Inspection Scope

Hazard Assessment and Instructions to Workers

During facility tours, the inspectors directly observed labeling of radioactive material and postings for radiation areas and high radiation areas established within the radiologically controlled area (RCA) of the Unit 1 reactor and turbine buildings. The inspectors independently measured radiation dose rates or directly observed conduct of licensee radiation surveys for selected RCA areas. The inspectors reviewed survey records for

several plant areas including surveys for alpha emitters, discrete radioactive particles, airborne radioactivity, gamma surveys with a range of dose rate gradients, neutron exposure, and pre-job surveys for Unit 1 Refueling Outage B121R1 tasks. The inspectors also discussed changes to plant operations that could contribute to changing radiological conditions since the last inspection. For selected outage jobs, the inspectors attended pre-job briefings and reviewed radiation work permit (RWP) details to assess communication of radiological control requirements and current radiological conditions to workers.

Hazard Control and Work Practices

The inspectors evaluated access barrier effectiveness for selected Locked High Radiation Area locations and discussed procedural guidance for Locked High Radiation Area and Very High Radiation Area controls with health physics personnel and manager. The inspectors reviewed implementation of controls for the storage of irradiated material within the spent fuel pools. Established radiological controls were evaluated for selected B121R1 refueling outage tasks, including removal and movement of control rod drive mechanisms, and torus inspection diving activities. In addition, the inspectors reviewed licensee controls for areas where dose rates could change significantly as a result of plant shutdown and refueling operations.

Through direct observations and interviews with licensee staff, inspectors evaluated occupational workers' adherence to RWPs and health physics technician proficiency in providing job coverage. Electronic dosimeter (ED) alarm set points and worker stay times were evaluated against area radiation survey results for selected B121R1 refueling outage tasks. The inspectors also reviewed the use of personnel dosimetry, including EDs and multi-badging in high dose rate gradients, and evaluated worker responses to ED alarms during selected work activities.

Control of Radioactive Material

The inspectors observed surveys of material and personnel being released from the RCA using small article monitors, personnel contamination monitors, and portal monitor instruments. The inspectors reviewed and discussed equipment sensitivity, alarm setpoints, and release program guidance with licensee staff. The inspectors reviewed recent 10 CFR Part 61 results for the Dry Active Waste radioactive waste (radwaste) stream for the plant's isotopic mix and percent abundance. The inspectors also reviewed records of leak tests on selected sealed sources and discussed nationally tracked source transactions with licensee staff.

Problem Identification and Resolution

The inspectors reviewed and assessed NCRs associated with radiological hazard assessment and control. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with licensee procedures. The inspectors also reviewed recent self-assessment results.

Radiation protection activities were evaluated against the requirements of UFSAR Section 12; TS Sections 5.4 and 5.7; 10 CFR Parts 19 and 20; and approved licensee procedures. Licensee programs for monitoring materials and personnel released from the RCA were evaluated against 10 CFR Part 20 and I&E Circular 81-07, "Control of Radioactively Contaminated Material". Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

2RS8 Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation (71124.08 – 1 sample)

a. Inspection Scope

Waste Processing and Characterization

During inspector walk-downs, accessible sections of the liquid and solid radwaste processing systems were assessed for material condition and conformance with system design diagrams. Inspected equipment included storage tanks, transfer piping, resin dewatering and packaging components, and abandoned radwaste processing equipment. The inspectors discussed component function, processing system changes, and radwaste program implementation with licensee staff.

The inspectors reviewed the 2014 Annual Radioactive Effluent Report and radionuclide characterizations from 2014 - 2015 for each major waste stream. For reactor water cleanup resin and Dry Active Waste (DAW) the inspectors evaluated analyses for hard-to-detect nuclides, reviewed the use of scaling factors, and examined quality assurance comparison results between licensee waste stream characterizations and outside laboratory data. Waste stream mixing and concentration averaging methodology for resin waste streams were evaluated and discussed with cognizant radwaste staff. The inspectors also reviewed the licensee's procedural guidance for monitoring changes in waste stream isotopic mixtures.

Radioactive Material Storage

During walk-downs of selected indoor and outdoor radioactive material storage areas located in the Unit 1 and Unit 2 reactor buildings, turbine buildings, and the Low Level Waste Facility (LLWF), the inspectors observed the physical condition and labeling of storage containers and the posting of Radioactive Material Areas. The inspectors also reviewed licensee procedural guidance for storage and monitoring of radioactive material.

Transportation

The inspectors directly observed preparation activities for shipments of contaminated protective clothing and plant trash at the LLWF. The inspectors noted package markings, vehicle placarding, observed dose rate measurements, and interviewed shipping technicians regarding Department of Transportation (DOT) regulations. The inspectors evaluated shipping records for consistency with licensee procedures and compliance with NRC and DOT regulations. The inspectors reviewed emergency response information, DOT shipping package classification, waste classification, and radiation survey results. Licensee procedures for opening and closing Type A and B shipping casks were compared to Certificate of Compliance requirements.

Problem Identification and Resolution

The inspectors reviewed NCRs in the areas of shipping and radwaste processing. The inspectors evaluated the licensee's ability to identify and resolve the issues. The inspectors also reviewed recent self-assessment results.

Radwaste processing, radioactive material handling, and transportation activities were reviewed against the guidance and requirements contained in the licensee's Process Control Program, UFSAR Chapter 11, 10 CFR Part 20, 10 CFR Part 61, 10 CFR Part 71, the Branch Technical Position on Waste Classification (1983), and NUREG-1608. Documents reviewed during the inspection are listed in the Attachment.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151 – 6 samples)

a. Inspection Scope

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 January 1, 2015, and December 31, 2015, 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.

Cornerstone: Initiating Events

- unplanned scrams per 7000 critical hours
- unplanned power changes per 7000 critical hours
- unplanned scrams with complications

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 NCRs, attended screening meetings, or accessed the licensee's computerized corrective action database.

.2 Annual Follow-up of Selected Issues

a. Inspection Scope

The inspectors conducted a detailed review of the following NCRs:

- NCR 1988423, Adverse Trend on Service Water Pump Shear Key Failures in 2015
- NCR 2003042, 2B RCR Pump Upper Bearing Low Oil Level

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 NCRs
- completion of corrective actions in a timely manner

Documents reviewed are listed in the Attachment.

b. Findings

Introduction: The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, because the licensee failed to identify and correct a condition adverse to quality associated with the 2B NSW pump strainer. Specifically, the licensee did not ensure the spacers/shims were filed down or seated appropriately, which resulted in the 2B NSW pump strainer shear key failures, and the unavailability of the 2B NSW pump on three separate occasions.

Description: On August 17, 2015, the licensee performed a disassembly inspection and rebuild of the 2B NSW pump strainer under planned preventive maintenance (PM) WO 13351049.

On September 20, 2015, during performance of a surveillance test, the licensee identified the 2B NSW pump discharge strainer motor was running; however, the strainer was not rotating. The licensee wrote NCR 1955358 and replaced the strainer shear key via WO 20019526. The inspection noted a normal amount of shells, and that the thrust bearing appeared to be dragging on the shims. The thrust bearing and shims were replaced.

On September 30, 2015, the 2B NSW pump discharge strainer motor was turning but the strainer shaft was not rotating during the daily backwash cycle. The pump was declared inoperable and TS Limiting Condition for Operation (LCO) 3.7.2 was entered. The shear key was replaced via WO 20023741 and NCR 1959671 was written. A rework evaluation was completed since the strainer had been worked on September 20, 2015. The rework evaluation cited several large shells found in the strainer as the reason for the shear key failing. The shear key and shims were replaced and the gap between the shoes and tube sheet were checked as satisfactory.

On October 16, 2015, the 2B NSW pump was declared inoperable due to a broken shear key on the discharge strainer. The shear key was replaced via WO 20026910 and NCR 1966266 was written. Engineering personnel were contacted, the strainer

maintenance occurred down to the stop collar, resulting in a correct fit-up of the shim/spacer.

The licensee performed a quick cause evaluation with a rework evaluation due to three failures in two months. The evaluation determined the cause to be that the strainers are prone to excessive clogging and may result in failure of the strainer motor or shearing of the strainer motor shaft key to the strainer. The cause evaluation also noted that the strainer failures occurred during bay cleaning activities with a direct cause identified as evaluated risk. The corrective action was to replace the shear key.

The inspectors reviewed the cause evaluation and challenged the licensee on the cause and the corrective action. The inspectors determined that bay cleaning was not a likely cause for the shear key failures since the bay cleaning was not near the 2B NSW pump and that very few shells were found in the strainer. The inspectors also determined the corrective action to replace the shear key did not correct the issue that was causing the shear keys to fail. The licensee re-performed the cause evaluation and identified the following causes: 1) Inadequate WO instructions and inappropriate assumptions did not indicate that the failures were repetitive and that investigation into failure mode was required; 2) The correct personnel were not involved in the investigation of the multiple failures due to inadequate organizational communication and a high threshold for equipment failures; and 3) The spacers/shims utilized by maintenance personnel in the PM WO on August 17, 2015, were not filed down or were not seated appropriately, which caused drag against the thrust bearing and contributed to failure of the shear key. The repair work orders did not adjust the stop collar. The corrective action was to implement procedure revision request 2002720 to add guidance to procedure 0PM-STR500, R.P. Adams Self-Cleaning Strainers, Models VWS 10 Through 40, Section 7.19, to "ensure edges of spacer are filed smooth, spacer is seated appropriately, and stop collar is adjusted to avoid unnecessary wear on the shear key." The inspectors reviewed the corrective actions and re-performed cause evaluation and agreed with the conclusions.

Analysis: The inspectors determined the licensee's failure to ensure the 2B NSW pump strainer spacers/shims were filed down or seated appropriately 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 to ensure the availability of systems that respond to initiating events to prevent undesirable consequences. Specifically, this resulted in the failure of 2B NSW pump strainer shear key, and unavailability of the 2B NSW pump during repairs to the strainer. Using IMC 0609, Appendix A, issued June 19, 2012, the SDP for Findings At-Power, the inspectors determined the finding was of very low safety significance (Green) because the finding did not affect the design or qualification of a mitigating SSC, the finding did not represent a loss of system and/or function, the finding did not represent an actual loss of a function of a single train for greater than the TS allowed outage time, the finding did not represent an actual loss of a function of one or more non-TS trains of equipment, and did not screen as potentially risk-significant due to a seismic, flooding, or severe weather initiating event. The finding has a cross-cutting aspect in the area of problem identification and resolution associated with the evaluation attribute because the licensee failed to thoroughly evaluate issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. Specifically, the licensee failed to evaluate the cause of the 2B NSW pump strainer shear key failures to ensure the appropriate repair. [P.2]

Enforcement: Appendix B to 10 CFR Part 50, Criterion XVI, Corrective Action, requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. Contrary to the above, on August 17, 2015, September 20, 2015, and September 30, 2015, the licensee failed to identify and correct a condition adverse to quality associated with the 2B NSW pump strainer. Specifically, the licensee failed to ensure the spacers/shims were filed down or seated appropriately, which resulted in the 2B NSW pump strainer shear key failures, and the unavailability of the 2B NSW pump on September 20, 2015, September 30, 2015, and October 16, 2015. As corrective actions, the licensee ensured the spacers/shims were filed down and seated appropriately for the 2B NSW pump strainer and revised the procedure to ensure these steps were performed in the future. Because this finding is of very low safety significance and was entered into the licensee's CAP as NCR 1988423, consistent with Section 2.3.2.a of the NRC's Enforcement Policy, this violation is being treated as an NCV: NCV 05000324/2016001-02, Failure to Identify and Correct a Condition Adverse to Quality Associated with the 2B NSW Pump Strainer.

4OA3 Follow-up of Events (71153 – 4 samples)

.1 Event Notifications

a. Inspection Scope

For the plant events listed below, the inspectors reviewed plant parameters, reviewed personnel performance, and evaluated performance of mitigating systems. The inspectors communicated the plant events to appropriate regional NRC personnel, and compared the event details with criteria contained in IMC 0309, issued October 28, 2011, "Reactive Inspection Decision Basis for Reactors," for consideration of potential reactive inspection activities. As applicable, the inspectors verified that the licensee made appropriate emergency classification assessments and properly reported the event in accordance with 10 CFR 50.72. The inspectors reviewed the licensee's follow-up actions related to the events to assure that the licensee implemented appropriate corrective actions commensurate with their safety significance. Documents reviewed are listed in the Attachment.

- Event Notification 51715: Alert Declared Due to Electrical Fault Resulting in a Fire/Explosion

On February 7, 2015, operations personnel declared an Alert for Units 1 and 2 in accordance with Emergency Action Level HA 2.1 due to an explosion/fire in the Unit 1 balance of plant (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 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 power interruption resulted in closure of the main steam isolation valves, per design. The manual reactor SCRAM also resulted in closure of Group 2, 6, and 8 containment isolation valves. The licensee downgraded to a Notice of Unusual Event (NOUE) because the plant no longer met the criteria for an Alert, but met the criteria for an Unusual Event due to a "loss of all offsite power to Emergency 4 kV buses E1 and E2 for greater than or equal to 15 minutes". The licensee restored offsite power to

the emergency buses and exited the NOUE. The licensee wrote NCR 1998726 to address this event.

- Event Notification 51739: Invalid Actuation of Emergency Diesel Generator 2

On January 9, 2016, an invalid actuation of EDG 2 occurred during the performance of OPT-12.2.1B, Emergency Core Cooling System Diesel Generator 2 Logic Test, when procedure steps were performed out of sequence. As a result, EDG 2 control logic was not properly defeated to prevent the auto-start prior to testing portions of the Emergency Core Cooling EDG 2 logic. EDG 2 responded properly to the auto-start signal, and ran unloaded. Since no actual bus under voltage condition existed which required the start of EDG 2, the licensee determined the event was an invalid actuation. The inspectors reviewed the event and cause determination.

- b. Findings

Introduction: The inspectors are opening a URI to facilitate prompt tracking, documentation, and closure of inspection, verification, and resolution activities, including enforcement action determinations, associated with the Alert declaration due to the electrical fault resulting in an explosion/fire in the Unit 1 BOP 4 kV switchgear bus area. The inspectors are opening a URI to review the root cause and determine if a performance deficiency exists.

Description: On February 7, 2015, operations personnel declared an Alert for Units 1 and 2, 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 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 restored offsite power to the emergency buses and exited the NOUE. The licensee wrote NCR 1998726 to address this event. This issue is being tracked as a URI: URI 05000325/2016001-03; Alert Declared Due to Electrical Fault Resulting in a Fire/Explosion.

These event notifications are closed.

- .2 (Closed) Licensee Event Report 05000325/2015-001-01, Unit 1 HPCI System was Declared Inoperable Due to Failure of the HPCI Auxiliary Oil Pump

- a. Inspection Scope

On February 12, 2015, the Unit 1 HPCI system was declared inoperable due to a failure of the HPCI auxiliary oil pump. The cause was a faulty magnetic motor contactor coil (m-coil) within the HPCI auxiliary oil pump circuit. The licensee revised the licensee event report (LER) to include the root cause evaluation results. The root cause was determined to be aging from long-term thermal stress. The licensee's corrective action was to replace the HPCI m-coil and, based on the low failure rate, a one-time replacement. The inspectors reviewed the root cause evaluation and the revised LER. Documents reviewed are listed in the Attachment.

- b. Findings

No findings were identified. This LER is closed.

.3 (Closed) Granted Notice of Enforcement Discretion 16-2-001: LCO 3.0.3 per TS 3.8.1, AC Sources – Operating

a. Inspection Scope

On March 2, 2016, at 1458, EDG 1 was declared inoperable for planned modifications. emergency bus E1 and BOP bus 1D were deenergized in support of the EDG 1 maintenance activities. Due to the shared electrical distribution system, Unit 2 entered TS 3.8.1, Condition B, (i.e., two Unit 1 offsite circuits inoperable due to one Unit 1 BOP circuit path to the downstream 4.16 kV emergency bus inoperable for planned maintenance and the EDG associated with the affected downstream 4.16 kV emergency bus inoperable for planned maintenance). The completion time to restore both Unit 1 offsite circuits and EDG to operable status is 7 days.

On March 3, while restoring power to BOP bus 1D, an error occurred resulting in the invalid auto-start of EDGs 2 and 4. The invalid actuation mimicked under-voltage on the SAT, which is not a TS required start; however, should have, per design, started all available EDGs. EDG 3 failed to start. The licensee performed troubleshooting for the failure of EDG 3 to start and declared EDG 3 inoperable after identifying on March 4, 2016 at 12:35 p.m., a broken fuse block connection on the auto-actuation of EDG 3. When EDG 3 was declared inoperable, Unit 2 entered TS 3.8.1, Condition I, one or more offsite circuits and two or more EDGs inoperable, which requires entry into TS LCO 3.0.3 immediately.

On March 4, 2016, the inspectors reviewed the plant's request for enforcement discretion for the inoperability of emergency bus E1, BOP bus 1D, EDG 1 and EDG 3. Following risk assessments and evaluation of plant conditions, the licensee requested the NRC not enforce compliance with TS LCO 3.0.3, which requires, in part, that actions shall be initiated within 1 hour to place the unit, as applicable, in: Mode 2 within 7 hours; Mode 3 within 13 hours; and Mode 4 within 37 hours until March 5, 2016, at 12:35 p.m., for an additional 17 hours for each Mode change. The licensee requested and was granted the notice of enforcement discretion (NOED) on March 4, 2016, at 3:35 pm (NOED 16-2-001). The LCO extension allowed the site time to complete the replacement of the broken fuse block connection and test EDG 3 to restore operability. EDG 3 was restored to operable on March 4, 2016, at 1834.

The inspectors examined the site's actions to uncover the issue with the EDG 3, their actions to address the issue once it was identified, and their compensatory actions associated with the receipt of the NOED. The inspectors also reviewed licensee documents to verify that information contained in the NOED request was accurate. Inspection activities included gathering additional information on why the licensee needed the NOED; examining the site's decision-making process for the issue; reviewing the licensee's condition evaluation; observing the licensee's compensatory actions; and evaluating the licensee's operability determination. To correct this issue and exit the NOED, the licensee completed replacement of the EDG 3 broken fuse block connection, satisfactorily tested EDG 3, and declared the EDG operable. Documents reviewed are listed in the Attachment.

b. Findings

The inspectors concluded that once the issue was discovered, the licensee's efforts to identify and correct the condition were reasonable to restore operability of EDG 3 and exit the NOED.

Introduction: In accordance with the NRC's NOED process, the inspectors are opening a URI to facilitate prompt tracking, documentation, and closure of inspection, verification, and resolution activities, including enforcement action determinations, associated with the NOED. The inspectors are opening a URI to review the cause determination and determine if a performance deficiency exists.

Description: On March 4, 2016, due to the inoperability of emergency bus E1, BOP bus 1D, EDG 1 and EDG 3, the licensee requested the NRC not enforce compliance with TS LCO 3.0.3, which requires, in part, that actions shall be initiated within 1 hour to place the unit, as applicable, in: Mode 2 within 7 hours; Mode 3 within 13 hours; and Mode 4 within 37 hours until March 5, 2016 at 12:35 p.m., for an additional 17 hours for each mode change. The licensee requested and was granted the NOED on March 4, 2016 at 3:35 pm. The LCO extension allowed the site time to complete the replacement of the EDG 3 broken fuse block connection, satisfactorily tested EDG 3, and declare the EDG operable. The licensee entered this issue in the CAP as NCR 2007449. This issue is being tracked as a URI: URI 5000324/2016001-04; Notice of Enforcement Discretion for Replacement of EDG 3 Broken Fuse Block Connection.

4OA5 Other Activities

Groundwater Monitoring Program

On March 8, 2016, the inspectors held a teleconference with licensee staff to discuss the status of the groundwater monitoring program. The licensee provided an update on tritium concentrations in water collected from onsite and offsite groundwater and surface water sampling locations and discussed ongoing remediation efforts associated with the Storm Drain Stabilization Pond and areas near a Unit 1 Condensate Storage Tank underground pipe leak. The licensee had installed a network of sub-surface pumping wells that continuously removed water from the affected areas; thereby reducing the overall tritium concentration in groundwater and limiting plume migration. Publicly available information regarding onsite groundwater monitoring and radionuclide concentrations in the environment near Brunswick Steam Electric Plant can be found in the Annual Radiological Environmental Operating Report. Recently issued reports can be found on the NRC's public website: <http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/bru1-2.html>.

4OA6 Meetings, including Exit

On March 10, 2016, the inspectors presented the inspection results of the Radiation Protection Inspection to Mr. Randy Gideon, Brunswick Nuclear Plant Site Vice President, and other members of the licensee staff. Additionally, inspectors presented the inspection results of the Inservice Inspection to Mr. Randy Gideon, Site Vice President, and other members of the licensee staff. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

On April 13, 2016, the inspectors presented the inspection results of the Integrated Inspection to Mr. Randy Gideon, Brunswick Nuclear Plant Site Vice President, and other members of the licensee staff. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

W. Gideon	Vice President
K. Moser	Plant Manager
K. Allen	Director, Design Engineering
A. Brittain	Director, Nuclear Plant Security
P. Brown	Manager, Nuclear Performance Improvement
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
K. Krueger	Manager, Nuclear Work Management
B. Murray	Site Licensing
E. Neil	Manager, Nuclear Rad Protection
J. Nolin	General Manager, Nuclear Engineering
W. Orlando	Superintendent, E/I&C
A. Padleckas	Assistant Ops Manager, Training
O. Paladiy	Site Welding Engineer/Repair & Replacement Engineer
F. Payne	Manager, Nuclear Work Management
A. Pope	Director, Nuclear Organization Effectiveness
M. Regan	Project Manager, Major Projects
M. Smiley	Manager, Nuclear Ops Training
J. Sullivan	Site ISI Program Engineer
R. Wiemann	Director, Electrical/Rx Systems
E. Williams	Superintendent, Nuclear Maintenance
S. Williams	Site BWRVIP Program Engineer

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
M. Catts	Senior Resident Inspector
M. Schwieg	Resident Inspector
B. Collins	Reactor Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000325/2016001-01	URI	ASME Section IX Weld Procedure Qualification (Section 1R08)
05000325/2016001-03	URI	Alert Declared Due to Electrical Fault Resulting in a Fire/Explosion (Section 4OA3.1)
05000324/2016001-04	URI	Notice of Enforcement Discretion for Replacement of EDG 3 Broken Fuse Block Connection (Section 4OA3.3)

Opened and Closed

05000324/2016001-02	NCV	Failure to Identify and Correct a Condition Adverse to Quality Associated with the 2B NSW Pump Strainer (Section 4OA2.2)
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Closed

05000325/2015-001-01	LER	Unit 1 HPCI system was declared inoperable due to failure of the HPCI Auxiliary Oil Pump (Section 4OA3.2)
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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

0AOP-13.0, Operation During Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 62
0PEP-02.6 Severe Weather, Rev. 19
0AI-68, Brunswick Nuclear Plant Response to Severe Weather Warnings, Rev. 48
0AP-062, Cold Weather Preparations, Rev. 3
0AOP-22.0, Grid Instability, Rev. 27
0AOP-36.1, Loss of any 4160V Buses or 480V E-Buses, Rev. 69

Work Orders

13372814 13372556 13372813

Section 1R04: Equipment Alignment

Procedures

2OP-43, Service Water System Operating Procedure, Rev. 157
1OP-17, Residual Heat Removal System Operating Procedure, Rev. 126
2OP-19, High Pressure Coolant Injection System Operating Procedure, Rev. 138
SD-19, High Pressure Coolant Injection System, Rev. 24
AD-OP-ALL-0201, Protected Equipment, Rev. 1
0OP-37, Control Building Ventilation System Operating Procedure, Rev. 62
0PT-23.1, Control Room Emergency Filtration System Operability Test, Rev. 31
1OP-10, Standby Gas Treatment System Operating Procedure, Rev. 66
0PT-15.6, Standby Gas Treatment System Operability, Rev. 34
1OP-18, Core Spray System Operating Procedure, Rev. 61
1OP-51 DC electrical system operating procedure, rev. 73
0AOP-39.0, Loss of DC Power, Rev. 42
1OP-17, Residual Heat Removal System Operating Procedure, Rev. 129

Drawings

F-04080, Control Building Air Flow Diagram, Rev. 15
F-40073, Reactor Building Standby Gas Treatment Piping Diagram, Rev. 9
D-25024, Reactor Building Core Spray System Piping Diagram Sheet 1, Rev. 42
D-25024, Reactor Building Core Spray System Piping Diagram Sheet 2, Rev. 38
F-30006, Single Line Diagram 125/250 Volt D.C. System Distribution Switchboard 1A & 1B, Rev. 37
F-30007, 125/250 Volt D.C. System Distribution Switchboard 1A & 1B Three Line Diagram, Rev. 34

Miscellaneous

SD-37, Control Building Heating, Ventilation, and Air-Conditioning System, Rev. 16
 BN-10.0.1 Standby Gas Treatment, Rev. 01
 SD-18, Core Spray System, Rev. 6

Section 1R05: Fire ProtectionProcedures

0PFP-CB, Control Building Prefire Plans, Rev. 11
 0PFP-PBAA, Power Block Auxiliary Areas Prefire Plans, Rev. 26
 1PFP-RB, Reactor Building PreFire Plans, Rev. 18
 1PFP-TB, Turbine Building PreFire Plans, Rev. 25
 2PFP-RB, Reactor Building PreFire Plans, Rev. 18

Condition Reports

2005407 2005338 2007636 2007740

Section 1R06: Flood Protection MeasuresProcedures

EGR-NGGC-0351, Condition Monitoring of Structures, Rev. 22
 0AOP-13.0, Operation during Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 62

Condition Reports

2000996 1983394 20012673

Work Orders

20031677

Miscellaneous

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

Section 1R07: Heat Sink PerformanceProcedures

0ENP-2704, Administrative Control of NRC Generic Letter 89-13 Requirements, Rev. 24

Condition Reports

2010162 2009362

Work Orders

13527441

Miscellaneous

EPRI NP-7552, Heat Exchanger Performance Monitoring Guidelines

Section 1R08: Inservice Inspection ActivitiesProcedures

0PT-90.1, Vessel Internal Component Remote Examinations, Rev. 43
 NDEP-0408, Ultrasonic Thickness Measurement (A-Scan), Rev. 14
 NDEP-0425, Ultrasonic Examination of Austenitic Pipe Welds (PDI), Rev. 14
 NDEP-0606, Remote Visual Examination, Rev. 09
 NDEP-0617, Enhanced VT-1 (EVT-1) Examinations for the Brunswick Nuclear Plant, Rev. 10

Condition Reports

2000149 2002959

Work Orders

1882400-01 12274018-08 01882400-01 12274010-08

Miscellaneous

Ultrasonic Testing (UT) examination of weld 1B11-N8A-JPI-FWRI-22-1, ASME Class 1, Reactor Coolant system, 4" safe end-to-nozzle weld (observed)

Magnetic Particle Testing (MT) examination of welds 1B21-1394 through -1401, ASME Class 1, Reactor Coolant system, 1 ½" pipe-to-pipe welds (reviewed)

Penetrant Testing (PT) examination of welds 1-SW-5584 through -5586, ASME Class 3, Nuclear Service Water system, 30" pipe-to-pipe welds (reviewed)

Enhanced Visual Testing (EVT) examination of welds on Steam Dryer Lifting Eye LE-145 (observed)

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 0GP-05, Unit Shutdown, Rev. 177
 0GP-10, Rod Sequence Check-off Sheets, Rev. 43
 0GP-12, Power Changes, Rev. 78

1PT-01.7, Heatup/Cooldown monitoring, Rev. 9
 0AOP-31, Flooding in Turbine Building Condenser Pit or Pipe Tunnel, Rev. 13
 0AOP-37, Low Condenser Vacuum, Rev. 39
 0AOP-13.0, Operation during Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 62
 0AOP-02.0, Control Rod Malfunction/Misposition, Rev. 28
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 AD-EG-ALL-1311, Failure Investigation Process (FIP), Rev. 0

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 20022826

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0PM-BXR002A, PM For ITE K-Line Circuit Breakers, Rev. 48
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1994140	1970576	1975402	583778	580111	711396
1991527					

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00192283	20052910	20030188	13441123	20035133	20046520
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Procedure Revision Request 1995321
 Preventative Maintenance Task 593920

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0AP-060, Technical Task Risk/Rigor Assessment, Rev. 0
 BNP-PSA-041, BNP On-Line Equipment Out of Service Probabilistic Safety Assessment Model, Rev. 16
 AD-WC-ALL-0250, Work Implementation and Completion, Rev. 0
 AD-WC-ALL-0410, Work Activity Integrated Risk Management, Rev. 1
 AD-WC-ALL-0200, Online Work Management, Rev. 5
 AD-OP-ALL-0201, Protected Equipment, Rev. 1
 AD-WC-ALL-0430, Outage Risk Review, Rev. 1
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 AD-EG-ALL-1311, Failure Investigation Process (FIP), Rev. 0
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1993263	1994616
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1OP-10, Standby Gas Treatment System Operating Procedure, Rev. 66
 1OP-11, Radiation Monitoring System Operating Procedure, Rev. 40
 1OI-03.1, Reactor Operator Daily Surveillance Report, Rev. 126
 AD-OP-ALL-0105, Operability Determinations and Functionality Assessments, Rev. 0
 0ENP-54, Building Ventilation Pressure Control Program, Rev. 33
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 Organization Response, Rev. 7

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1987735	396398	1991676	676097	2000871	1991660
1989512	1995392	1996413			

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13397263	20018539	20020286	20020711
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Diesel Gen 1 Load trend data
 SD-39, Emergency Diesel Generators, Rev. 20
 EC 299232, Unit 2 Reactor Building Roof Drain Replacement
 R2-15-0086, pressure seal permit for RB

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0SP-EC70989-01, Integrated Testing of EG1 Voltage Regulator Engineering Changes, Rev. 4

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2005482	2004695	2003609
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12224413

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0-FP-86610, Emergency Diesel Generator Excitation Potential Transformer Sh. 25, Rev. A
 0-FP-86610, Emergency Diesel Generator Excitation Current Transformer Sh. 28, Rev. A
 0-FP-86610, Emergency Diesel Generator Excitation Wiring Schematic Sh. 1, Rev. D
 0-FP-88810, Emergency Diesel Generator Excitation System Wiring Diagram Sheet 1, Rev. 7
 0-FP-88810, Emergency Diesel Generator Excitation System Wiring Diagram Sheet 2, Rev. 8
 F-09345, Diesel Generator No. 1 Circuits Control Wiring Diagram, Rev. A

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Replace EDG 1 Exciter/ Voltage Regulator, Rev. 11
 C07R12, UFSAR mark-ups
 Attachment X, EDG Margin Improvement Impact Evaluation

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OPT-12.2C, NO.3 Diesel Generator Monthly Load Test, Rev. 106
 1PT-24.1-1, Service Water Pump and Discharge Valve Operability Test, Rev. 87

1OP-43, Service Water System Operating Procedure, Rev. 123
 0CM-M503, Maintenance Instructions for the RHRSW Pump Motors, Rev. 7
 AD-EG-ALL-1132, Preparation and Control of Design Change Engineering Changes, Rev. 2
 AD-EG-ALL-1133, Preparation and Control of Equivalent Change Engineering Changes, Rev. 0
 AD-EG-ALL-1134, Preparation and Control of Evaluation Engineering Changes, Rev. 0
 AD-EG-ALL-1135, Preparation and Control of Configuration Management Update Engineering Changes, Rev. 0
 0SMP-GOV001, HPCI Governor Dynamic Tuning, Rev. 2
 0PT-09.2, HPCI Operability Test, Rev. 146
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 0PM-NSB001, Inspection and Cleaning Non-Segregated Buses, Rev. 10

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732624 2007261 1995566

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13487959 20011263 13488830 13420745 20055939 20061937 12229991

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 QDP 67A, GEIC7700 Series Motor Control Centers, Rev. 16

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 0GP-02, Approach to Criticality and Pressurization of the Reactor, Rev. 109
 0GP-03, Unit Startup and Synchronization, Rev. 83
 0GP-05, Unit Shutdown, Rev. 177
 0GP-06, Cold Shutdown to Refueling (Head Unbolted), Rev. 42
 0GP-07, Preparations for Core Alterations, Rev. 61
 0GP-08, Refueling to Cold Shutdown, Rev. 49
 0GP-10, Rod Sequence Check-off Sheets, Rev. 43
 0GP-12, Power Changes, Rev. 78
 1PT-01.7, Heatup/Cooldown monitoring, Rev. 9
 1SP-16-100, Unit 1 EGM 11-03 OPDRV Activities, Rev. 0
 0OI-01.01, BNP Conduct of Operations Supplement, Rev. 73
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 0SMP-RPV501, Reactor Vessel Disassembly, Rev. 30
 0ENP-54, Building Ventilation Pressure Control Program, Rev. 34
 2SP-15-101, Unit 2 Enforcement Guidance Memorandum 11-003 Operations with the Potential for Draining the Reactor Vessel Activities, Expires 12-31-15, Rev. 0
 0ENP-24.0, Reactor Engineering Guidelines, Rev. 63
 0AP-022, BNP Outage Risk Management, Rev. 53
 0ENP-24.13, Core Verification, Rev. 21
 0EOP-01-SEP-10, Circuit Alternation Procedure, Rev. 15
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2006843	2006844	2006855	2005836	2005391	2005390
2005380	2005327	2005303	2005191	2005406	2005420
2005452	2005469	2005482	2005259	2001011	2001025
2001049	2001387	2000285	2000279	2000267	2000252
2000179	2000112	1999745	1999246	1999632	

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13527348	13398981	13527389	13423229	12216807	20056366
20056515	20055939				

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NRC EGM 11-003, Rev. 3, Dispositioning Boiling Water Reactor Licensee Noncompliance with Technical Specification Containment Requirements during OPDRVs

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List of Outage Modifications

Engineering Change 297229, Replace EDG 1 Exciter / Voltage Regulator

Engineering Change 281847, Replace EDG 1 Governor Controls

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Engineering Change 402844, Evaluate Fault Damage to Unit 1 Sat X-Winding Non-SEG Bus SD-12, Primary Containment Isolation System (Including Steam Leak Detection and Reactor Instrument Penetrations), Rev. 11

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1OP-02, Recirculation Pump Operating Procedure, Rev. 120

0PT-09.2, HPCI System Operability Test, Rev. 146

0PT-09.7, HPCI System Valve Operability Test, Rev. 33

0PT-10.1.1, RCIC System Operability Test, Rev. 104

0LP-DPT006, Digital Feedwater Control System Feedwater Flow Loop Calibration, Rev. 28

1MST-RCIC21R, RCIC Steam Line Break High D/P Instrument Channel Cal, Rev. 19

0PT-20.3-E11, Local Leakrate Testing For Residual Heat Removal System, Rev. 12

0PT-02.3.1, Suppression Chamber To Drywell Vacuum Breakers Operability Test, Rev. 41

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0PT-80.1, Reactor Pressure Vessel ASME Section XI Pressure Test, Rev. 70

0PT-40.2.6, Turbine Overspeed Trip Test, Rev. 47

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1989512	1965402	2012704
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20048315 20053717 20054766

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0AOP-13.0, Operation during Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 62

0AOP-02.0, Control Rod Malfunction/Misposition, Rev. 28

0PEP-02.2.1, Emergency Action Level Technical Bases, Rev. 7

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AD- PI-ALL-0100, Corrective Action Program, Revision (Rev.) 3

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OE&RC-0040, Administrative Controls for High Radiation Areas, Locked High Radiation Areas, and Very High Radiation Areas, Rev. 42

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1942106	1981598	1992773			

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Air Sample Survey 030416-018, U1 Drywell MSIV, 03/04/16

Air Sample Survey 030516-041, 2DW, 17' Drywell by "B" Pump, 03/05/16

Air Sample Survey 030716-035, Torus diving platform during diving, 03/07/16

Air Sample Survey 030916-046, CRD Exchange, 3/9/16

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Description of Materials in Spent Fuel Pool, WOs 13483873-01 (U2) and 13508091-01 (U1)

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Radiological Survey 030316-037, U1 RWCU Heat Exchanger Room, 03/03/16

Radiological Survey 030316-044, U1 RB EI 52' Drywell, 03/03/16

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Radiological Survey 030516-054, Torus, 03/05/16

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Radiological Survey 030616-024, U1 RB EI 52' Drywell, 03/06/16

Radiological Survey 030816-008, 1B MSIV Breach, 03/07/16

Radiological Survey 030916-026, Drywell CRD Exchange Under Vessel, 03/09/16
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 ADP-RP-ALL-3001, Control of Radioactive Material and Use of Radioactive Material Labels, Rev. 1
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 ADP-RP-ALL-5000, Preparation and Shipment of Radioactive Material, Rev. 0
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 Carolina Power & Light Company, Brunswick Nuclear Plant, Process Control Program (PCP), Rev. 5
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 BNP 10 CFR Part 61 Radioactive Waste Stream Sample Information, 01/26/16
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 Shipment No. 15-81 (LSA)
 Shipment No. 15-214 (LSA-II)
 Shipment No. 16-040 (LSA-I)
 Shipment No. 16-042 (LQ)

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Quick Hitter Self- Assessment Report, Self-Assessment No. 721614, Radioactive Material Storage (RAM Storage), 07/20/15

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Brunswick Unit 2 PI Summary, January – December, 2015

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2013142	2011704	2012638	2012643	2009840	2009482
2009510	2008231	2005123	1988423	742444	1959671
1966266	1997979	711361	668564	2003042	

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13509326	20019526	20023741	20026910	13351049	20055165
13361257	13437731	11975061	13478366	20059502	

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20061937

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 EN 51715, Alert Declared Due to Electrical Fault Resulting in a Fire/Explosion
 EN 51769, Emergency Diesel Generator Declared Inoperable
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 NOED 16-2-001: Limiting Condition for Operation 3.0.3 per Technical Specification 3.8.1, AC Sources – Operating
 EOOS Risk Profile, Unit 2, Week of March 1, 2016
 BN-50.1.01, E1 Bus Loads, Rev. 0
 SD-39, Emergency Diesel Generators System Description, Rev. 20

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