



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
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ATLANTA, GEORGIA 30303-1257

November 7, 2017

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 – NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT 05000325/2017003 AND  
05000324/2017003**

Dear Mr. Gideon:

On September 30, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Brunswick Steam Electric Plant, Units 1 and 2. On October 25, 2017, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

No NRC-identified or self-revealing findings were identified during this inspection. However, the inspectors documented a licensee-identified violation, which was determined to be of very low safety significance in this report. The NRC is treating this violation 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, and the NRC Resident Inspector at the Brunswick Steam Electric Plant.

W. Gideon

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This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

***/RA/***

Steven D. Rose, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Docket Nos.: 50-325, 50-324  
License Nos.: DPR-71, DPR-62  
Enclosure:  
IR 05000325, 324/2017003  
w/Attachment: Supplementary Information

cc Distribution via ListServ

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT – NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT 05000325/2017003 AND  
05000324/2017003 November 7, 2017

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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.: 05000325/2017003, 05000324/2017003

Licensee: Duke Energy Progress, LLC

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: Southport, NC

Dates: July 1, 2017 through September 30, 2017

Inspectors: G. Smith, Senior Resident Inspector  
M. Schwieg, Resident Inspector  
A. Patz, Resident Inspector (Sections 1R05Q, 1R19, 1R22)  
S. Sanchez, Sr. Emergency Preparedness Inspector  
(Sections 1EP2, 1EP3, 1EP4, 1EP5, 4OA1)  
C. Fontana, Emergency Preparedness Inspector (Sections 1EP2,  
1EP3, 1EP4, 1EP5, 4OA1)  
J. Panfel, Health Physicist (Sections 1EP2, 1EP3, 1EP4, 1EP5,  
4OA1)  
W. Loo, Sr. Health Physicist (Sections 2RS2, 4OA1)  
J. Rivera, Health Physicist (2RS5)

Approved by: Steven D. Rose, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

Enclosure

## **SUMMARY**

Integrated Inspection Report 05000325/2017003, 05000324/2017003; July 1, 2017, through September 30, 2017; Brunswick Steam Electric Plant, Units 1 and 2.

The report covered a three-month period of inspection by resident inspectors and regional inspectors. There were no NRC-identified violations 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. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated November 1, 2016. The NRC's program for overseeing the safe operations of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

A violation of very low safety significance, which was identified by the licensee, was reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program (CAP). The violation and corrective action tracking number are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period at 100 percent rated thermal power (RTP). On August 25, 2017, power was reduced to 70 percent for control rod sequence and valve testing. The power was returned to 100 percent on August 27, 2017. On August 30, 2017, the power was reduced to 85 percent for a control rod improvement. The power was returned to 100 percent on August 31, 2017. On September 29, 2017, the power was reduced to 70 percent for a control rod improvement. The power was returned to 100 percent on September 30, 2017, and remained at or near 100 percent RTP for the remainder of the inspection period.

Unit 2 began the inspection period at 100 percent RTP. On July 13, 2017, power was reduced to 88 percent to repair the 230 kV Whiteville line. After repairs, power was returned to 100 percent on July 14, 2017. On September 15, 2017, the power was reduced to 70 percent for control rod sequence testing. The power was returned to 100 percent on September 18, 2017. The unit remained at or near 100 percent 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 – 1 sample)

##### Impending Adverse Weather Conditions

##### a. Inspection Scope

The inspectors reviewed the licensee's preparations to protect risk-significant systems from Hurricane Harvey and Hurricane Irma between August 28 and September 12, 2017. 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 could have resulted from the 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 walk downs 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

The inspectors verified that critical portions of the four selected systems were correctly aligned by performing partial walkdowns. The inspectors selected these particular 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 reactor core isolation cooling system while high pressure coolant injection system (HPCI) was out-of-service (OOS) for planned maintenance
- Unit 1 emergency diesel generator (EDG) No. 4
- Unit 1 'A' train residual heat removal (RHR) while 'B' train RHR was OOS for planned maintenance
- Unit 2 'B' train RHR while 'A' train RHR was OOS for planned maintenance

#### .2 Complete System Walkdown

The inspectors verified the alignment of the control building ventilation system. 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, and other documents. The inspectors reviewed records related to the system's 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 condition reports and outstanding work order (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/A – 5 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 four fire areas to assess material condition and operational status of fire protection equipment. Documents reviewed are listed in the Attachment.

- Unit 1 HPCI room, -17 ft. elevation, 1PFP-RB1-02
- Unit 1 RHR room, -17 ft. elevation, 1PFP-RB1-01C
- Unit 1 Reactor Building East Central, 20 ft. Elevation, 1PFP-RB1-01G
- Diesel Generator basement, 2ft. elevation, 0PFP-DG-1

#### .2 Annual Inspection

The inspectors evaluated the licensee's fire brigade performance during an actual fire on August 3, 2017, and assessed the brigade's capability to meet fire protection licensing basis requirements. The fire was associated with the turbine building crane motor on Unit 2. No flames were noted, however, a burning smell was exhibited. The fire was extinguished and electrical power was removed within 15 minutes. 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 Scope

Internal Flooding

The inspectors reviewed related flood analysis documents and walked down the area listed below containing risk-significant structures, systems, and components 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.

- Control Building

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 September 15, 2017, the inspectors observed an evaluated simulator scenario administered to an operating crew as part of the annual regualification operating test required by 10 CFR 55.59, "Regualification." The scenario involved the loss of a DC motor control center followed by a spurious 2B core spray actuation signal. Eventually, the scenario evolved to a line rupture in the reactor water cleanup system and failure of the HPCI system that necessitated an emergency depressurization.

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 in the Actual Plant/Main Control Room

The inspectors observed licensed operator performance in the main control room during licensee procedure 2AOP-04, Low Core Flow, when the 2B recirculation pump variable frequency drive tripped on an internal fault. This fault caused core flow to drop by four percent. Additionally, the inspectors evaluated the execution of clearances in the main control room.

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 two 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.

- service water building high room temperature
- maintenance rule a(3) evaluation report (2015 – 2017)

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 five 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.

- Yellow risk due to Unit 2 'B' RHR/Residual Heat Removal Service Water (RHRSW) outage on July 5, 2017
- Yellow risk due to Unit 1 'B' RHR/RHRSW outage on August 2, 2017
- Elevated risk due to 2A nuclear service water pump outage on August 10, 2017
- Elevated risk due to planned Unit 2 'A' train RHR outage on August 31, 2017
- Emergent failure of EDG No. 2 on September 22, 2017

b. Findings

No findings were identified.

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

a. Inspection Scope

Operability and Functionality Review

The inspectors selected the six 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 technical specification (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 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.

- EDG No. 1 time delay relay failure, condition report (CR) 2136973
- EDG No. 4 unable to reach 3850 kW, CR 2138157
- EDG No. 4 tripped due to frequency/kilowatt, CR 2151329
- RHRSW leak, CR 2141499
- EDG Loose lug on degraded voltage relay, CR 2144019
- EDG cell No. 1 damper failed, CR 2146999

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 5 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.

- WO 20183414, Unit 1 HPCI turbine bearing oil pressure low, July 13, 2017
- WO 20076379, 2A CREV maintenance outage, July 24, 2017
- WO 20034694, EDG No. 4 emergency auto-start relay replacement on July 19, 2017
- WO 13457478, Replace 2A nuclear service water pump on August 10, 2017
- WO 20100391, Repair EDG No. 2 field flash relay on September 18, 2017

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.

1R22 Surveillance Testing (71111.22 – 4 samples)

a. Inspection Scope

The inspectors reviewed the four surveillance tests listed below and either observed the test or reviewed test results to verify testing activities adequately demonstrated that the affected structures, systems and components remained capable of performing the intended safety functions (under conditions as close as practical to design bases conditions or as required by TS) 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

- OPT-07.2.4B, Core Spray System Operability Test
- OPT-34.2.2.1, Fire Door Inspections
- OPT-12.2D, No. 4 Diesel Generator Monthly Load Test

In-Service Tests (IST)

- OPT-08.2.2B, LPCI/RHR System Operability Test – Loop B

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP2 Alert and Notification System Evaluation (71114.02 – 1 sample)

a. Inspection Scope

The inspectors evaluated the adequacy of the licensee's methods for testing and maintaining the alert and notification system in accordance with NRC Inspection Procedure (IP) 71114, Attachment 02, Alert and Notification System Evaluation. The applicable planning standard, 10 CFR Part 50.47(b)(5), and its related 10 CFR Part 50, Appendix E requirements were used as reference criteria. The criteria contained in NUREG-0654, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, Revision 1, were also used as a reference.

The inspectors reviewed various documents which are listed in the Attachment and interviewed personnel responsible for system performance. This inspection activity satisfied one inspection sample for the alert and notification system on a biennial basis.

b. Findings

No findings were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System (71114.03 – 1 sample)

a. Inspection Scope

The inspectors reviewed the licensee's Emergency Response Organization (ERO) augmentation staffing requirements and process for notifying the ERO to ensure the readiness of key staff for responding to an event and timely facility activation. The qualification records of key position ERO personnel were reviewed to ensure all ERO qualifications were current. A sample of problems identified from augmentation drills or system tests performed since the last inspection was reviewed to assess the effectiveness of corrective actions. The inspection was conducted in accordance with NRC IP 71114, Attachment 03, Emergency Response Organization Staffing and

Augmentation System. The applicable planning standard, 10 CFR 50.47(b)(2), and its related 10 CFR Part 50, Appendix E, requirements were used as reference criteria.

The inspectors reviewed various documents which are listed in the Attachment. This inspection activity satisfied one inspection sample for the ERO staffing and augmentation system on a biennial basis.

b. Findings

No findings were identified.

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04 – 1 sample)

a. Inspection Scope

Since the last NRC inspection of this program area, one change was made to the Radiological Emergency Plan, no changes were made to the emergency action levels, and several changes were made to the implementing procedures. The licensee determined that, in accordance with 10 CFR 50.54(q), the Plan continued to meet the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. The inspectors reviewed these changes to evaluate for potential reductions in the effectiveness of the Plan. However, this review was not documented in a Safety Evaluation Report and does not constitute formal NRC approval of the changes. Therefore, these changes remain subject to future NRC inspection in their entirety.

The inspection was conducted in accordance with NRC IP 71114, Attachment 04, Emergency Action Level and Emergency Plan Changes. The applicable planning standards of 10 CFR 50.47(b), and its related requirements in 10 CFR Part 50, Appendix E were used as reference criteria. The inspectors reviewed various documents that are listed in the Attachment to this report. This inspection activity satisfied one inspection sample for the emergency action level and emergency plan changes on an annual basis.

b. Findings

No findings were identified.

1EP5 Maintenance of Emergency Preparedness (71114.05 – 1 sample)

a. Inspection Scope

The inspectors reviewed the corrective actions identified through the Emergency Preparedness program to determine the significance of the issues, the completeness and effectiveness of corrective actions, and to determine if issues were recurring. The licensee's post-event after action reports, self-assessments, and audits were reviewed to assess the licensee's ability to be self-critical, thus avoiding complacency and degradation of their emergency preparedness program. Inspectors reviewed the licensee's 10 CFR 50.54(q) change process, personnel training, and selected screenings and evaluations to assess adequacy. The inspectors toured facilities and reviewed equipment and facility maintenance records to assess licensee's adequacy in maintaining them. The inspectors evaluated the capabilities of selected radiation

monitoring instrumentation to adequately support Emergency Action Level (EAL) declarations.

The inspection was conducted in accordance with NRC IP 71114, Attachment 05, and Maintenance of Emergency Preparedness. The applicable planning standards, related 10 CFR 50, Appendix E requirements, and 10 CFR 50.54(q) and (t) were used as reference criteria. The inspectors reviewed various documents which are listed in the Attachment. This inspection activity satisfied one inspection sample for the maintenance of emergency preparedness on a biennial basis.

b. Findings

No findings were identified.

2. RADIATION SAFETY (RS)

Cornerstones: Public Radiation Safety and Occupational Radiation Safety

2RS2 Occupational As Low As Reasonably Achievable (ALARA) Planning and Controls (71124.02 – 3 samples)

a. Inspection Scope

Work Planning and Exposure Tracking

The inspectors reviewed work activities and their collective exposure estimates for the last Unit 2 refueling outage (RFO) (B223R1). In addition, the inspectors reviewed activities and ALARA planning packages associated with the ongoing Unit 1 dry fuel storage fuel loading campaign. The inspectors reviewed ALARA planning packages for Unit 2 RFO B223R1 activities related to the following high collective exposure tasks: In-Service Inspection/Non-Destructive Examination, reactor reassembly, and insulation activities. For the selected tasks, the inspectors reviewed established dose goals and discussed assumptions regarding the bases for the current estimates with responsible ALARA planners. The inspectors evaluated the incorporation of exposure reduction initiatives and operating experience, including historical post-job reviews, into radiation work permit requirements. Day-to-day collective dose data for the selected tasks were compared with established dose estimates and evaluated against procedural criteria (work-in-progress review limits) for additional ALARA review. Where applicable, the inspectors discussed changes to established estimates with ALARA planners and evaluated them against work scope changes or unanticipated elevated dose rates.

Source Term Reduction and Control

The inspectors reviewed the collective exposure three-year rolling average from 2013 – 2015. Source term reduction initiatives, including cobalt reduction and zinc injection, were reviewed and discussed with cognizant licensee staff. The inspectors also reviewed temporary shielding packages for Unit 2 RFO B223R1.

Problem Identification and Resolution

The inspectors reviewed and discussed selected CAP documents associated with

ALARA program implementation. The inspectors evaluated the licensee's ability to identify and resolve the issues. The inspectors also reviewed recent self-assessment results.

#### Inspection Criteria

ALARA program activities were evaluated against the requirements of Updated Final Safety Analysis Report (UFSAR) Section 12, TS Section 5.4, 10 CFR Part 20, and approved licensee procedures. Documents reviewed are listed in the Attachment.

#### b. Findings

No findings were identified.

### 2RS5 Radiation Monitoring Instrumentation (71124.05 - 3 Samples)

#### a. Inspection Scope

The inspectors reviewed the licensee's radiation monitoring instrumentation programs to verify the accuracy and operability of radiation monitoring instruments used to monitor areas, materials, and workers to ensure a radiologically safe work environment during normal operations and under postulated accident conditions.

#### Walkdowns and Observations

During tours of the site areas, the inspectors observed installed radiation detection equipment including the following instrument types: area radiation monitors (ARMs), continuous air monitors (CAMs), personnel contamination monitors (PCMs), small article monitors (SAMs), and portal monitors (PMs). The inspectors observed the calibration status, physical location, material condition and compared TSs for this equipment with UFSAR requirements. In addition, the inspectors observed the calibration status and functional checks of selected in-service portable instruments and discussed the bases for established frequencies and source ranges with radiation protection staff personnel. The inspectors reviewed periodic source check records for compliance with plant procedures and manufacturer's recommendation for selected instruments and observed the material condition of sources used.

#### Calibration and Testing Program

The inspectors reviewed calibration data for selected ARMs, PCMs, PMs, SAMs, and laboratory instruments as well as the last calibration and methodology for the whole body counter. The inspectors reviewed calibration data, methodology used and the source certification for the Unit 1 dry well high-range radiation monitor. The current output values for the portable instrument calibrator and the instrument certifications used to develop them were reviewed by the inspectors. The inspectors reviewed the licensee's process for investigating instruments that were removed from service for calibration or response check failures and discussed specific instrument failures with plant staff. In addition, the inspectors reviewed 10 CFR Part 61 data to determine if sources used in the maintenance of the licensee's radiation detection instrumentation were representative of radiation hazards in the plant and scaled appropriately for "hard to detect" nuclides.



## Problem Identification and Resolution

The inspectors reviewed and discussed selected CAP documents associated with radiological instrumentation including licensee-sponsored assessments. The inspectors evaluated the licensee's ability to identify and resolve issues.

### Inspection Criteria

Operability and reliability of selected radiation detection instruments were reviewed against details documented in the following: 10 CFR Part 20; NUREG-0737, "Clarification of TMI Action Plan Requirements"; UFSAR Chapter 12, TS Section 3.3.3.1, and applicable licensee procedures. Documents reviewed are listed in the report Attachment.

#### b. Findings

No findings were identified.

## 4. OTHER ACTIVITIES

### 4OA1 Performance Indicator (PI) Verification (71151 - 9 samples)

#### a. Inspection Scope

#### .1 Emergency Preparedness PIs

The inspectors sampled licensee submittals relative to the three PIs listed below for the period July 1, 2016, through June 30, 2017. To verify the accuracy of the PI data reported during that period, PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, was used to confirm the reporting basis for each data element.

### Emergency Preparedness Cornerstone

- Drill/Exercise Performance (DEP)
- Emergency Response Organization Readiness
- Alert and Notification System (ANS) Reliability

For the specified review period, the inspectors examined data reported to the NRC, procedural guidance for reporting PI information, and records used by the licensee to identify potential PI occurrences. The inspectors verified the accuracy of the PI for ERO drill and exercise performance through review of a sample of drill and event records. The inspectors reviewed selected training records to verify the accuracy of the PI for ERO drill participation for personnel assigned to key positions in the ERO. The inspectors verified the accuracy of the PI for alert and notification system reliability through review of a sample of the licensee's records of periodic system tests. The inspectors also interviewed the licensee personnel who were responsible for collecting and evaluating the PI data. Licensee procedures, records, and other documents reviewed within this inspection area are listed in the Attachment. This inspection satisfied three inspection samples for PI verification on an annual basis.

.2 Radiation Safety PIs

Occupational Radiation Safety Cornerstone

The inspectors reviewed the Occupational Exposure Control Effectiveness PI results for the Occupational Radiation Safety Cornerstone from January 2016 through June 2017. For the assessment period, the inspectors reviewed electronic dosimeter alarm logs and CAP documents related to controls for exposure significant areas. Documents reviewed are listed in the Attachment.

Public Radiation Safety Cornerstone

The inspectors reviewed the Radiological Control Effluent Release Occurrences PI results for the Public Radiation Safety Cornerstone from January 2016 through June 2017. For the assessment period, the inspectors reviewed cumulative and projected doses to the public contained in liquid and gaseous release permits and CAP documents related to Radiological Effluent TS/Offsite Dose Calculation Manual issues. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in the Attachment.

.3 Reactor Safety PIs

The inspectors reviewed a sample of the performance indicator data, submitted by the licensee, for the Unit 1 and Unit 2 PIs listed below. The inspectors reviewed plant records compiled between July 1, 2016, and June 30, 2017 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: Barrier Integrity

- reactor coolant system leak rate for Unit 1 and Unit 2
- reactor coolant system specific activity for Unit 1 and Unit 2

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 followup. The inspectors reviewed condition reports, attended screening meetings, or accessed the licensee's computerized corrective action database.

## .2 Annual Followup of Selected Issues

### a. Inspection Scope

The inspectors conducted a detailed review of the CRs below:

- CR 2132988, Unit 1 250 V DC battery ground
- CR 2129416, 3 of 11 Unit 2 Cycle 22 SRV lift pressures found outside TS

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

A licensee-identified violation is documented in Section 4OA7.

## 4OA3 Follow-up of Events (71153 – 1 sample)

### a. Inspection Scope

(Closed) Licensee Event Report (LER) 05000324/2017-003-00, Setpoint Drift in Main Steam Line Safety/Relief Valves Results in Three Valves Inoperable

On June 5, 2017, the licensee received the results of testing of 11 main steam line safety relief valves (SRVs) removed from Unit 2 during the spring RFO. Three of the 11 valves were found to have as-found lift setpoints of their pilot valves outside the  $\pm 3$  percent tolerance required by TS 3.4.3. Although the SRV setpoint limits required by the TS were exceeded, the plant condition (three valves out of tolerance) was bounded by the Brunswick Unit 2 Cycle 22 Reload Safety Analysis, which demonstrated that the SRVs could have performed their safety function of limiting reactor vessel overpressure. Specifically, the analysis concluded that with at least five total SRVs operable, the overpressure safety function would not be challenged. TS 3.4.3 requires 10 of the 11 installed SRVs to be operable. Since less than 10 SRVs were operable, this event was reported by the licensee in accordance with 10 CFR 50.73(a)(2)(i)(B) for operation prohibited by the plant's TS. The SRV pilot valves were replaced with certified spares before the startup of Unit 2. The licensee revised a procedure to reduce corrosion bonding by improving surface preparation of SRV pilot valve discs.

b. Findings

The enforcement action associated with this LER is documented in Section 4OA7. No additional findings were identified during the review of this LER. This LER is closed.

4OA6 Meetings, Including Exit

On October 25, 2017, the inspectors presented the inspection results to Mr. Gideon and other members of the licensee staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

4OA7 Licensee Identified Violation

The following finding of very low significance (Green) was identified by the licensee and is a violation of NRC requirements which meet the criteria of the NRC Enforcement Policy, for being dispositioned as a NCV.

1. 10 CFR Part 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, states in part that activities affecting quality shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, from August 2015 until April 2017, Unit 2 SRV pilot valves did not incorporate precision grinding to remove micro-cracking layer as described in licensee procedure OCM-VSR509, Main Steam Relief Valves Target Rock Model 7567 Air Operators and Pilot Assembly, Disassembly, Inspection, and Reassembly. This resulted in 3 of the 11 SRVs being out of tolerance. Since less than 10 SRVs were operable, Unit 2 operation was prohibited by TS 3.4.3. The licensee took corrective action to replace all of the pilot valves with the correct surface finish. This violation was determined to be of very low safety significance (Green) because the violation did not represent a loss of safety function since this condition was supported by the Brunswick Unit 2 Cycle 22 Reload Safety Analysis. Specifically, the analysis concluded that with at least five total SRVs operable, the overpressure safety function would not be challenged. The licensee entered this issue into their CAP as CR 2129416.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee Personnel

K. Allen	Director, Design Engineering
B. Bagwell	Environmental & Chemistry
A. Baker	Supervisor, Environmental & Chemistry
J. Berry	Supervisor, LOCT Training
P. Brown	Manager, Nuclear Performance Improvement
B. Bryant	Manager, Nuclear Oversight
J. Bryant	Regulatory Affairs
R. Carpenter	Radiation Monitor Engineer
P. Dubrouillet	Director, Nuclear Engineering, Mechanical Systems
C. Dunsmore	Manager, Nuclear Outage
W. Gideon	Vice President
L. Grzeck	Manager, Nuclear Regulatory Affairs
J. Hicks	Manager, Nuclear Training
B. Houston	Manager, Nuclear Maintenance
J. Johnson	Manager, Nuclear Chemistry
K. Krueger	Manager, Nuclear Operations
J. McAdoo	Manager, Nuclear Rad Protection
M. McPherson	Director, Nuclear Organizational Effectiveness
K. Moser	Plant Manager
B. Murray	Licensing
J. Nolin	General Manager, Nuclear Engineering
W. Orlando	Superintendent, E/I&C
O. Paladiy	Welding Engineer/Repair & Replacement Engineer
A. Padleckas	Assistant Ops Manager, Training
D. Petrusic	Superintendent, Environmental & Chemistry
J. Pierce	Manager, Nuclear Work Management
E. Rau	Operations Training
M. Regan	Project Manager, Major Projects
L. Rohrbaugh	Operator Training
M. Smiley	Manager, Nuclear Ops Training
L. Spencer	Operator Training
S. West	Director, Nuclear Plant Security
R. Wiemann	Director, Nuclear Engineering, Electrical Reactor Systems
E. Williams	Operations Manager
S. Williams	BWRVIP Program Engineer
C. Winslow	ISI Program Engineer

#### State of North Carolina

P. Cox	Department of Health and Human Services
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#### NRC Personnel

S. Rose	Chief, Reactor Projects Branch 4
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## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Closed

05000324/2017-003-00	LER	Setpoint Drift in Main Steam Line Safety/Relief Valves Results in Three Valves Inoperable (Section 4OA3)
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## LIST OF DOCUMENTS REVIEWED

### **Common Documents Reviewed**

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

### **Section 1R01: Adverse Weather Protection**

#### Procedures

0AOP-13.0, Operation During Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 66  
0AI-68, Brunswick Nuclear Plant Response to Severe Weather Warnings, Rev. 51

### **Section 1R04: Equipment Alignment**

#### Procedures

0OP-16, Reactor Core Isolation Cooling System Operating Procedure, Rev. 87  
0OP-39, Diesel Generator Operating Procedure, Rev. 184  
0OP-37, Control Building Ventilation System Operating Procedure, Rev. 62  
0PFP-DG, Diesel Generator Building PreFire Plans, Rev. 26  
1OP-17, Residual Heat Removal System Operating Procedure, Rev. 130  
2OP-17, Residual Heat Removal System Operating Procedure, Rev. 175  
AD-EG-ALL-1520, Transient Combustible Control, Rev. 7

#### Condition Reports

2137710

#### Drawings

D-02529, Reactor Core Isolation Cooling System Piping, Rev. 63

#### Miscellaneous

DBD-39, Diesel Generator System Description, Rev. 21  
SD-16, Reactor Core Isolation Cooling, Rev. 12  
SD-37, Control Building Heating, Ventilating, and Air Conditioning System, Rev. 19

### **Section 1R05: Fire Protection**

#### Procedures

CSD-BP-PFP-1RB, Reactor Building Pre-Fire Plans, Rev. 0

### **Section 1R06: Flood Protection Measures**

#### Procedures

0AOP-13.0, Operation During Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 66

#### Miscellaneous

DBD-144, External and Internal Flooding Topical Design Basis Document, Rev. 0

### **Section 1R11: Licensed Operator Regualification Program and Licensed Operator Performance**

#### Procedures

2AOP-04, Low Core Flow, Rev. 39

Condition Reports

2135260

Work Orders

20077787

Miscellaneous

LORX-063, Loss of 2XDB, Inadvertent Core Spray Initiation, Unisolable RWCU System Rupture, Rev. 3

**Section 1R12: Maintenance Effectiveness**Procedures

AD-EG-ALL-1210, Maintenance Rule Program, Rev. 1

Condition Reports

2122700      2131688

Work Orders

20076220      20114258

Miscellaneous

Self-Assessment 2075605, Maintenance Rule (a)(3) Assessment, Rev. 0

**Section 1R13: Maintenance Risk Assessment and Emergent Work Control**Procedures

AD-OP-ALL-0201, Protected Equipment, Rev. 4

**Section 1R15: Operability Determinations and Functionality Assessments**Procedures

OOP-39, Diesel Generator Operating Procedure, Rev. 184

OPT-12.2D, No. 4 Diesel Generator Monthly Load Test, Rev. 116

Condition Reports

2136973      2120738      2138157      2151329

Work Orders

20154299

Drawings

F-09345, Diesel Generator No. 1 circuit control wiring diagram, Rev. 45

Miscellaneous

DBD-39, Diesel Generator System Description  
Engineering change 290112

**Section 1R19: Post Maintenance Testing**Procedures

OPT-09.7, HPCI System Valve Operability Test, Rev. 34

OPT-34.13.4.0, Train A Control Room Emergency Ventilation System Thermal Fire Detector  
Functional Test, Rev. 4

OPT-12.2D, Units 1 and 2, No. 4 Diesel Generator Monthly Load Test, Rev. 116

OOP-39, Diesel Generator Operating Procedure, Rev. 183



Condition Reports  
2136854

Work Orders  
20183414    20076379    20034694

**Section 1R22: Surveillance Testing**

Procedures

OPT-08.2.2B, LPCI/RHR System Operability Test - Loop B, Rev. 104  
OPT-34.2.2.1, Fire Door Inspections, Rev. 54  
OPT-07.2.4B, Core Spray System Operability Test, Rev. 82  
OPT-12.2D, Units 1 and 2, No. 4 Diesel Generator Monthly Load Test, Rev. 116

Condition Reports

20057258

**Section 1EP2: Alert and Notification System Evaluation**

Procedures and Reports

0ERP, Radiological Emergency Plan (ERP), Revision 89  
SNC Alert and Notification System (ANS) Design Report  
Brunswick Nuclear Plant 2017 Emergency Preparedness Information Calendar  
WPS-2900 Series High Power Voice & Siren System Operating & Troubleshooting Manual, 2005  
0EPM-600, Brunswick Siren System User Guide, Rev. 5  
OPEP-04.2, Emergency Facilities and Equipment, Rev. 43  
OPEP-04.2, Emergency Facilities and Equipment, Rev. 44

Records and Data

Records of Silent, Full Cycle, and Growl ANS testing - July 1, 2016 through June 30, 2017  
BSEP 16-002, Siren Operability letter to FEMA, Region #4, dated January 25, 2016  
BSEP 16-012, Siren Operability letter to FEMA, Region #4, dated January 23, 2017  
BSEP 17-0012, 2016 FEMA Siren Report, 01/23/17  
Weekly Silent Tests, June 2016 – June 2017  
Quarterly Growl Tests, June 2016 – June 2017  
Annual Siren Full Volume Test, 2016  
Documentation of ANS repair and annual preventative maintenance – July 1, 2016 through June 30, 2017  
Brunswick Nuclear Plant 2016-2017 Emergency Preparedness Guide, Schools/Visitors Brochure  
AD-PI-ALL-300, Self-Assessment and Benchmark Programs, Rev. 4  
Quick Hitter Self-Assessment #2089314, 2017 BNP EP Program Readiness, 05/26/17

**Corrective Action Program Documents (Nuclear Condition Reports)**

NCR 01943666, Siren B19- Brunswick County  
NCR 01952101, Siren B19 Damaged by vehicle  
NCR 01962141, 9-8-15 BNP Siren B19 and RTU communication failure  
NCR 02022651, BNP Siren NH06 OOS  
NCR 02063498, BNP Siren B25 is indicating and RTU communication failure  
NCR 02063824, Siren B06 and B32 intermittent RTU communication failure  
NCR 02128221, Initiate NCRs for Siren Equipment Issues  
NCR 02132665, Missing Docs for Records  
Picasso Ticket INC00026313409  
Picasso Ticket INC00026301742

### **Section 1EP3: Emergency Response Organization Staffing and Augmentation System**

#### Procedures

OPEP-04.3, Performance of Training, Exercises, and Drills, Rev. 7  
 OPEP-02.1.1, Emergency Control – Unusual Event, Alert, Site Area Emergency, and General Emergency, Rev. 29  
 OPEP-02.6.28, Offsite Protective Action Recommendations, Revisions 14 and 15  
 EPQ-001, Emergency Response Organization Qualifications Checklists Brunswick, Rev. 20  
 AD-EP-ALL-0300, Self-Assessment and Benchmark Program, Rev. 4  
 AD-EP-ALL-1000, Conduct of Emergency Preparedness, Rev. 2

#### Records and Data

AD-EP-ALL-0300, Self-Assessment and Benchmark Program, Attachment 2, 2016 BNP EP Program Readiness Pre-Assessment for NRC IP71114 Inspection, 5/26/2017  
 AD-EP-ALL-0301, Activation of the Emergency Response Organization Notification System (ERONS), Revisions 0, 1, and 2  
 BNP 02/07/2016, Emergency Plan Activation Summary and Critique, Brunswick, Unit #1, E-Plan Activation  
 BNP 07/12/2016, Brunswick Unit #2 E-Plan Activation Alert EAL SA 8.1, Hazardous Event Affecting a Safety System  
 Augmentation Drill Critique Report, December 10, 2015  
 Augmentation Drill Reports and test results, EOF/TSC Activation response times, 1Q16 – 2Q17  
 Emergency Response Organization current list  
 Focused Self-Assessment report, readiness assessment for Brunswick 2016 NRC EP Biennial Inspection & Graded Exercise, and 2016 INPO/WANO Emergency Management Performance Evaluation, 6/26/2016  
 Minimum On-Shift Staffing for Emergency Response, Radiological Emergency Response Plan (0ERP), Revision 89, Attachment 1 – Page 10 of 67  
 On-call schedule, ERO memorandum, dated 8/20/2017  
 Selected ERO Personnel Estimated Response Times  
 Self-Assessment Benchmark Program, Rev. 2  
 Training Status Reports and training records for selected ERO individuals

#### Corrective Action Program Documents

NCR 02000196, BNP Alert 02-07-2016 ERO logs  
 NCR 02041356, BNP Monthly ERO Call in drills individual response trending

### **Section 1EP4: Emergency Action Level and Emergency Plan Changes**

#### Procedures

AD-EP-ALL-0202, Emergency Response Offsite Dose Assessment, Rev. 2 & 3  
 AD-EP-ALL-0502, Emergency Preparedness 10 CFR 50.54(q) Training Requirements, Rev. 0 and Rev. 1  
 AD-EP-ALL-0602, Emergency Plan Change Screening & Effectiveness Evaluations 10 CFR 50.54(q), Rev. 1  
 0ERP Radiological Emergency Response Plan Rev. 88 & 89

#### Change Packages

10 CFR 50.54(q) Screening Evaluation Form for 0ERP Radiological Emergency Response Plan Rev. 89, dated 4/10/17  
 10 CFR 50.54(q) Effectiveness Evaluation Form for 0ERP Radiological Emergency Response Plan Rev. 89, dated 4/12/17  
 10 CFR 50.54(q) Screening Evaluation Form for OPEP-02.6.28, Offsite Protective Action Recommendations, Rev. 15, 05/29/17

- 10 CFR 50.54(q) Effectiveness Evaluation Form for OPEP-02.6.28, Offsite Protective Action Recommendations, Rev. 15, 05/29/17
- 10 CFR 50.54(q) Screening Evaluation Form for AD-EP-ALL 0202, Emergency Response Offsite Dose Assessment, 11/14/16
- 10CFR 50.54(q) Effectiveness Evaluation Form for AD-EP-ALL 0202, Emergency Response Offsite Dose Assessment, 11/14/16

#### Corrective Action Program Documents

- NCR 02049711, EP 10 CFR 50.54(q) accuracy OPEP-02.2.1 (EAL Basis)
- NCR 0211730, Expanded Summer PAR Flowchart Discrepancy
- NCR 01958209, Hardened Wet-well Vent Radiation Monitor

### **Section 1EP5: Maintenance of Emergency Preparedness**

#### Procedures

- AD-NO-ALL-1001, Conduct of Audit, Rev. 4
- AD-PI-ALL-0100, Corrective Action Program, Rev. 7
- AD-PI-ALL-0300, Self-Assessment & Benchmark Programs, Rev. 4
- OPEP-04.6, Environmental Monitoring Kit, Rev. 33

#### Records and Data

- Emergency Plan Activation, Alert via EAL SA 8.1 on 07/12/2016, dated 09/23/16
- OPT-23.1, Control Room Emergency Filtration System Operability Test, Rev. 31, dated 2/9/17
- OPT-23.1.3, Control Room Emergency Ventilation System Monthly Operability Test, Rev. 9, dated 5/13/17
- OPT-93.0, EOF/TSC Building Emergency System Test, Rev. 9, dated 3/31/15
- 2015-BNP-EP-01, NOS Audit of Brunswick Emergency Preparedness, dated 7/16/15
- 2016-BNP-EP-01, NOS Audit of Brunswick Emergency Preparedness, dated 2/16/16
- 2/7/16 Actual Event on Brunswick Unit 1 Alert Declaration, dated 7/13/16
- 7/12/16 Actual Report on Brunswick Unit 2 Alert Declaration, dated 9/23/16
- BNP 2015 Population Update Analysis, dated 11/16/15
- BNP 2016 Population Update Analysis, dated 11/15/16
- BNP-EP-ID-15-04, Emergency Preparedness Limited Scope Quarterly Drill Critique Report, Rev. 1, dated 7/21/16
- BNP-EP-ID-15-05, Emergency Preparedness Limited Participation Quarterly Drill Critique Report, Rev. 1, dated 7/21/16
- BNP-EP-ID-16-03, Emergency Response Organization Drill Critique Report, Rev. 1, dated 9/30/16
- BNP-EP-ID-16-11, Emergency Response Organization Drill Critique Report, dated 10/21/16
- BNP-EP-ID-16-12, Emergency Response Organization Drill Critique Report, dated 12/27/16
- BNP-EP-EX-16-01-R1, Emergency Response Organization Exercise Critique Report, dated 10/2/16
- Brunswick Nuclear Plant Task Force Meeting Summary, dated 1/12/17
- Brunswick Nuclear Plant Task Force Meeting Summary, dated 2/11/16
- Brunswick Nuclear Plant Task Force Meeting Summary, dated 11/12/15

#### Corrective Action Documents

- NCR 01945339, Emergency kit equipment not in described location
- NCR 01972657, Control room as TSC backup
- NCR 02030141, EP release calculations incorrect
- NCR 02041382, BNP EP periodic drill requirements not demonstrated
- NCR 02030141, EP release calculations incorrect
- NCR 02041382, BNP EP periodic drill requirements not demonstrated

NCR 02030141, EP release calculations incorrect  
 NCR 02041382, BNP EP periodic drill requirements not demonstrated  
 NCR 02049720, NRC identified player critique improvements 7/26/16  
 NCR 02060853, Adherence to standards & drill critique gaps identified  
 NCR 02066304, TSC readiness concerns  
 NCR 02127330, EP emergency response facility walkdown for EP program assessment  
 NCR 02127475, DEP Notification Opp. performed by Unqualified Worker

## **Section 2RS2: Occupational ALARA Planning and Controls**

### Procedures, Guidance Documents, and Manuals

0E&RC-3101, Radiological Environmental Monitoring Program, Revision (Rev.) 36  
 0RST-Radiological Surveillance of BNP's 61BTH Independent Spent Fuel Storage Installation (ISFSI), Rev. 1  
 AD-PI-ALL-0100, Corrective Action Program, Rev. 8  
 AD-PI-ALL-0102, Apparent Cause Evaluation, Rev. 4  
 AD-RP-ALL-2000, Preparation and Management of Radiation Work Permits (RWP), Rev. 3  
 AD-RP-ALL-2006, Radiation Protection Risk Management Process, Rev. 3  
 AD-RP-ALL-4013, Area TLD Monitoring Program, Rev. 0  
 AD-RP-ALL-9000, ALARA Program, Rev. 6  
 AD-RP-ALL-9001, ALARA Planning, Rev. 3  
 MNT-NGGC-0003, Radiation Shielding Use, Rev. 16  
 TE-RP-ALL-2007, Neutron Dose Tracking, Rev. 2

### Records and Data

0RST-Radiological Surveillance of BNP's 61BTH Independent Spent Fuel Storage Installation (ISFSI), Rev. 1, 07/20/17 and 08/17/17  
 ALARA Plan No. 1082-U1ON-2017-BNP, 2017 U/1 Dry Fuel Storage Fuel Loading Campaign, Rev. 0  
 ALARA Plan No. 2260-U2OU-2017-BNP, B223R1 ISI/NDE Activities, Rev. 0  
 ALARA Plan No. 2262-U2OU-2017-BNP, Control Rod Drive Change-Out ALARA Plan for B223R1 (LPRM/Dry Tube DW Support), Rev. 1  
 ALARA Plan No. 2266T-U2OU-2017-BNP, Insulation Activities, Rev. 0  
 ALARA Plan No. 2281-U2OU-2017-BNP, B223R1 Reactor Reassembly Activities, Revs. 0 and 1  
 B223R1 SAC Meeting Minutes, 04/05/17 and 04/12/17  
 Brunswick Nuclear Plant, ALARA, B223R1 Refueling Outage Report, Rev. 00  
 Brunswick Nuclear Plant, Radiological Survey, Survey BNP-M-20170815-2, Post drain down of DSC-LT22 (Tech Spec Survey), 08/15/17  
 Challenge ALARA Committee Meeting Minutes, 04/03/17, 04/06/17, and 04/11/17  
 ISI NDE ALARA Plan Rev. 1 Dose Approval Meeting Minutes, 04/08/17 and 04/10/17  
 Radiation Work Permit No. 1030, U1 RB0 Dry Fuel Storage, Rev. 04  
 REMP TLD Summary Report for ISFSI, Monitoring Period 07/08/16 – 07/07/17  
 Station ALARA Committee Meeting Minutes, 03/26/17, 03/27/17, 03/28/17, 03/29/17, 03/30/17, 03/31/17, and 04/13/17  
 Temporary Shielding Request (TSR) No. 2-17RF-010, Source Description: B32, RCR, 2020 Recirc System Piping shielding on all sizes, loops and valves shown on the attachments, Rev. 0, 05/17/17  
 TSR No. 2-17RF-030, Source Description: FW, B21, 1005 N4 A, B, C, D Feedwater Nozzles 67' Elevation, Rev. 0, 05/17/17  
 TSR No. 2-17RF-040, Source Description: N5 A&B Loop Core Spray Nozzles, Rev. 0, 05/17/17

Corrective Action Program (CAP) Documents

Apparent Cause Evaluation Report No. 02112968-01,

AR 02112630

AR 02112968

AR 02115996

Self-Assessment Report, Self-Assessment No. AR 02079140, Brunswick Nuclear Plant  
Radiation Protection Source Term Review 2016

**Section 2RS5: Radiation Monitoring Instrumentation**Procedures, Guidance Documents, and Manuals

AD-CP-ALL-0013, Count Room Quality Assurance, Rev. 1

AD-PI-ALL-1000, Corrective Action Program, Rev. 8

AD-RP-ALL-7000, Use of Sample Manager for Radiation Protection Equipment, Rev. 1

AD-RP-ALL-7001, Radiation Protection Support Equipment Issue and Return, Rev. 1

AD-RP-ALL-7005, Radiation Protection Portable Instrument Source Check, Rev. 1

AD-RP-ALL-7007, Apex Whole Body Counter Calibration, Rev. 1

AD-RP-ALL-7008, Apex InVivo Whole Body Counter Operation, Quality Checks and Data  
Review, Rev. 1

ENRAD-PROC-825, Source Check of Fixed Instrumentation, Rev. 6

0E&RC-0295, Operation / Calibration of the Canberra ICAM and ICAM Ping, Rev. 6

0PEP-02.1, Brunswick Nuclear Plant Initial Emergency Actions, Rev. 53

0PT-01.14B, Equipment and Instrument Channel Checks, Rev. 66

Records and Data

0E&RC-0295, Operation/Calibration of the Canberra ICAM and ICAM Ping, EnRad No. 11873,  
05/20/15 and 10/31/16

2016 Recalibration of the Canberra Apex In-Vivo Extended Fastscan Counting System,  
11/10/16

2900TR Tri-Carb – Effluent H3 Bkg Response Chart, 06/17/17 – 08/16/17

2900TR Tri-Carb – H3 Source Check Response Chart, 06/17/17 – 08/16/17

AD-RP-ALL-7005, Attachment 2, Daily or Weekly Extended Use Source Check Records  
(Cronos / Argos), 07/13/17 – 08/13/17

Analytics Certificate of Calibration, Standard Radionuclide Source, 28417-10, 01/01/88

BNPFS1 (WBC) Daily Calibration and Background Check, 08/16/17

BNPFS2 (WBC) Daily Calibration and Background Check, 08/16/17

Brunswick Nuclear Plant, Verification of the Calibration of the Hopewell BX3, 04/26/17

Brunswick, Verification of the BNP Shepherd Calibrator Master Recertification, 03/9/17

DOS-NGGC-0020, Attachment 1, WBC Calibration Verification Record, and Attachment 2, WBC  
Calibration Verification Results, 08/20/15

Detector 4 (HPGE Count Room) – 59.5 keV, 661 keV, and 1332 keV Activity Response Charts,  
06/17/17 – 08/16/17

Detector 4 (HPGE Count Room) – Background Response Chart, 06/17/17 – 08/16/17

EnRad Laboratories, Central Calibration Facility, Certificates of Calibrations: 07248, S/N

290099, Lud-93, 08/04/14 and 01/17/17; 10197, S/N 46750, Lud-177, 03/11/16 and 06/28/17;

11698, S/N 1105-065, GEM-5 (Security Portal), 08/08/16 and 07/31/17; 12228, S/N 6613-145,

Telepole, 03/08/16 and 03/1/17; 02834, S/N 252007, Lud 12-4 (Remball), 11/20/14 and

04/26/17

WMG Nuclide Distribution Report (Part 61), DAW, 08/08/16

WO 02125941 01, Perform 0MST-AMI24R, Post Accident High Range (U1), 02/20/14

WO 02125942 01, Perform 0MST-AMI23R, AMI Post Accident High Range (U1), 02/19/14

WO 13425619 01, Perform 0MST-AMI24R, Post Accident High Range (U1), 02/04/16

WO 13425620 01, Perform 0MST-AMI23R, AMI Post Accident High Range (U1), 02/03/16

WO 13530683 01, U2 Hi-Range DW Rad Monitor Out of Spec, 03/22/16  
 Source Certificate of Compliance 84R129 (DW HR RM), 01/14/05  
 System Health Report, Radiation Monitoring, 07/10/17  
 TN-05 (Count Room) – Alpha Background Response Chart (Count Room), 06/18/17 – 08/16/17  
 TN-05 (Count Room) – Alpha Source Check Response Chart (Count Room), 07/22/17 –  
 08/16/17  
 TN-05 (Count Room) – Background Response Chart (Count Room), 06/18/17 – 08/16/17  
 TN-05 (Count Room) – Beta Source Check Response Chart (Count Room), 07/22/17 –  
 08/16/17

#### CAP Documents

AD-PI-ALL-0300, Quick-Hitter Self-Assessment Report, 02103536-05, 2/9/17  
 NCR 00738968  
 NCR 00748056  
 NCR 00749749  
 NCR 00755051  
 NCR 01939459  
 NCR 02002862  
 NCR 02009313  
 NCR 02062733  
 NCR 02106923

#### **Section 40A1: Performance Indicator Verification**

##### Procedures, Guidance Documents, and Manuals

AD-EP-ALL-0002, NRC Regulatory Assessment Performance Indicator Guideline Emergency Preparedness Cornerstone, Rev. 2  
 AD-LS-ALL-004, NRC Performance Indicators and Monthly Operating Report, Rev. 1  
 AD-LS-ALL-0004, NRC Performance Indicator and Monthly Operating Report, Rev.1  
 AD-RP-ALL-1101, Performance Indicators (PI) for the Occupational and Public Radiation Cornerstones, Rev. 0

##### Records and Data

Annual Radioactive Effluent Release Report, 2016  
 DEP opportunities documentation for 3<sup>rd</sup> and 4<sup>th</sup> quarters 2016, 1<sup>st</sup> and 2<sup>nd</sup> quarters 2017  
 Drill and exercise participation records of ERO personnel for 3<sup>rd</sup> and 4<sup>th</sup> quarters 2016, 1<sup>st</sup> and 2<sup>nd</sup> quarters 2017  
 G-2017-0598, Gas Permit Post-Release Data, 07/12/17  
 G-2017-0604, Gas Permit Post-Release Data, 07/12/17  
 Gas Status Summary Report, Site; Annual 2016 and January to July 19, 2017  
 L-2017-0137, Liquid Permit Post-Release Data, 07/18/17  
 Liquid Status Summary Report, Liquid Radwaste; Annual 2016 and January to July 2017  
 List of Brunswick Dose and Dose Rate Alarms, Jan 2016 – June 2017  
 Siren test data for 3<sup>rd</sup> and 4<sup>th</sup> quarters 2016, 1<sup>st</sup> and 2<sup>nd</sup> quarters 2017

##### Corrective Action Documents

BNP-EP-ID-16-03, Emergency Response Organization Drill Critique Report, Rev. 1, dated 9/30/16  
 BNP-EP-ID-16-11, Emergency Response Organization Drill Critique Report, dated 10/21/16  
 BNP-EP-ID-16-12, Emergency Response Organization Drill Critique Report, dated 12/27/16  
 BNP-EP-EX-16-01-R1, Emergency Response Organization Exercise Critique Report, dated 10/2/16  
 Brunswick Nuclear Plant Task Force Meeting Summary, dated 1/12/17  
 Brunswick Nuclear Plant Task Force Meeting Summary, dated 2/11/16

Brunswick Nuclear Plant Task Force Meeting Summary, dated 11/12/15  
 Focused Self-Assessment Report #01988295, dated 4/12/17  
 Quick Cause Evaluation for NCR 02060853-02, dated 11/7/16  
 Quick Hit Self-Assessment Report #02089314-05, dated 10/20/16  
 NCR 02000231, EP DEP KPI changed to Yellow  
 NCR 02001390, Revision to ERO qualification checklist is needed (EPQ-001)  
 NCR 02048866, 7/26/16 EP Exercise DEP Failure – SAE Classification Time  
 NCR 02049327, 7/26/16 EP Exercise – ORO PAG did not match the BNP PAR  
 NCR 02049712, Out of Sequence notifications counted for DEP  
 NCR 02052843, BNP EP DEP KPI changed to red for July 2016  
 NCR 02107511, BNP Tier 3 KPI for Non-DEP is Red

## **Section 40A2: Problem Identification and Resolution**

### Procedures

1OP-51, DC Electrical System Operating Procedure, Rev. 76  
 0AI-115, 125/250 VDC System Ground Correction Guidelines, Rev.11

### Condition Reports

2132988      2131694      2129416      737292

### Work Orders

20076264

### Miscellaneous

SD-51, DC Distribution System, Rev.10  
 QCE 2129416  
 ACE 737292

## **Section 40A3: Follow-up of Events**

### Procedures

0CM-VSR509, "Main Steam Relief Valves Target Rock Model 7567 Air Operators and Pilot Assembly Disassembly, Inspection, and Reassembly, Rev. 21

### Condition Reports

2129416      737292

### Work Orders

20076264

### Miscellaneous

ACE 737292      EC 409048      QCE 2129416

**Section 40A7: Licensee Identified Violations**

Procedures

OCM-VSR509, "Main Steam Relief Valves Target Rock Model 7567 Air Operators and Pilot Assembly Disassembly, Inspection, and Reassembly, Rev. 21

Condition Reports

2129416      737292

Work Orders

20076264

Miscellaneous

ACE 737292      EC 409048      QCE 2129416