



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

February 11, 2019

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 05000325/2018004 AND 05000324/2018004

Dear Mr. Gideon:

On December 31, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Brunswick Steam Electric Plant, Units 1 and 2 facilities. On January 23, 2019, 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.

The NRC inspectors did not identify any finding or violation of more than minor significance.

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/

Lundy F. Pressley, Acting Chief
Reactor Projects Branch 4
Division of Reactor Projects

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

Enclosure:
IR 05000325, 324/2018004
w/Attachment: Supplementary Information

cc: Distribution via ListServ

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REPORT 05000325/2018004 AND 05000324/2018004 February 11, 2019

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Numbers: 50-325, 50-324

License Numbers: DPR-71, DPR-62

Report Numbers: 05000325/2018004, 05000324/2018004

Enterprise Identifier: I-2018-004-0047

Licensee: Duke Energy Progress, LLC

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: Southport, NC

Inspection Dates: October 1, 2018 to December 31, 2018

Inspectors: G. Smith, Senior Resident Inspector
J. Steward, Resident Inspector
M. Bates, Senior Operations Engineer
D. Bacon, Senior Operations Engineer
A. Goldau, Operations Engineer

Approved By: Lundy F. Pressley, Acting Chief
Reactor Projects Branch 4
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring licensee's performance by conducting a quarterly integrated inspection at Brunswick Steam Electric Plant, Units 1 and 2 in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

No findings were identified.

PLANT STATUS

Unit 1 began the inspection period at 100 percent rated thermal power (RTP) and continued to operate there until October 19, when power was reduced to 77 percent RTP in order to perform a control rod improvement and execute the testing associated with the modification “maximum extended load limit line plus (MELLLA+).” The unit was restored to 100 percent RTP on October 20, where it continued to operate until October 27, when power was again reduced to 77 percent RTP for MELLLA+ testing. Following completion of testing, power was restored to 100 percent RTP where the unit continued to operate until November 12, when power was reduced to 87 percent RTP due to a loss of one of the four Unit 1 switchyard lines (Jacksonville). Following repairs to the Jacksonville line, the unit was returned to 100 percent RTP where it continued to operate until December 14, when power was reduced to 50 percent RTP to perform planned maintenance on the ‘A’ recirculation pump motor variable frequency drive (VFD). The licensee elected to enter single loop operation on the ‘B’ recirculation pump to replace all the VFD power cells associated with the ‘A’ recirculation pump motor. Following the VFD power cell replacement, a follow-on rod sequence exchange, control rod drive (CRD) maintenance, and turbine valve testing, the unit was restored to 100 percent RTP on December 18, where it continued to operate for the remainder of the period.

Unit 2 began the inspection period at 94 percent RTP due to a failure of one of the four Unit 2 off site power lines (Wallace). On October 10, a temporary repair was completed on the Wallace line and the unit was restored to 100 percent RTP where it continued to operate until November 2, when power was reduced to 70 percent RTP for a rod improvement. On November 3, the unit was restored to 100 percent RTP where it continued to operate until November 16, when power was again reduced to 70 percent RTP for a rod improvement. On November 17, power was restored to 100 percent RTP where it continued to operate until December 8, when power was reduced to 55 percent RTP for a control rod sequence exchange, CRD maintenance, and turbine valve testing. Following completion of these activities, the unit was restored to 100 percent RTP on December 11, where it continued to operate until December 31, when the ‘A’ reactor feed pump tripped and caused a partial runback. Power was stabilized at 60 percent when the inspection period ended.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, “Light-Water Reactor Inspection Program - Operations Phase.” The inspectors performed plant status activities described in IMC 2515, Appendix D, “Plant Status,” and conducted routine reviews using IP 71152, “Problem Identification and Resolution.” The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.”

REACTOR SAFETY

71111.01 - Adverse Weather Protection

External Flooding (1 Sample)

The inspectors completed an evaluation of the site's readiness to cope with external flooding on December 21, 2018.

71111.04 - Equipment Alignment

Partial Walkdown (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Unit 1 conventional service water (CSW) and Unit 2 service water (SW) systems during '1A' bay cleaning on October 16, 2018.
- (2) Unit 1 residual heat removal (RHR) 'A' loop while 'B' loop was out of service (OOS) on October 30, 2018.
- (3) Emergency diesel generator (EDG)-2 while EDG-3 was OOS on November 27, 2018.

71111.05AQ - Fire Protection Annual/Quarterly

Quarterly Inspection (4 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) Unit 1 turbine building 38 foot (ft) and 41 ft elevations on November 2, 2018.
- (2) EDG building EDG cells 1,2,3,4 (elevation 26 ft) on November 18, 2018.
- (3) EDG building emergency switchgear cells 1,2,3,4 (elevation 50 ft) on November 18, 2018.
- (4) Augmented off-gas (AOG) building (21 ft and 37 ft elevations and AOG roof) on December 19, 2018.

Annual Inspection (1 Sample)

- (1) Fire drill in the Unit 2 reactor building (RB) Health Physics office 20 ft elevation on October 19, 2018.
- (2) Fire drill in the Unit 1 turbine building, 38 ft elevation south (MCC 1TG) on November 2, 2018.

71111.11 - Licensed Operator Requalification Program and Licensed Operator Performance

Biennial Operator Requalification Program (1 Sample)

The inspectors evaluated the licensed operator requalification program on September 10, 2018, and from October 16-18, 2018.

Operator Exams (1 Sample)

The inspectors reviewed and evaluated requalification examination results on November 28, 2018.

Operator Requalification (1 Sample)

The inspectors observed and evaluated a Cycle 5 evaluated simulator scenario on November 15, 2018.

Operator Performance (1 Sample)

The inspectors observed and evaluated a Unit 2 down power and turbine valve retest on October 9, 2018, and a Unit 2 rod exercise testing on December 7, 2018.

71111.12 - Maintenance Effectiveness

Routine Maintenance Effectiveness (2 Samples)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

- (1) EDG-3 major bearing replacement outage on November 30, 2018.
- (2) On December 20, 2018, the inspectors completed an evaluation of the Unit 2 'A' recirculation pump trip which occurred on July 6, 2018.

71111.13 - Maintenance Risk Assessments and Emergent Work Control (4 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) Unit 1 'B' CSW strainer repair on October 8, 2018.
- (2) Yellow risk during Unit 1 'B' train RHR system outage on October 31, 2018.
- (3) EDG-3 outage on November 30, 2018.
- (4) Unit 1 down power to 50 percent for planned single loop operations on '1B' recirculation loop to provide for VFD power cell replacement on '1A' recirculation pump motor on December 14, 2018.

71111.15 - Operability Determinations and Functionality Assessments (5 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) CR 2239512 - Immediate Determination of Operability (IDO) due to oil leak from containment atmosphere radiation monitor sample pump on November 30, 2018.
- (2) CR 2239641 - IDO regarding '1D' control building heating, ventilation, and air conditioning (HVAC) unit not cooling on December 18, 2018.
- (3) CR 2246721 - IDO on EDG-2, slight oil leak identified on the crankcase vacuum pump Oil Separator on December 20, 2018.
- (4) CR 2239777 - Bus 'E2' under frequency device failed on December 21, 2018.

- (5) Various work orders associated with control rod operability potential issue of concern for planned maintenance on hydraulic control units (HCUs) 06-35, 10-35, 18-11 and 18-39 on December 18, 2018.

71111.18 - Plant Modifications (1 Sample)

The inspectors evaluated the following permanent modification:

- (1) Engineering change (EC) 402758 – MELLLA+ on December 17, 2018.

71111.19 - Post Maintenance Testing (9 Samples)

The inspectors evaluated the following post maintenance tests (PMTs):

- (1) PMT on the diesel-driven fire pump (2-FP-RV1), work order (WO) task instructions on October 3, 2018.
- (2) PMT (OPT-12.26, Supplemental Diesel Generator Load Test), partial for Diesel Air Compressor PMT on October 10, 2018.
- (3) PMT (OPT-06.1, Standby Liquid Control System Operability Test) following maintenance on 2A Standby Liquid Control (SLC) Pump on November 01, 2018.
- (4) PMT RHR Loop B Valve Stroking (E11-F007B and E11-F048B) following maintenance, OPT-08.2.2B, LPCI/RHR System Operability Test – Loop B (Unit 1) on November 6, 2018.
- (5) PMT for 2-E11-F016B, Drywell Spray Outboard Isolation Valve, following maintenance, OPT-08.2.2B, LPCI/RHR System Operability Test – Loop B (Unit 2) on November 28, 2018.
- (6) PMT on Unit 1 for main steam low pressure transmitter PT-N015A on November 19, 2018.
- (7) PMT for '1B' CSW pump strainer repair on November 20, 2018.
- (8) PMT for '2B' RHRSW booster pump and various system valves, following maintenance, OPT-08.1.4B, RHR Service Water System Operability Test – Loop B on November 21, 2018.
- (9) PMT on EDG-3 following bearing replacement, OCM-ENG519, Nordberg Emergency Diesel Suggested Engine "Break-In" Schedule on December 10, 2018.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Routine (2 Samples)

- (1) OPT-12.2C, No. 3 Diesel Generator Monthly Load Test, (Unit 2) on December 12, 2018.
- (2) OPT-12.8.1, Breaker Alignment Operability Test, (Unit 1 and Unit 2) on December 21, 2018.

In-service (2 Samples)

- (1) OPT-08.1.4B, RHR Service Water System Operability Test – Loop B (Unit 2) on October 29, 2018.
- (2) OPT-08.1.4B, RHR Service Water System Operability Test – Loop B (Unit 1) on November 19, 2018.

Reactor Coolant System Leak Detection (1 Sample)

(1) Unit 1, 1-OI-03.1 Reactor Operator Daily Surveillance Report on December 14, 2018.

71114.06 - Drill Evaluation

Drill/Training Evolution (1 Sample)

The inspectors evaluated a drill and exercise performance opportunity during an evaluated simulator session on November 29, 2018.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below for the period from October 1, 2017, through September 30, 2018. (6 Samples)

- (1) MS07: Unit 1 MSPI - High pressure injection systems
- (2) MS07: Unit 2 MSPI - High pressure injection systems
- (3) MS08: Unit 1 MSPI - Heat removal systems
- (4) MS08: Unit 2 MSPI - Heat removal systems
- (5) MS09: Unit 1 MSPI - RHR systems
- (6) MS09: Unit 2 MSPI - RHR systems

71152 - Problem Identification and Resolution

Semiannual Trend Review (1 Sample)

The inspectors completed an evaluation of the licensee's corrective action program (CAP), which included the search for any trends that might be indicative of a more significant safety issue, on December 31, 2018.

Annual Follow-up of Selected Issues (1 Sample)

The inspectors reviewed the licensee's implementation of its CAP related to the following issue:

- (1) NCR 2217082 – Inconsistent Use of Performance Analysis Process for Performance Gaps on December 31, 2018.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

60855.1 - Operation of an Independent Spent Fuel Storage Installation (1 Sample)

The inspectors evaluated the licensee's independent spent fuel storage installation pad by completing a walk-down on December 19, 2018.

INSPECTION RESULTS

Observation	71152 – Annual Follow up of Selected Issues
<p data-bbox="201 331 1401 394"><u>Annual Follow-up of Selected Issues: Inconsistent Use of Performance Analysis Process for Performance Gaps</u></p> <p data-bbox="201 432 1422 693">The inspectors conducted a detailed review of CR 2217082, “Inconsistent Use of Performance Analysis Process for Performance Gaps.” The inspectors chose this sample as it dealt with a significant breakdown in the corrective action process where training deficiencies were not promptly dealt with in the corrective action process. The licensee performed a detailed root cause analysis and developed several corrective actions to address the deficiencies. The inspectors determined that the licensee’s plan to address this issue was reasonably commensurate with the safety significance of equipment that might be affected by this type of programmatic failure.</p>	

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On November 28, 2018, the inspectors presented the licensed operator requalification inspection results to Mr. K. Moser, Plant Manager, and other members of the licensee staff.
- On January 23, 2019, the inspectors presented the quarterly inspection results to Mr. K. Moser, Plant Manager, and other members of the licensee staff.

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

71111.01 - Adverse Weather Protection

Procedures

0AI-68, Brunswick Nuclear Plant Response to Severe Weather Warnings, Rev. 55
0AOP-13.0, Operation during Hurricane, Flood Condition, Tornado, or Earthquake, Rev. 68

Miscellaneous

DBD-144, External and Internal Flooding, Rev. 1

71111.04 - Equipment Alignment

Procedures

1OP-17, Residual Heat Removal System Operating Procedure, Rev. 132
Updated Final Safety Analysis Report, Section 5.4.7, Residual Heat Removal System, Rev. 26
0OP-39, Diesel Generator Operating Procedure, Rev. 190
Updated Final Safety Analysis Report, Section 8.3.1.1, Onsite Power Systems Description,
Rev. 26

Drawings

D-25025 Sheet 1A, Reactor Building Residual Heat Removal System Piping Diagram, Rev. 59
D-25025 Sheet 1B, Reactor Building Residual Heat Removal System Piping Diagram, Rev. 74
D-25025 Sheet 2A, Reactor Building Residual Heat Removal System Piping Diagram, Rev. 62
D-25025 Sheet 2B, Reactor Building Residual Heat Removal System Piping Diagram, Rev. 71
D-02270, sheet 1B, Diesel Generator Lube Oil System Piping Diagram, Rev. 23
D-02265, sheet 1B, Starting Air for Diesel Generators Piping Diagram, Rev. 28
D-02272, sheet 1B, Diesel Generator Jacket Water System Piping Diagram, Rev. 16
D-02268, sheet 1B, Fuel Oil Diesel Generators Piping Diagram, Rev. 31
D-02267, sheet 1, Diesel Generator Air Intake Exhaust & Crankcase Vacuum System Piping
Diagram, Rev. 13

71111.05AQ - Fire Protection Annual/Quarterly

Procedures

CSD-BNP-PFP-1TB, Turbine Building Prefire Plans, Rev. 3
0FPP-060, Fire Drill Program, Rev. 2
0PFP-013, General Fire Plan, Rev. 54
AD-EG-ALL-1532, NFPA 805 Pre-Fire Plans, Rev.1
AD-EG-ALL-1520, Transient Combustible Control, Rev. 11
CSD-BNP-PFP-0PBAA, Power Block Auxiliary Areas Pre-Fire Plans, Rev. 1

71111.11 - Licensed Operator Requalification Program and Licensed Operator Performance

Simulator Exam

LORX-055, Rev 01

LORX-180, Rev 0

LORX-020, Rev 14

LORX-065, Rev 03

LORX-18, Rev. 15a, Requal scenario given November 15, 2018

JPMs

AOT-OJT-JP-008-03, Rev 5

AOT-OJT-JP-303-19, Rev 0

LOT-SIM-JP-002-A03, Rev 2

LOT-SIM-JP-007-04, Rev 3

LOT-OJT-JP-300-K17, Rev 2

AOT-OJT-JP-008-04, Rev 5

AOT-OJT-JP-304-16, Rev 5

LOT-ADM-JP-201-E05, Rev 1

LOT-SIM-JP-010-A02, Rev 10

LOT-SIM-JP-015-01, Rev 1

Written Exam

2017 Biennial Exam 3 (RO), 09/05/2017

2017 Biennial Exam 3 (SRO), 09/05/2017

Simulator Performance

STP-TN-001, Rev 3

STP-TN-002, Rev 3

STP-TN-004, Rev 4

STP-TN-005, Rev 5

STP-TN-006, Rev 4

STP-TN-006.1, Rev 5

STP-TN-007, Rev 5

STP-TN-008, Rev 6

SSR 16-0030, 12/21/2016

SSR 17-0022, 11/16/2017

Corrective action process review

AR 02152308, 09/20/2017

AR 02138707, 07/24/2017

AR 02088862, 01/02/2017

AR 02225236, 08/20/2018

LOR-SIM-2017 Diagnostic, Rev 00

OPS-EDG-DLA, Rev 00

71111.12 - Maintenance Effectiveness

Procedures

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

Condition Reports

CR 2221408

CR 2217180

Miscellaneous

Maintenance Rule Database

NUMARC 93-01, Industry Guidelines for monitoring the effectiveness of maintenance at Nuclear Power Plants, Rev. 4A

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Procedures

0AP-025, BNP Integrated Scheduling, Rev. 57

AD-OP-ALL-0201, Protected Equipment, Rev. 05

0AP-022, BNP Outage Risk Management, Rev. 59

AD-WC-ALL-0250, Work Implementation and Completion, Rev. 09

AD-WC-ALL-0410, Work Activity Integrated Risk Management, Rev. 07

AD-WC-ALL-0200, Online Work Management, Rev. 13

AD-WC-ALL-0430, Outage Risk Review, Rev. 04

71111.15 - Operability Determinations and Functionality Assessments

Procedures

AD-OP-ALL-0105, Operability Determinations and Functionality Assessments, Rev. 4

AD-PI-ALL-0100, Corrective Action Program, Rev. 20

Condition Reports

2239512

2239641

2246721

2239777

Work Orders

20124069

20245280

20270522

12291326

20270745

20270747

71111.18 - Plant Modifications

Procedures

PD-EG-ALL-1130, Engineering Change Program. Rev. 0

1SP-EC402758-01, Unit 1 MELLLA+ Test Plan, Rev. 0

1PT-01.11, Core Performance Parameter Check, Rev. 25

71111.19 - Post Maintenance Testing

Procedures

PMT on Diesel Fire Pump, Work Order Task Instructions, 2-FP-RV1

OPT-12.26, Supplemental Diesel Generator Load Test, Rev. 5
OPT-06.1, Standby Liquid Control System Operability Test, Rev. 89
OPT-08.2.2B, LPCI/RHR System Operability Test - Loop B, Rev. 107
OPT-08.1.4B, RHR Service Water System Operability Test – Loop B, Rev. 77
OCM-ENG519, Nordberg Emergency Diesel Suggested Engine “Break-In” Schedule, Rev. 19

Work Orders

20213384
20278747-03
13452788-03
20120571
20220921
20112135
20262530
20208983
20243926
20222075
20222074
20140456
20107025
20243479-02
20273508

71111.22 - Surveillance Testing

Procedures

OPT-08.1.4B, RHR Service Water System Operability Test – Loop B, Rev. 77
OPT-12.2C, NO.3 Diesel Generator Monthly Load Test, Rev. 116
OPT-12.8.1, Breaker Alignment Operability Test, Rev. 13

Work Orders

20214589
20135649
20220920
20111302
20298346

71114.06 - Drill Evaluation

Procedures

AD-OP-ALL-0101, Event Response and Notifications, Rev. 009
OPEP-02.1, Initial Emergency Actions, Rev. 054
OPEP-02.1.1, Emergency Control - Unusual Event, Alert, Site Area Emergency, and General
Emergency, Rev. 031
OOI-01.07, Notifications, Rev. 041

Simulator Exam

LORX-029, Rev 08a, Shift manager qualification scenario on the simulator given
November 29, 2018

71151 - Performance Indicator Verification

Procedures

AD-LS-ALL-004, NRC Performance Indicators and Monthly Operating Report, Rev. 3
REG-NGGC-0009, NRC Performance Indicators and Monthly Operating Report Data, Rev. 15

Miscellaneous

Operator narrative logs from 2018

71152 - Problem Identification and Resolution

Procedures

AD-HU-ALL-0001, Human Performance Program, Rev. 15
AD-PI-ALL-0100, Corrective Action Program, Rev. 20
AD-PI-ALL-0101, Root Cause Evaluation, Rev. 06
AD-PI-ALL-0102, Apparent Cause Evaluation, Rev. 04
AD-PI-ALL-0400, Operating Experience Program, Rev. 07