



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II

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

July 6, 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 – NRC PROBLEM IDENTIFICATION  
AND RESOLUTION INSPECTION REPORT NOS.: 05000325/2017009 AND  
05000324/2017009**

Dear Mr. Gideon:

On May 25, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed a problem identification and resolution biennial inspection at your Brunswick Steam Electric Plant, Units 1 and 2 and discussed the results of this inspection with you and other members of your staff. The inspection team documented the results of this inspection in the enclosed inspection report.

The NRC inspection team reviewed the station's corrective action program and the station's implementation of the program to evaluate its effectiveness in identifying, prioritizing, evaluating, and correcting problems, and to confirm that the station was complying with NRC regulations and licensee standards for corrective action programs. Based on the samples reviewed, the team determined that your staff's performance in each of these areas adequately supported nuclear safety.

The team also evaluated the station's processes for use of industry and NRC operating experience information and the effectiveness of the station's audits and self-assessments. Based on the samples reviewed, the team determined that your staff's performance in each of these areas adequately supported nuclear safety.

Finally, the team reviewed the station's programs to establish and maintain a safety-conscious work environment, and interviewed station personnel to evaluate the effectiveness of these programs. Based on the team's observations and the results of these interviews, the team found no evidence of challenges to your organization's safety-conscious work environment. Your employees appeared willing to raise nuclear safety concerns through at least one of the several means available.

NRC inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

W. Gideon

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

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; and the NRC resident inspector at the Brunswick Steam Electric Plant.

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/*

Reinaldo Rodriguez, Chief  
Reactor Projects Branch 7  
Division of Reactor Projects

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

Enclosure:  
IR 05000325/2017009, 05000324/2017009  
w/Attachment: Supplemental Information

cc Distribution via ListServ

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT – NRC PROBLEM IDENTIFICATION  
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05000324/2017009 July 6, 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.: 05000325/2017009, 05000324/2017009

Licensee: Duke Energy Progress, Inc.

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: Southport, NC

Dates: May 8, 2017 through May 25, 2017

Inspectors: D. Retterer, Resident Inspector, Team Leader  
M. Schwieg, Resident Inspector  
N. Staples, Senior Project Inspector  
A. Wilson, Project Engineer

Approved by: R. Rodriguez, Chief  
Reactor Projects Branch 7  
Division of Reactor Projects

Enclosure

## SUMMARY

IR 05000325/2017009, 05000324/2017009; May 8, 2017 – May 25, 2017; Brunswick Steam Electric Plant, Units 1 and 2; Biennial Problem Identification and Resolution report.

The inspection was conducted by one senior reactor inspector, two resident inspectors, and a project engineer. There was one self-revealed violation documented in this report. The significance of inspection findings are indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," (SDP) dated April 29, 2015. The cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas" dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated 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.

### Cornerstone: Mitigating Systems

- Green. A self-revealing Green non-cited violation (NCV) of 10 CFR 50 Appendix B Criterion XVI, "Corrective Actions," was identified on February 19, 2017, when emergency diesel generator (EDG) number one was determined to be inoperable due to an oil leak on the linkshaft hydraulic control assembly. This violation of regulatory requirement existed from October 27, 2015 until February 20, 2017. The licensee entered this issue in their corrective action program as nuclear condition report (NCR) 02101084.

The inspectors determined that the finding was more than minor because it was associated with the Mitigating Systems cornerstone attribute of Equipment Performance and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, failure to correct a condition adverse to quality led to the inoperability of EDG1. The inspectors screened this finding using IMC 0609, Appendix A, "The Significant Determination Process (SDP) For Findings At-Power," dated June 19, 2012, Based on Exhibit 2, Question A3, the inspectors determined that a detailed risk evaluation was necessary given the uncertainty over how long EDG1 would have operated while leaking oil. A regional senior reactor analyst (SRA) conducted the risk assessment and screened the issue to Green based on an increase in risk of less than 1E-6. The inspectors determined that this finding did not have an associated cross cutting aspect because this finding was not reflective of current licensee performance due to enhancements of site procedures guiding creation of work orders. (4OA2.1)

### Identification and Resolution of Problems

The inspectors concluded that, in general, problems were properly identified, evaluated, prioritized, and corrected. The licensee was effective at identifying problems and entering them into the corrective action program (CAP) for resolution, as evidenced by the relatively few number of deficiencies identified by external organizations (including the NRC) that had not been previously identified by the licensee, during the review period. Generally, prioritization and evaluation of issues were adequate, formal root cause evaluations for significant problems were adequate, and corrective actions specified for problems were acceptable. Overall, corrective actions developed and implemented for issues were generally effective and implemented in a timely manner.

The inspectors determined that overall, audits and self-assessments were adequate in identifying deficiencies and areas for improvement in the CAP, and appropriate corrective actions were developed to address the issues identified. Operating experience (OE) usage was found to be generally acceptable and integrated into the licensee's processes for performing and managing work and plant operations.

Based on discussions and interviews conducted with plant employees from various departments, the inspectors determined that personnel at the site felt free to raise safety concerns to management and use the CAP to resolve those concerns.

## REPORT DETAILS

### 4. OTHER ACTIVITIES

#### 4OA2 Problem Identification and Resolution

##### .1 Assessment of the Corrective Action Program

###### a. Inspection Scope

The inspectors reviewed the licensee's CAP procedures which described the administrative process for initiating and resolving problems primarily through the use of the problem investigation program. To verify that problems were properly identified, appropriately characterized and entered into the CAP, the inspectors reviewed Nuclear Condition Reports (CRs) that were issued between June 2015 and May 2017, including a detailed review of selected CRs associated with the following risk-significant systems: emergency diesel generators, reactor core isolation cooling, residual heat removal and safety relief valves. Where possible, the inspectors independently verified that the corrective actions were implemented. The inspectors also reviewed selected common causes and generic concerns associated with root cause evaluations to determine if they had been appropriately addressed. To help ensure that samples were reviewed across all cornerstones of safety identified in the NRC's Reactor Oversight Process (ROP), the inspectors selected a representative number of CRs that were identified and assigned to the major plant departments, including operations, maintenance, engineering, health physics, chemistry, emergency preparedness and security. These CRs were reviewed to assess each department's threshold for identifying and documenting plant problems, thoroughness of evaluations, and adequacy of corrective actions (CAs). The inspectors reviewed selected CRs, verified corrective actions were implemented, and attended meetings where CRs were screened for significance to determine whether the licensee was identifying, accurately characterizing, and entering problems into the CAP at an appropriate threshold.

The inspectors conducted plant walkdowns within the selected systems listed above and other plant areas to assess the material condition and to identify any deficiencies that had not been previously entered into the CAP. The inspectors reviewed CRs, maintenance history, CAs, completed work orders (WOs) for the systems, and reviewed associated system health reports. These reviews were performed to verify that problems were being properly identified, appropriately characterized, and entered into the CAP. Items reviewed generally covered a two-year period; however, in accordance with the inspection procedure, a five-year review was performed for selected systems for age-dependent issues.

Control room walkdowns were also performed to assess the main control room (MCR) deficiency list and to ascertain if deficiencies were entered into the CAP and tracked to resolution. Operator workarounds and operator burden screenings were reviewed, and the inspectors verified compensatory measures for deficient equipment which were being implemented in the field.

The inspectors conducted a detailed review selected CRs to assess the adequacy of the root-cause and apparent-cause evaluations of the problems identified. The inspectors reviewed these evaluations against the descriptions of the problem described in the CRs and the guidance in licensee procedures AD-PI-ALL-0101, "Root Cause Evaluation," Revision 4 and AD-PI-ALL-0102, "Apparent Cause Evaluation," Revision 4. The inspectors assessed if the licensee had adequately determined the cause(s) of identified problems, and had adequately addressed operability, reportability, common cause, generic concerns, extent-of-condition, and extent-of-cause. The review also assessed if the licensee had appropriately identified and prioritized corrective actions to prevent recurrence for significant conditions adverse to quality.

The inspectors reviewed selected industry operating experience (OE) items, including NRC generic communications, to verify that they had been appropriately evaluated for applicability and that issues identified through these reviews had been entered into the CAP.

The inspectors reviewed site trend reports, to determine if the licensee effectively trended identified issues and initiated appropriate corrective actions when adverse trends were identified.

The inspectors reviewed licensee audits and self-assessments, including those which focused on problem identification and resolution programs and processes, to verify that findings were entered into the CAP and to verify that these audits and assessments were consistent with the NRC's assessment of the licensee's CAP.

The inspectors attended various plant meetings to observe management oversight functions of the corrective action process. These included CR screening meetings and Performance Improvement and Oversight Committee (PIOC) meetings.

Documents reviewed are listed in the Attachment.

b. Assessment

Problem Identification

The inspectors determined that the licensee was generally effective in identifying problems and entering them into the CAP and there was an appropriately low threshold for entering issues into the CAP. This conclusion was based on a review of the requirements for initiating CRs as described in licensee procedure AD-PI-ALL-0100, "Corrective Action Program," Revision 7, in addition to management's expectation that employees were encouraged to initiate CRs for any reason. Trending was generally effective in monitoring equipment performance. Site management was actively involved in the CAP and focused appropriate attention on significant plant issues.

Based on reviews and walkdowns of accessible portions of the selected systems, the inspectors determined that system deficiencies were being identified and placed in the CAP.



### Problem Prioritization and Evaluation

Based on the review of CRs sampled by the inspection team during the onsite period, the inspectors concluded that problems were generally prioritized and evaluated in accordance with the licensee's CAP procedures as described in the CR severity level determination guidance in AD-PI-ALL-0100. Each CR was assigned a priority level at the Central Screening Team (CST) meeting and adequate consideration was given to system or component operability and associated plant risk.

The inspectors determined that station personnel had conducted root cause and apparent cause analyses in compliance with the licensee's CAP procedures and assigned cause determinations were appropriate, considering the significance of the issues being evaluated. A variety of formal causal-analysis techniques were used depending on the type and complexity of the issue consistent with AD-PI-ALL-0100.

### Effectiveness of Corrective Actions

Based on a review of corrective action documents, interviews with licensee staff, and verification of completed corrective actions, the inspectors determined that, overall, corrective actions were timely, commensurate with the safety significance of the issues, and effective, in that conditions adverse to quality were corrected and non-recurring. For significant conditions adverse to quality, the corrective actions directly addressed the cause and effectively prevented recurrence, in that a review of performance indicators, CRs, and effectiveness reviews demonstrated that the significant conditions adverse to quality had not recurred. Effectiveness reviews for corrective actions to prevent recurrence (CAPRs) were sufficient to ensure corrective actions were properly implemented and were effective.

#### c. Findings

Introduction: A self-revealing Green non-cited violation of 10 CFR 50 Appendix B Criterion XVI, "Corrective Actions," was identified on February 19, 2017, when EDG1 was determined to be inoperable due to an oil leak on the linkshaft hydraulic control assembly. The performance deficiency was a failure to document corrective actions for Quick Cause Evaluation (QCE) 538586 at a level of detail necessary to replace the non-conforming components and prevent the failure of EDG1 on February 19, 2017.

Description: During the February 19, 2017 performance of 0PT-12.2A, "No. 1 Diesel Generator Monthly Load Test," a link shaft hydraulic cylinder lube oil leak was observed coming from a cracked pipe fitting. Approximately 0.25 gallons per minute were observed leaking from a pipe nipple fitting used to control the position of the fuel racks. The leakage was such that operators were unsure of how long EDG1 would run and it was conservatively taken out of service to affect repairs. Analysis of the failed pipe nipple determined that the direct cause was cyclic fatigue, which was considered a run time dependent mechanism, occurring only when the machine was operating. Also, cyclic fatigue failure would be progressive and cumulative, occurring over a period of time as the fatigue crack propagated through the material. The licensee had two cyclic fatigue failures of the same component in two EDGs which were in service for the same service life, indicating that the leak likely occurred over a period of time depending on system run time and vibrations.

Prior to this failure, on May 23, 2012, a 70 drops per minute leak was discovered on the EDG4 left bank link shaft actuator cylinder inboard pipe nipple during a post maintenance run. The pipe nipple failure, which was similar to the failure that occurred on EDG1 in 2017, was determined to be due to cyclic stress fatigue. Corrective actions for the 2012 leak were documented in a QCE for NCR 538586, and consisted of work requests (WRs) initiated for each EDG. The wording in each WR was specified a "One time replacement of piping on lead control mechanism hydraulic cylinders at cyclic stress points. Contact [system engineer] for planning details." Work Orders (WOs) were planned for each EDG, however the WRs relied on face to face communication of the details from system engineering to the planner. These undocumented details were not captured and failed to get effectively incorporated into the WO instructions. A lack of detail in the WR description from the 2012 QCE corrective actions led to inadequate work order scope and instructions and ultimately, the required components susceptible to cyclic fatigue were not replaced. The apparent cause evaluation in NCR 2101084 determined that if the corrective actions from the 2012 QCE were implemented as intended in the 2015 EDG1 limiting condition for operation maintenance window, the EDG1 2017 leak event would have been prevented.

Due to the run time dependent nature of the failure from cyclic fatigue, inspectors determined that had EDG1 been called upon to operate after the January 22, 2017 monthly surveillance, the machine would likely not have been able to complete its seven-day mission time. Specifically, the EDG lube oil inventory was insufficient to meet the seven-day requirement.

The licensee entered this issue into the corrective action program as NCR 2101084. Following discovery of the condition, the licensee took immediate corrective action to replace the cracked pipe nipple. EDG1 was returned to service and subsequently declared operable on February 20, 2017. Additionally, the licensee has scheduled maintenance to replace the degraded non-conforming pipe fittings on all EDGs.

Analysis: Failure to document corrective actions per CAP-NGGC-0205 "Condition Evaluation and Corrective Action Process", at a level of detail necessary to replace the non-conforming components and prevent the failure of EDG1 was a performance deficiency. The inspectors determined that the finding was more than minor because it was associated with the Mitigating Systems cornerstone attribute of Equipment Performance and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to correct a condition adverse to quality led to the inoperability of EDG1. The inspectors screened this finding using IMC 0609, Appendix A, "The Significant Determination Process (SDP) For Findings At-Power," dated June 19, 2012, Based on Exhibit 2, Question A3, the inspectors determined that a detailed risk evaluation was necessary given the uncertainty over how long EDG1 would have operated while leaking oil. A regional senior reactor analyst (SRA) conducted the risk assessment using SAPHIRE software Version 8.1.5 and the Standardized Plant Analysis Models, Version 8.50, for each of Units 1 & 2. To account for the uncertainty on EDG1 run time the SRA increased the failure probability of EDG1 to 0.1. Because at least one pipe nipple still susceptible to fatigue remained installed in each of EDG2, EDG3, and EDG4, the SRA increased the failure probability of those machines by a factor of 2. To account for the run time aspect of cyclic fatigue, the SRA used an exposure time of 239 days, which was the total number of days it took to confirm that EDG1 could run for 24 hours plus one day of

repair time. The dominant sequences included the various loss of offsite power scenarios coupled with failure of the emergency power system and failure to recover either an EDG or offsite power. The result was a risk increase of less than 1E-6. The SRA also considered increased risk from external events and concluded that the change in risk remained below 1E-6, therefore this finding was determined to be of very low safety significance (Green). The inspectors determined that this finding did not have an associated cross cutting aspect because this finding was not reflective of current licensee performance.

Enforcement: Title 10 CFR 50 Appendix B Criterion XVI, "Corrective Actions," states, in part, that "Measures shall be established to assure that conditions adverse to quality, such as failure, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected." When documenting corrective actions in a Quick Cause Evaluation, procedure CAP-NGGC-0205 required in part, that a level of detail should be provided such that a third party reader can understand the results.

Contrary to the above, the licensee failed to correct a condition adverse to quality. Specifically, the licensee failed to replace non-conforming pipe nipples susceptible to cyclic fatigue due to an inadequate level of detail in corrective action documents. This resulted in the inoperability of EDG1 when the pipe nipple failed due to cyclic fatigue. This violation of regulatory requirement existed from the failure to replace the non-conforming pipe nipple on October 27, 2015 until February 20, 2017. The licensee entered this issue in their corrective action program as NCR 02101084. Following discovery of the condition, the licensee took an immediate corrective action to replace the cracked pipe nipple and EDG1 was returned to service and subsequently declared operable on February 20, 2017. This violation is being treated as an NCV, consistent with Section 2.3.2.a of the Enforcement Policy. (NCV 05000325/2017009-01, "Inoperability of EDG1 Due to Cyclic Fatigue Failure of Hydraulic Fuel Rack Control")

## .2 Assessment of the Use of Operating Experience

### a. Inspection Scope

The inspectors examined the licensee's use of industry OE to assess the effectiveness of the plant. In addition, the inspectors selected OE documents (e.g., NRC generic communications, 10 CFR Part 21 reports, licensee event reports, vendor notifications, and plant internal OE items, etc.) which had been issued since June 2015, to verify whether the licensee had appropriately evaluated each notification for applicability to the Brunswick Nuclear Station, and whether issues identified through these reviews were entered into the CAP. Documents reviewed are listed in the Attachment.

### b. Assessment

Based on a review of selected documentation related to operating experience issues, the inspectors determined that the licensee was generally effective in screening OE for applicability to the plant. Industry OE was evaluated at either the corporate or plant level depending on the source and type of the document. Relevant information was then forwarded to the applicable department for further action or informational purposes.

Operating experience issues requiring action were entered into the CAP for tracking and closure. In addition, OE was included in all root cause evaluations in accordance with licensee procedure AD-PI-ALL-0101.

c. Findings

No findings were identified.

.3 Assessment of Self-Assessments and Audits

a. Inspection Scope

The inspectors reviewed audit reports and self-assessment reports, including those which focused on problem identification and resolution, to assess the thoroughness and self-criticism of the licensee's audits and self-assessments, and to verify that problems identified through those activities were appropriately prioritized and entered into the CAP for resolution in accordance with licensee procedure AD-PI-ALL-0300, "Self-Assessments and Benchmark Programs," Revision 4.

b. Assessment

The inspectors determined that the scopes of assessments and audits were adequate. Self-assessments were generally detailed and critical, as evidenced by findings consistent with the inspector's independent reviews. The inspectors verified that CRs were created to document all areas for improvement and findings resulting from the self-assessments, and verified that actions had been completed consistent with those recommendations. Generally, the licensee performed evaluations that were technically accurate.

c. Findings

No findings were identified.

.4 Assessment of Safety-Conscious Work Environment

a. Inspection Scope

During the course of the inspection, the inspectors assessed the station's safety-conscious work environment (SCWE) through review of the station's employee concerns program (ECP) and interviews with various departmental personnel. The inspectors reviewed a sample of ECP issues to verify that concerns were being properly reviewed and identified deficiencies were being resolved and entered into the CAP when appropriate.

b. Assessment

Based on the interviews conducted and the CRs reviewed, the inspectors determined that licensee management emphasized the need for all employees to identify and report problems using the appropriate methods established within the administrative programs, including the CAP and ECP. These methods were readily accessible to all employees. Based on discussions conducted with a sample of plant employees from various

departments, the inspectors determined that employees felt free to raise issues, and that management encouraged employees to place issues into the CAP for resolution. The inspectors did not identify any reluctance on the part of the licensee staff to report safety concerns.

c. Findings

No findings were identified.

4OA6 Exit

Exit Meeting Summary

On May 25, 2017, the inspectors presented the inspection results to Mr. R. Gideon and other members of the licensee's staff. The inspectors confirmed that all proprietary information examined during the inspection had been returned to the licensee. A re-exit with Mr. Bryan Wooten and other members of the licensee staff was conducted on July 5, 2017.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee personnel:

K. Allen	Director, Design Engineering
J. Bryant	Regulatory Affairs
R. Carpenter	Radiation Monitor Engineer
W. Gideon	Vice President
L. Grzeck	Manager, Nuclear Regulatory Affairs
J. Hicks	Manager, Nuclear Training
B. Houston	Manager, Nuclear Maintenance
K. Krueger	Manager, Nuclear Operations
K. Moser	Plant General Manager
E. Rau	Operations Training
M. Smiley	Manager, Nuclear Ops Training
M. Turkal	Acting Manager, Nuclear Regulatory Affairs
E. Williams	Operations Manager
B. Wooten	Organizational Effectiveness Director

### LIST OF REPORT ITEMS

#### Opened and Closed

05000325/2017009-01	NCV	Inoperability of EDG1 due to Cyclic Fatigue Failure of Hydraulic Fuel Rack Control (Section 4OA2.1)
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## LIST OF DOCUMENTS REVIEWED

### Procedures

AD-PI-ALL-0100, Corrective Action Program, Rev. 7  
 AD-PI-ALL-0105, Effectiveness Reviews, Rev. 1  
 AD-PI-ALL-0101, Root Cause Evaluation, Rev. 4  
 AD-PI-ALL-0102, Apparent Cause Evaluation, Rev. 4  
 AD-PI-ALL-0103, Quick Cause Evaluation, Rev. 4  
 AD-OP-ALL-0105, Operability Determinations and Functionality Assessments, Rev. 3  
 AD-EG-ALL-1209, System, Component, and Program Health Reports and Notebooks, Rev. 6  
 AD-PI-ALL-0400, Operating Experience Program, Rev. 3  
 AD-NO-ALL-0202, Employee Concerns Program, Rev. 1  
 AD-PI-ALL-0300, Self-Assessment and Benchmark Programs, Rev. 4  
 AD-EG-ALL-1210, Maintenance Rule Program, Rev. 1  
 OPT-08.2.4, RHR Service Water System Component Test, Rev. 32  
 OPT-34.2.2.1, Fire Door, Pressure Boundary Door, and ASSD Access/Egress Door Inspections, Rev. 54  
 AD-EG-BNP-1619, External Events Protection Program, Rev. 0  
 BN-ENG-3120, External Events Protection Program Manager, Rev. 1  
 OOP-39, Diesel Generator Operating Procedure, Rev. 182  
 OPT-12.2A, No. 1 Diesel Generator Monthly Load Test, Rev. 113  
 SD-39, Emergency Diesel Generators, Rev. 21  
 DBD-39, Emergency Diesel Generator And Supplemental Diesel Generator Systems, Rev. 21

### Root Cause Evaluations

717634	738272	1998726	700764	732624	739864
742643	1972982	1988599	2007449	2045123	

### Nuclear Condition Reports (CRs)

2059064	2091805	2104993	2110174	2111332	2112062
1992293	2060354	2075488	2093467	2045123	1974848
2002959	1986752	2002959	1986752	755120	756991
1948241	1952829	1955100	1978463	1972749	1974064
1992294	1998695	2123059	2014075	2025608	2034412
2058491	2037920	749702	2123216	166953	668564
700764	717634	726190	732624	732886	734041
735077	735545	736011	736224	738146	738272
739740	739864	740606	742444	742643	745053
747712	749545	750663	755253	758350	758454
759923	1938644	1972509	1972982	1973002	1976559
1981795	1988599	1998597	1998726	2000996	2002662
2003416	2007449	2015217	2037920	2041523	2043067
2045123	2070838	2109814	2007261	2121027	2066681
2120738	2113068	2101084	2006681	2068062	753450
2122324	2121027	2123300	2123302	753244	2113068
2023237	2012638	1989486	754934	538586	2001412
756736	2059326	2059449	2060649	1999979	1998720
2083081	2104076	2000883	2001930	2005486	2006883
2005118	2008270	2007261	754934	2007449	2007720
2070317	2091608	2000871	2099153	2099929	2100405
2100675	1998726	2007449	2006681	2068062	01942213

01942164	01949923	01977775	01972233	01986297	01982346
01987735	01991618	02018581	02027189	02045191	02046570
02061898	02091737	01968364	02007704	02067899	02101260
02105119	02105614	02108800	02109291	02111238	02111293
02111315	00758454	02001887	02024792	02111449	

Work Orders

2089135	2138322	11970472	12092737	12287058	13455389
13474969	13487959	13489246	13491844	13491853	13494697
13495431	13495780	13498022	13530195	13530197	13530198
13535673	13730196	20019242	20022988	20024133	20029005
20036056	20039779	20040033	20055628	20055767	20055939
20055940	20056366	20057156	20057159	20057593	20059524
20062937	20066789	20095314	20132955	20139332	20154300
20154301	20154299	20154302	20071959	20071869	2089470
10540480	20116708	20116707	2100758	2100762	2100763
20064893	20064892	20064889	20064887		

Other Documents

FP-20322, Nordberg Diesel Engine Manual, Rev. R

SD-39, Emergency Diesel Generator System Description, Rev. 21

TrendBuilder Diesel Generator load trends

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

0BNP-TR-019, EC0000299448; EC0000300846, Rev. 6

Control Room Narrative Logs, dated 2/19/2017

System 7005 Main Stack Radiation Monitoring Maintenance Rule(A)(1) Action Plan

SRV vendor manual (FP-9316)