



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

October 3, 2018

Mr. J. W. Shea  
Vice President, Nuclear Regulatory Affairs  
and Support Services  
Tennessee Valley Authority  
1101 Market Street, LP 4A  
Chattanooga, TN 37402-2801

**SUBJECT: BROWNS FERRY NUCLEAR PLANT – NRC PROBLEM IDENTIFICATION  
AND RESOLUTION INSPECTION REPORT 05000259/2018012,  
05000260/2018012 AND 05000296/2018012**

Dear Mr. Shea:

On August 23, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed a problem identification and resolution inspection at your Browns Ferry Nuclear Plant, Units 1, 2, and 3. On that date, the NRC inspectors discussed the results of this inspection with Mr. Lang Hughes and other members of your staff. The results of this inspection are documented 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 without fear of retaliation through at least one of the several means available.

NRC inspectors documented a 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 non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

J. Shea

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If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis of 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 Browns Ferry Nuclear 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/*

Anthony D. Masters, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Docket Nos.: 50-259, 50-260, 50-296  
License Nos.: DPR-33, DPR-52, DPR-68

Enclosure:  
IR 05000259/2018012, 05000260/2018012  
and 05000296/2018012

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SUBJECT: BROWNS FERRY NUCLEAR PLANT – NRC PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION REPORT 05000259/2018012, 05000260/2018012 AND 05000296/2018012 October 3, 2018

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DATE	10/2/2018					

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Numbers: 50-259, 50-260, and 50-296

License Numbers: DPR-33, DPR-52, and DPR-68

Report Numbers: 05000259/2018012, 05000260/2018012, and 05000296/2018012

Enterprise Identifier: I-2018-012-0017

Licensee: Tennessee Valley Authority (TVA)

Facility: Browns Ferry Nuclear Plant, Units 1, 2, and 3

Location: Corner of Shaw and Nuclear Plant Road  
Athens, AL 35611

Inspection Dates: August 6, 2018 to August 23, 2018

Inspectors: W. Deschaine, Resident Inspector, Team Lead  
T. Stephen, Senior Resident Inspector  
N. Hobbs, Resident Inspector  
M. Kirk, Resident Inspector  
G. Eatmon, Resident Inspector  
S. Ninh, Senior Project Engineer

Approved By: A. Masters, Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

Enclosure

## SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting a Problem Identification and Resolution Inspection at Browns Ferry Nuclear Plant, Units 1, 2, and 3 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. NRC and self-revealed findings, violations, or additional items are summarized in the table below.

### List of Findings and Violations

Failure to correct an inoperable 250V Shutdown Board Battery Charger			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000296/2018-012-01 Closed	None	71153
<p>A self-revealed, Green, NCV of Technical Specifications (TS) 3.8.4 was identified when the licensee failed to correct an inoperable 250V Shutdown Board (SDBD) 3EB Battery Charger on Unit 3. Specifically, in 2014 the 250V SDBD 3EB Battery Charger was entered into the Corrective Action Program (CAP) as a Condition Adverse to Quality (CAQ), but no actions were taken to correct the condition, which led to the component being in inoperable for longer than the allowed outage time defined in TS 3.8.4.</p>			

### Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000296/2018-002-00	Inoperable 250V Shutdown Board Battery Charger Results in Condition Prohibited by Technical Specifications	71153	Closed

## INSPECTION SCOPE

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 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

### 71152 – Problem Identification and Resolution

#### Biennial Team Inspection (1 Sample)

The inspectors performed a biennial assessment of the licensee's corrective action program, use of operating experience, self-assessments and audits, and safety conscious work environment. The assessment is documented below.

- (1) Corrective Action Program Effectiveness: Problem Identification, Problem Prioritization and Evaluation, and Corrective Actions – The 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.
- (2) Operating Experience and Self-Assessments and Audits – The team 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.
- (3) Safety Conscious Work Environment - 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.

### 71153 - Follow-up of Events and Notices of Enforcement Discretion

#### Licensee Event Reports (1 Sample)

The inspectors evaluated the following licensee event reports (LER) which can be accessed at <https://lersearch.inl.gov/LERSearchCriteria.aspx>:

- (1) LER 05000296/2018-002-00, Inoperable 250V Shutdown Board Battery Charger Results in Condition Prohibited by Technical Specifications

## INSPECTION RESULTS

Corrective Action Program Effectiveness Assessment	71152—Problem Identification and Resolution
<p>Based on the samples reviewed, the team determined that the licensee’s corrective action program (CAP) complied with regulatory requirements and self-imposed standards. The licensee’s implementation of the corrective action program adequately supported nuclear safety.</p> <p><u>Problem Identification:</u> The inspectors determined that the licensee was effective in identifying problems and entering them into the corrective action program and there was a low threshold for entering issues into the corrective action program. This conclusion was based on a review of the requirements for initiating Condition Reports (CRs) as described in licensee procedure NPG-SPP-22.300, “Corrective Action Program,” and management’s expectation that employees were encouraged to initiate condition reports for any reason. Additionally, site management was actively involved in the corrective action program and focused appropriate attention on significant plant issues. Based on reviews and walkdowns of accessible portions of selected systems, the inspectors determined that deficiencies were being identified and placed in the CAP.</p> <p><u>Problem Prioritization and Evaluation:</u> 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 CR significance determination guidance in procedure NPG-SPP-22.300. The inspectors determined that in general, adequate consideration was given to system or component operability and associated plant risk.</p> <p>The inspectors determined that plant personnel had conducted root cause and apparent cause analyses in compliance with the licensee’s CAP procedures and cause determinations were appropriate, and considered the significance of the issues being evaluated. A variety of formal causal-analysis techniques were used to evaluate CRs depending on the type and complexity of the issue consistent with the applicable cause evaluation procedures.</p> <p><u>Corrective Actions:</u> 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. For significant conditions adverse to quality, the corrective actions directly addressed the cause and effectively prevented recurrence. The team reviewed performance indicators, CRs, and effectiveness reviews, as applicable, to verify 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.</p>	

Operating Experience, Self-Assessments, and Audits Assessment	71152—Problem Identification and Resolution
<p>Based on the samples reviewed, the team determined that the station’s processes for the use of industry and NRC operating experience information and for the performance of audits and</p>	

self-assessments were effective and complied with all regulatory requirements and licensee standards. The implementation of these programs adequately supported nuclear safety. Overall, the team concluded that operating experience was adequately evaluated for applicability and that appropriate actions were implemented to address lessons learned as needed. In general, the inspectors determined that the licensee was effective at performing self-assessments and audits to identify issues at a low level, properly evaluated those issues, and resolved them commensurate with their safety significance.

Safety Conscious Work Environment Assessment	71152—Problem Identification and Resolution
<p>Based on a sample size of approximately 30 people interviewed from a cross-section of plant employees, the team found no evidence of challenges to a safety-conscious work environment. Employees interviewed appeared willing to raise nuclear safety concerns through at least one of the several means available.</p> <p>However, the team does recognize that the licensee during a 2017 Nuclear Safety Culture (NSC) Self-Assessment in the RP department determined that the NSC was unhealthy resulting in a chilled environment in the RP department. The licensee identified Areas for Improvement (AFIs) and entered them into their CAP. The NRC was unable to determine, at this time, if the corrective actions by the licensee have been effective. The NRC will conduct a follow-up inspection in this area after the licensee has completed their effectiveness reviews.</p>	

71153 - Follow-up of Events and Notices of Enforcement Discretion

Failure to correct an inoperable 250V Shutdown Board Battery Charger			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000296/2018-012-01 Closed	None	71153
<p><u>Introduction:</u> A self-revealed, Green, NCV of Technical Specifications (TS) 3.8.4 was identified when the licensee failed to correct an inoperable 250V Shutdown Board (SDBD) 3EB Battery Charger on Unit 3. Specifically, in 2014 the 250V SDBD 3EB Battery Charger was entered into the CAP as a CAQ, but no actions were taken to correct the condition, which led to the component being in inoperable for longer than the allowed outage time as defined in TS 3.8.4.</p>			



Description: The Licensee Event Report (LER) was associated with the Unit 3 250V SDBD 3EB Battery Charger failing its TS required surveillance test on December 22, 2017. Operations personnel from the licensee placed the spare battery charger in service and exited TS Limiting Conditions for Operation (LCOs) for DC Sources 3.8.4. The licensee determined that a failed firing card in 250V SDBD 3EB Battery Charger was the cause of the failed TS surveillance test. Based on the results from their troubleshooting, a Past Operability Evaluation (POE) was requested on February 5, 2018. The violation of TS was first recognized on February 28, 2018, when the POE determined that the 250V SDBD 3EB Battery Charger, was functional but inoperable from April 3, 2014, until December 22, 2017, which is longer than allowed by TS, thus requiring an LER.

The apparent cause of this event was no Preventive Maintenance (PM) strategy exists to replace or refurbish subcomponents of the SDBD Battery Chargers that are vulnerable to age degradation failures. A lack of precise and rigorous communication between Operations and Engineering personnel in regards to the operability determination of the 3EB Battery Charger in 2014 was a contributing cause.

The inspectors reviewed the licensee event report and determined that the report adequately documented the summary of the event including the cause of the event and potential safety consequences.

Corrective Action(s): As an immediate corrective action, the licensee replaced the firing card in the 250V SDBD 3EB Battery Charger. The licensee also plans to create a PM strategy to replace or refurbish subcomponents of the SDBD Battery Chargers that are vulnerable to similar age degradation failures.

Corrective Action Reference(s): CR 1383682

Performance Assessment:

Performance Deficiency: The failure to correct a condition adverse to quality was a performance deficiency (PD). Specifically, in 2014 the 250V Shutdown Board Battery Charger was entered into the CAP as a CAQ, but no actions were taken to correct the condition until December 22, 2017.

Screening: This performance deficiency 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. With the 3EB Battery Charger inoperable the availability and reliability was adversely affected. An evaluation was completed and the Shutdown Board subsystem was considered functional, but inoperable.

Significance: The team used IMC 0609, Attachment 4, "Initial Characterization of Findings," issued October 7, 2016, for mitigating systems, and IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012, and determined the finding to be of very low safety significance (Green) because the finding was a deficiency that did not represent a loss of safety function. While the charger did not meet the TS Surveillance Requirement to supply the minimum current of 50A at greater than or equal to

210V DC, the charger was capable of fully charging the battery in less than 12 hours because it could provide a current above 27.92A, which was the required current limit for functionality.

Cross-cutting Aspect: No cross-cutting was assigned because it is not indicative of current licensee performance.

Enforcement:

Violation: Browns Ferry Nuclear Plant, Unit 3 TS Subsection 3.8.4, 'DC Sources – Operating,' Condition A requires that with the 3EB Shutdown Board DC electrical power subsystem inoperable, restoration of the 3EB Shutdown Board DC electrical power subsystem is required within 7 days. Condition B requires that if the required action and associated completion time of condition A could not be met then the unit shall be placed in Mode 3 within 12 hours and Mode 4 within 36 hours.

Contrary to the above, the 3EB Shutdown Board DC electrical power subsystem was inoperable from April 3, 2014, to December 22, 2017, and the unit did not enter mode 3 as required in 12 hours after exceeding the allowed outage time.

Enforcement Action(s): This violation is being treated as a NCV consistent with Section 2.3.2 of the Enforcement Policy.

## **EXIT MEETINGS AND DEBRIEFS**

The inspectors confirmed that proprietary information was controlled to protect from public disclosure. No proprietary information was documented in this report.

- On August 23, 2018, the inspectors presented the problem identification and resolution inspection results to Mr. Lang Hughes and other members of the licensee staff.

## DOCUMENTS REVIEWED

### Procedures

BFN-ODM-4.16, Operator Workarounds/Burdens/Challenges, Rev. 0005  
COO-SPP-22.305, Level 2 Evaluations (Apparent Cause Evaluation), Rev. 0000  
OPDP-1, Conduct of Operations, Rev. 0040  
OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking,  
Rev. 0024  
NEDP-22, Operability Determinations and Functional Evaluations, Rev. 0018  
NPG-SPP-07.1.4, Work Management Prioritization - On Line, Rev. 0008  
NPG-SPP-09.16.1, Component and Program Health, Rev. 0011 System  
NPG-SPP-22.000, Performance Improvement Program, Rev. 0008  
NPG-SPP-22.001, Effectiveness Reviews, Rev. 0001  
NPG-SPP-22.102, NPG Self-Assessment and Benchmarking Programs, Rev. 0005  
NPG-SPP-22.300, Corrective Action Program, Rev. 0010  
NPG-SPP-22.500, Operating Experience Program, Rev. 0007  
0-TI-444(Bases), AIST Program Bases Document, Revision 0006  
0-TI-444, Augmented In-service Testing Program, Revision 001  
TRN-30, Radiological Emergency Preparedness Training, Revision 38  
ECI-0-000-BKR008, Testing and Troubleshooting of Molded Case Circuit Breakers and Motor  
Starter Overload Relays, Revision 107  
EPIP-5, General Emergency, Revision 54  
CAP Training Manual, Revision 5  
NPG-SPP-01.7.1, Employee Concerns Program, Revision 3  
NPG-SPP-22.600, Issue Resolution, Revision 4  
NPG-SPP-07.3.4, Protected Equipment, Revision 4

### Condition Reports

1017294	1221273	1336241	1423322	1384056	1385434	1389480
1146001	1228557	1336242	1423322	1384057	1393879	1414608
1146363	1249802	1336246	1427962	1392134	1409305	1423044
1150455	1298080	1340855	1431238	1407222	1272790	1233079
1169573	1249717	1340872	1433902	1419921	1153853	1294294
1119892	1249723	1346131	1436281	1420973	1166017	1161911
1153826	1253350	1347792	1147778	1336830	1189404	1204735
1157981	1268051	1350086	1157182	1337825	1292179	1159943
1158463	1281537	1352009	1157862	1328204	1353663	1192000
1160702	1286193	1354876	1158643	1337825	1354876	1170978
1168726	1233084	1389131	1165935	1413039	1353667	1131140
1170980	1294760	1393879	1170124	1170978	1354886	1133821
1176706	1303737	1402739	1258736	1189508	1233049	1112692
1176922	1312984	1403761	1266308	1237382	1175751	1170971
1195081	1322394	1413619	1267323	1268177	1186857	1115172
1201196	1329543	1413619	1284073	1395402	1229794	1179483
1204730	1331462	1413620	1285600	1161179	1252195	1228065
1212034	1332866	1413621	1328204	1161926	1336349	1385280
1219043	1333906	1413623	1329024	1172128	1374607	1260619
1221265		1420413	1379565	1348588	1382275	1413623

1143588	1233076	1158499	1242311	1331793	1228030	868804
1143590	1170968	1163243	1258637	1345723	1241805	1383682
1170970	1179696	1181071	1276753	1145799	1354876	
1260580	1142006	1189810	1314615	1393423		

Self-Assessments, Audits, and Trend Reports

QA-BF-17-008, Assessment of Security Performance, Browns Ferry Nuclear Plant, March 2-5, 2017  
 QA-BF-18-001, Security, Browns Ferry Nuclear Plant, June 19, 2018  
 BFN-OTH-FSA-17-001, Nuclear Safety Culture with Emphasis on Safety Conscious Work Environment (Rad -Protection), 9/11/2017  
 BFN-OTH-FSA-17-002, Nuclear Safety Culture with Emphasis on Safety Conscious Work Environment (Security) 9/11/2017  
 Site Audit Report SSA1706 Operations Browns Ferry Nuclear Plant (BFN), April 17 - 28, 2017  
 SSA1804, Site Audit Report Maintenance BFN, April 30 – May 11, 2018  
 SSA1801, Site Audit Report Materials Management & Procurement Engineering BFN, January 22 – February 2, 2018  
 SSA1708, Site Audit Report Radiation Protection BFN, July 31 – August 11, 2017  
 BFN-PI-FSA-17-001, Nuclear Safety Culture assessment, May 30 – June 12, 2017  
 BFN-OTH-FSA-17-001, Nuclear Safety Culture with Emphasis on SCWE (Rad-Protection), August 28 – August 29, 2017  
 QA-BF-18-006, Unit 3 Refueling Outage BFN, February 17 – April 6, 2018  
 QA-BF-18-001, BFN-Quality Assurance December Site Report, January 18, 2018  
 QA-BF-16-018, Unit 1 Outage Assessment (1R11) BFN, October 1, 2016 – November 6, 2016  
 QA-BF-16-017, Winter Readiness BFN, November 7, 2016 – November 10, 2016  
 QA-BF-16-003, BFN Operations Fleet Assessment, February 16 – February 19, 2016

Work Orders (WOs)

117339825	119259118	119531837
117760950	115707718	113729018
117764640	117595795	117217900
117821415	117962593	117877268
117861528	118372021	117638828
117877268	118433481	117675541
118304355	118557418	117692872
118393397	118880286	117770137
119186157	118880287	117822991
119371766	118662022	118014100
119524773	118680184	119408126
119594233	118680351	119539861
119639339	118842853	
119639366	119099221	
119639704	119259118	
119676900	119462580	

Cancelled Work Orders (WOs)

117977191	117966837	117952469
117968137	117967265	117910853

117822890	118330690	117648294
117966856	117651167	117663684
119685837	119130053	118456896
119130053	118660656	118225189
118288229	118578729	118169216
117698103	118493283	117724905
118152936	118237511	118027573
118077890	118122113	117938363
117968137	118091807	117907703
117888235	118061119	117907705
117838767	119158148	
117839581	119158087	

### Other

System 571 Monitoring Plan

System 82 Health System Report April 2018

General Design Criteria Document, No. BFN-50-7082, Standby Diesel Generators

Outage Control Room Deficiencies, April 7, 2018

BFN Outage and Non-Outage Control Room Deficiencies, June 18, 2018

All Active OWAs Browns Ferry Nuclear, July 10, 2018

OWA Focus Codes: W1, W2, W3, June 18, 2018

Standing Order: OS-201, Rev 0, Interim Guidance on Verifying TS 3.8.6 Specific Gravity Limits, 8/3/2018

Air Conditioning System 031 (a)(1) Plan, Revision 6, Effective 8/18/2016

Air Conditioning System 031 (a)(1) Plan, Revision 7, Effective 5/30/2017

Air Conditioning System 031 (a)(1) Plan, Revision 8, Effective 8/23/2017

Heating and Ventilating Air Flow Diagram, Powerhouse – Turbine Building Unit 2,  
Figure 10.12-1, Amendment 25

System Health Report, Unit 0, A/C Heating CREV for date range 10/1/2015-1/31/2016

System Health Report, Unit 0, A/C Heating CREV for date range 2/1/2016-5/31/2016

System Health Report, Unit 0, A/C Heating CREV for date range 6/1/2016-9/30/2016

Management Review Committee (MRC) package for August 23, 2018

Plant Screening Committee (PSC) package for August 20, 2018

Level of Effort Screening for CR 1439272

LER 50-296/2018-002-00, Inoperable 250V Shutdown Board Battery Charger Results in  
Condition Prohibited by Technical Specifications, dated April 30, 2018

BFN-Unit 3 Technical Specifications 3.8.4 DC Sources – Operating, Amendment No. 212