



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

August 11, 2016

EA-14-005

Mr. J.W. Shea  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
1101 Market Street, LP 3D-C  
Chattanooga, TN 37402-2801

**SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC INTEGRATED INSPECTION  
REPORT 05000259/2016002, 05000260/2016002, AND 05000296/2016002**

Dear Mr. Shea:

On June 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Browns Ferry Nuclear Plant, Units 1, 2, and 3. On July 15, 2016, the NRC inspectors discussed the results of this inspection with Mr. K. Bronson and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented two findings of very low safety significance (Green) in this report. One of these findings involved violations of NRC requirements. Additionally, NRC inspectors documented one Severity Level IV violation with no associated finding. Because of their very low safety significance, the NRC is treating these violations as noncited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

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

In addition, if you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, RII, and the NRC Senior Resident Inspector at Browns Ferry Nuclear Plant.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Alan Blamey, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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

Enclosure: NRC Integrated Inspection Report 05000259/2016002,  
05000260/2016002 and 05000296/2016002

cc: w/encl. Distribution via ListServ

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NAME	D. Dumbacher	T. Stephen	A. Ruh	A. Nielsen	J. Panfel	M. Peck
DATE	7/29/2016	7/29/2016	7/29/2016	7/28/2016	7/28/2016	7/28/2016
E-MAIL	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
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SIGNATURE	Via Email/RA/CAF2	Via Email/RA/EMS	Via Email/RA/CRK1	AJB3		
NAME	C. Fontana	S. Sanchez	C. Kontz	A. Blamey		
DATE	8/1/2016	8/3/2016	8/8/2016	8/11/2016	8/ /2016	8/ /2016
E-MAIL	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

Letter to Joseph W. Shea from Alan Blamey dated August 11, 2016.

SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC INTEGRATED INSPECTION  
REPORT 05000259/2016002, 05000260/2016002, AND 05000296/2016002

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D. Gamberoni, RII

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-259, 50-260, 50-296

License Nos.: DPR-33, DPR-52, DPR-68

Report No.: 05000259/2016002, 05000260/2016002, 05000296/2016002

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

Dates: April 1, 2016, through June 30, 2016

Inspectors: D. Dumbacher, Senior Resident Inspector  
T. Stephen, Resident Inspector  
A. Ruh, Resident Inspector  
C. Fontana, Emergency Preparedness Inspector  
S. Sanchez, Senior Emergency Preparedness Inspector  
A. Nielsen, Senior Health Physicist  
J. Panfel, Reactor Inspector  
M. Peck, Senior Reactor Technical Instructor  
C.Kontz, Senior Project Engineer

Approved by: Alan Blamey, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

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## SUMMARY

05000259/2016002, 05000260/2016002, 05000296/2016002; 04/01/2016–06/30/2016; Browns Ferry Nuclear Plant, Units 1, 2 and 3; (Post Maintenance Testing, Maintenance of Emergency Preparedness, Problem Identification and Resolution of Problems)

The report covered a three-month period of inspection by resident and regional inspectors. Two findings and one traditional enforcement violation were identified. The significance of inspection findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP) dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Components 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 August 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

### A. NRC-Identified and Self-Revealing Findings and Violations

#### Cornerstone: Initiating Events

- Green. A self-revealing, finding for the licensee's failure to provide adequate work instructions for maintenance on the Unit 3 recirculation pump discharge valve motors which included appropriate testing as described in Procedure NPG – SPP 06.9.3 Post Modification testing, was a performance deficiency.

The performance deficiency was more than minor because it affected the equipment performance attribute of the Initiating Events Cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown operations. The inspector performed the initial significance determination using NRC Inspection Manual Chapter 0609, Appendix G, Attachment 3, "Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings" and determined that the finding was of very low safety significance. This finding had a cross-cutting aspect in the area of human performance because the licensee did not ensure that design documentation was correct and that work packages provided the proper tests to ensure the Variable Frequency Drives (VFD) / Recirculation pump trip logic. [H.7]. (Section 1R19)

#### Cornerstone: Mitigating Systems

- SL IV. An NRC identified Non-Cited Violation (NCV) of Title 10 of the Code of Federal Regulations (CFR) 50.72(b)(3)(v) and 10 CFR 50.73(a)(2)(v) was identified for the licensee's failure to notify the NRC within 8 hours and submit an LER within 60 days of discovery of a condition that could have prevented the fulfillment of a safety function. Specifically, the licensee failed to notify the NRC that the High Pressure Coolant Injection (HPCI) system had been rendered inoperable due to an equipment failure. As an immediate corrective action, the licensee entered the violation into the licensee's corrective action program as CR 1185268.

The licensee's failure to provide the required notification constitutes a traditional enforcement violation because it impacts the NRC's ability to carry out its regulatory function. The traditional enforcement violation was determined to be Severity Level IV because it matched

example 6.9.d.9 of the NRC Enforcement Policy. Because the violation is a traditional enforcement violation, no cross-cutting aspect was assigned. (Section 4OA2)

#### Cornerstone: Emergency Preparedness

- Green. The inspectors identified an NCV of Title 10 of the Code of Federal Regulations (CFR) Part 50.54(q)(2), for the licensee's failure to declare a Notification of Unusual Event (NOUE) within 15 minutes of entry conditions being met. Specifically, on April 6, 2016, at 3:05 pm, Browns Ferry Unit 3 main control room (MCR) operators received a high-high radiation alarm on the main steam lines (MSL) that met Emergency Action Level (EAL) 1.4-U for declaring a NOUE. The licensee initiated CR 1159943 to address the issue.

This performance deficiency was more than minor because it was associated with the Emergency Preparedness cornerstone attribute of Emergency Response Organization Performance, and adversely affected the cornerstone objective of ensuring that a licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, on April 6, 2016, personnel did not declare a NOUE within 15 minutes of initial indications that EAL 1.4-U had been exceeded. The performance deficiency is associated with the Emergency Classification Planning Standard, and is considered a Risk Significant Planning Standard (RSPS). The failure to declare a NOUE when directed by the EAL Matrix is considered a lost or degraded RSPS in accordance with Section 4 of Inspection Manual Chapter (IMC) 0609, Appendix B. Section 4.3.e of IMC 0609, Appendix B, provides the significance determination for a "Failure to Implement," and the performance deficiency was determined to be of very low safety significance (Green). The finding was associated with a cross-cutting aspect in the Procedure Adherence component of the Human Performance area because individuals did not follow processes, procedures and work instructions that would have led them to declare in a timely manner [H.8]. (Section 1EP5)

#### B. Licensee-Identified Violations

No findings were identified.

## REPORT DETAILS

### Summary of Plant Status:

Unit 1 operated at or near 100 percent rated thermal power (RTP) for the entire inspection period except for a planned downpower to 65 percent on May 12, 2016 for main steam isolation valve (MSIV) testing and rod pattern adjustment.

Unit 2 operated at or near 100 percent RTP for the entire inspection period.

Unit 3 operated at or near 100 percent RTP except for a planned downpower to 60 percent for MSIV testing and rod sequence exchange on June 4, 2016.

### **1. REACTOR SAFETY**

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection (71111.01)

##### .1 Readiness for Seasonal Extreme Weather Conditions:

###### a. Inspection Scope

After the licensee completed preparations for seasonal high temperatures, the inspectors walked down the Unit 3 shutdown board room chiller systems. These systems were selected because their safety related functions could be affected by adverse weather. The inspectors reviewed documents listed in the Attachment, observed plant conditions, and evaluated those conditions using criteria documented in Procedure NPG-SPP-7.1.7, Station Seasonal Readiness and 0-GOI-200-3, Hot Weather Operations. Documents reviewed are listed in the Attachment. This activity constituted one inspection sample as defined in Inspection Procedure 71111.01.

###### b. Findings

No findings were identified.

##### .2 Summer Readiness of Offsite and Alternate AC Power Systems:

###### a. Inspection Scope

The inspectors performed the annual review of the licensee's readiness of offsite and alternate alternating current (AC) power systems prior to the onset of the high grid loading season. The inspectors reviewed procedures affecting these areas and the communications protocols between the transmission system operator and the licensee to verify that appropriate information is exchanged when issues arise that could impact the offsite power system. The inspectors reviewed the generic industry issue for switchyard Open Phase Circuits, performed thermal monitoring checks of the offsite power supply systems, reviewed draft design changes for the open phase issue, and interviewed appropriate plant personnel to assess deficiencies and plant readiness for summer high grid loading. Documents reviewed are listed in the Attachment. The

inspectors completed one Summer Readiness of Offsite and Alternate AC Power Systems sample as defined in Inspection Procedure 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

Partial System Walkdown

a. Inspection Scope

The inspectors performed partial walkdowns of the following three systems to verify the operability of redundant or diverse trains and components when safety equipment was inoperable. The inspectors focused on identification of discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, walked down control system components, and determined whether selected breakers, valves, and support equipment were in the correct position to support system operation. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program (CAP). Documents reviewed are listed in the Attachment. The inspectors completed three Equipment Alignment Partial Walkdown samples as defined in Inspection Procedure 71111.04.

- Unit and shutdown boards with a focus on general design criteria (GDC) 17 and auto transfer functions
- Unit 2 Core Spray system
- Unit 2 Reactor Water Cleanup system

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Fire Protection Tours

a. Inspection Scope

The inspectors reviewed licensee procedures for transient combustibles and fire protection impairments, and conducted a walkdown of the fire areas (FA) and fire zones (FZ) listed below. Selected FAs/FZs were examined in order to verify licensee control of transient combustibles and ignition sources; the material condition of fire protection equipment and fire barriers; and operational lineup and operational condition of fire protection features or measures. The inspectors verified that selected fire protection impairments were identified and controlled in accordance with procedures. The inspectors reviewed applicable portions of the Fire Protection Report, Volumes 1 and 2, including the applicable Fire Hazards Analysis, and Pre-Fire Plan drawings, to verify that the necessary firefighting equipment, such as fire extinguishers, hose stations, ladders,

and communications equipment, was in place. Documents reviewed are listed in the attachment. This activity constituted five Fire Protection Walkdown inspection samples, as defined in Inspection Procedure 71111.05.

- Fire Zone 1-6, Unit 1 Reactor Building, Elevation 639' south of column line R
- Fire Zone 25-2, Residual Heat Removal Service Water (RHRSW) pump room 'A'
- Fire Zone 25-3, Residual Heat Removal Service Water (RHRSW) pump room 'C'
- Fire Zone 2-6, Unit 2 Reactor Building, Elevation 639' south of column line R
- Fire Zone 3-4, Unit 3 Reactor Building, Elevation 621 and 639' north of column R

b. Findings

No findings were identified.

.2 Annual Drill Observations

a. Inspection Scope

On May 05, 2016, the inspectors observed an unannounced fire drill in the Unit common Control building, 593' elevation in the Communications Board room. The inspectors assessed fire alarm effectiveness; response time for notifying and assembling the fire brigade; the selection, placement, and use of firefighting equipment; use of personnel fire protective clothing and equipment (e.g., turnout gear, self-contained breathing apparatus); communications; incident command and control; teamwork; and firefighting strategies. The inspectors also attended the post-drill critique to assess the licensee's ability to review fire brigade performance and identify areas for improvement. Following the critique, the inspectors compared their findings with the licensee's observations and to the requirements specified in the licensee's Fire Protection report. This activity constituted one Annual Drill Observation inspection sample as defined in Inspection Procedure 71111.05.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

.1 Internal Flooding

a. Inspection Scope

The inspectors reviewed two internal flood protection measures samples for the Unit 2 Reactor Water Cleanup rooms and the Diesel Generator Building internal flood design to verify that flood mitigation plans were consistent with the design requirements and risk analysis assumptions and that equipment essential for reactor shutdown was properly protected from a flood caused by pipe breaks in the rooms/building. Specifically, the inspectors reviewed the licensee's moderate energy line break flooding study to fully understand the licensee's flood mitigation strategy, reviewed licensee drawings and then verified that the assumptions and results remained valid. The inspectors walked down the areas to verify the assumed flooding sources, adequacy of common area drainage, and flood detection instrumentation to ensure that a flooding event would not impact

reactor shutdown capabilities. Documents reviewed are listed in the Attachment. The inspectors completed two Internal Flooding samples as defined in Inspection Procedure 71111.06.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification and Performance (71111.11)

.1 Licensed Operator Regualification

a. Inspection Scope

On April 12, 2016, the inspectors observed a licensed operator training session for an operating crew according to the Unit 2 Simulator Exercise Guide (SEG) OPL173S414, Fire Safe Shutdown Procedures, Revision 1 and SEG OPL 173S060 Security Event Response and Control Room Abandonment, Rev 16.

The inspectors specifically evaluated the following attributes related to the operating crew's performance:

- Clarity and formality of communication
- Ability to take timely action to safely control the unit
- Prioritization, interpretation, and verification of alarms
- Correct use and implementation of procedures including Abnormal Operating Instructions, Emergency Operating Instructions and Safe Shutdown Instructions
- Timely control board operation and manipulation, including high-risk operator actions
- Timely oversight and direction provided by the shift supervisor, including ability to identify and implement appropriate technical specifications actions such as reporting and emergency plan actions and notifications
- Group dynamics involved in crew performance

The inspectors assessed the licensee's ability to assess the performance of their licensed operators. The inspectors reviewed the post-examination critique performed by the licensee evaluators, and verified that licensee-identified issues were comparable to issues identified by the inspector. The inspectors reviewed simulator physical fidelity (i.e., the degree of similarity between the simulator and the reference plant control room, such as physical location of panels, equipment, instruments, controls, labels, and related form and function). Documents reviewed are listed in the attachment. This activity constituted one Observation of Regualification Activity inspection sample as defined in Inspection Procedure 71111.11.

b. Findings

No findings were identified.

## .2 Control Room Observations

### a. Inspection Scope

Inspectors observed and assessed licensed operator performance in the plant and main control room, particularly during periods of heightened activity or risk and where the activities could affect plant safety. Inspectors reviewed various licensee policies and procedures covering Conduct of Operations, Plant Operations and Power Maneuvering.

Inspectors utilized activities such as post maintenance testing, surveillance testing and other activities to focus on the following conduct of operations as appropriate;

- Operator compliance and use of procedures.
- Control board manipulations.
- Communication between crew members.
- Use and interpretation of plant instruments, indications and alarms.
- Use of human error prevention techniques.
- Documentation of activities, including initials and sign-offs in procedures.
- Supervision of activities, including risk and reactivity management.
- Pre-job briefs.

This activity constituted one Control Room Observation inspection sample as defined in Inspection Procedure 71111.11.

### b. Findings

No findings were identified.

## 1R12 Maintenance Effectiveness (71111.12)

### .1 Routine

#### a. Inspection Scope

The inspectors reviewed the specific structures, systems and components (SSC) within the scope of the Maintenance Rule (MR) (10CFR50.65) with regard to some or all of the following attributes, as applicable: (1) Appropriate work practices; (2) Identifying and addressing common cause failures; (3) Scoping in accordance with 10 CFR 50.65(b) of the MR; (4) Characterizing reliability issues for performance monitoring; (5) Tracking unavailability for performance monitoring; (6) Balancing reliability and unavailability; (7) Trending key parameters for condition monitoring; (8) System classification and reclassification in accordance with 10 CFR 50.65(a)(1) or (a)(2); (9) Appropriateness of performance criteria in accordance with 10 CFR 50.65(a)(2); and (10) Appropriateness and adequacy of 10 CFR 50.65 (a)(1) goals, monitoring and corrective actions. The inspectors compared the licensee's performance against site procedures. The inspectors reviewed, as applicable, work orders, surveillance records, problem evaluation reports (PERs), system health reports, engineering evaluations, and MR expert panel minutes; and attended MR expert panel meetings to verify that regulatory and procedural requirements were met. Documents reviewed are listed in the

attachment. This activity constituted four Maintenance Effectiveness inspection samples as defined in Inspection Procedure 71111.12.

- Maintenance Rule evaluation of Unit 3 Anticipated Transient Without SCRAM (ATWS) / Alternate Rod Insertion (ARI) trips and reliability improvement plan
- Maintenance Rule accounting of Unit 3 Recirculation pump start failures on 3-20-16 due to improper discharge valve LS-3 setting.
- Component Class GE CR 105 Contactors
- Unit 3 Core Spray System and Room Coolers

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation (71111.13)

a. Inspection Scope

For planned online work and/or emergent work that affected the combinations of risk significant systems listed below, the inspectors examined on-line maintenance risk assessments, and actions taken to plan and/or control work activities to effectively manage and minimize risk. The inspectors verified that risk assessments and applicable risk management actions (RMA) were conducted as required by 10 CFR 50.65(a)(4) applicable plant procedures. As applicable, the inspectors verified the actual in-plant configurations to ensure accuracy of the licensee's risk assessments and adequacy of RMA implementations. Documents reviewed are listed in the attachment. This activity constituted six Maintenance Risk Assessment inspection samples as defined in Inspection Procedure 71111.13.

- Unit 3 Automatic Depressurization System valve 3-PCV-1-22 out of service
- Tornado Watch on April 1, 2016
- Shutdown Bus 2 on alternate feed and B emergency diesel generator (EDG) out of service. April 25-29, 2016
- Unit 3 Yellow Risk due to residual heat removal (RHR) Loop II out of service
- Units 1 and 2 Yellow risk due to D1 residual heat removal service water (RHRSW) pump out of service, 1 of 2 battery chargers out of service for 'C' DG, Shutdown Bus 2 on alternate feed, and non-functional 3EC / C diesel generator (DG) crosstie capability
- Unit 3 Yellow Risk due to Main Bank 3 battery out of service

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessment (71111.15)

a. Inspection Scope

The inspectors reviewed the operability/functionality evaluations listed below to verify technical adequacy and ensure that the licensee had adequately assessed technical

specification (TS) operability. The inspectors reviewed applicable sections of the Updated Final Safety Analysis Report (UFSAR) to verify that the system or component remained available to perform its intended function. In addition, where appropriate, the inspectors reviewed licensee procedures to ensure that the licensee's evaluation met procedure requirements. Where applicable, inspectors examined the implementation of compensatory measures to verify that they achieved the intended purpose and that the measures were adequately controlled. The inspectors reviewed PERs on a daily basis to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the attachment. This activity constituted six Operability Evaluation inspection samples as defined in Inspection Procedure 71111.15.

- High Pressure Fire Protection System break discrepant minimum wall thickness calculations (CR 1178002)
- Automatic bus transfer of Unit Board 1B to Start Bus 1B was not blocked while Shutdown Bus 2 was supplied by Unit Board 1B (CR 1165168)
- Lower than expected RHRSW Flow to 1B RHR Heat Exchanger (CR 1162713)
- RHR Heat Exchanger 3B RHRSW Outlet Valve failed to open (CR 1154210)
- Loss of voltage regulator supplying Unit Station Service Transformer 3B Load Tap Changer (CR 1163822)
- Unit 3 Jet Pump number 12 flow indication elevated and outside of surveillance 3-3.4.2.1 curve (CR 1182784)

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

Permanent Plant Modifications

a. Inspection Scope

The inspectors verified that the plant modification listed below did not affect the safety functions of important safety systems. The inspectors confirmed the modifications did not degrade the design bases, licensing bases, and performance capability of risk significant structures, systems and components. The inspectors also verified modifications performed during plant configurations involving increased risk did not place the plant in an unsafe condition. Additionally, the inspectors evaluated whether system operability and availability, configuration control, post-installation test activities, and changes to documents, such as drawings, procedures, and operator training materials, complied with licensee standards and NRC requirements. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with modifications. Documents reviewed are listed in the attachment. This activity constituted one Plant Modification sample as defined in Inspection Procedure 71111.18.

- DCN 66071, 4kV and 480V Load Restrictions

b. Findings

No findings were identified.

1R19 Post Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors witnessed and reviewed post-maintenance tests (PMT) listed below to verify that procedures and test activities confirmed SSC operability and functional capability following the described maintenance. The inspectors reviewed the licensee's completed test procedures to ensure any of the SSC safety function(s) that may have been affected were adequately tested, that the acceptance criteria were consistent with information in the applicable licensing basis and/or design basis documents. The inspectors witnessed and/or reviewed the test data, to verify that test results adequately demonstrated restoration of the affected safety function(s). The inspectors verified that problems associated with PMTs were identified and entered into the CAP. Documents reviewed are listed in the attachment. This activity constituted two Post Maintenance Test inspection samples as defined in Inspection Procedure 71111.19.

- Unit 3 Recirculation Pump start failures CR 1151665
- Post maintenance test of the D EDG; WO117886451

b. Findings

Introduction. A self-revealing Green finding was identified for the licensee's failure to provide adequate work instructions for performing maintenance on the discharge valves for 3A and 3B Recirculation Pump motors.

Description. On March 20, 2016 the licensee replaced the Unit 3, A and B, recirculation pump discharge valve motors. The work instructions referenced drawing 3-47A370-68-10 to set the valve limit switches in conjunction with the motor replacement.

On March 20, 2016 the licensee commenced the hydrostatic test of the RCS. System temperature was approximately 157 degrees. Time to reactor core boiling was just over 2 hours. Shutdown cooling was operating on the opposite train. Two attempts were made to start the 3B Recirculation pump to support the test. Each time the pump tripped without an obvious indication or cause.

At 1:00 a.m. on March 21, 2016, the operators secured Loop II of shutdown cooling to allow use of the 3A recirculation pump to perform the hydrostatic testing. Unit 3 entered TS 3.4.8.B, RHR Shutdown Cooling System – Cold Shutdown, for not having any shutdown cooling in service. The licensee's intention was to perform the testing and restore RCS core flow within the one hour TS allowed outage time. At 1:10 a.m. the 3A Recirculation pump was started and then immediately tripped. Loop II of shutdown cooling was restored at 1:19 a.m.

For a total of 19 minutes the Unit 3 reactor had no operating core flow. RCS temperature did not increase significantly and did not result in a mode change due to the relatively low decay heat and quick response by the operators.

The licensee discovered drawing 3-47A370-68-10 had erroneous information for setting the valve limit switches. This resulted in a time delay trip signal being generated to trip the associated Recirculation pump Variable Frequency Drive (VFD) upon pump start and discharge valve opening. Following discovery that the drawing 3-47A370-68-10 error had resulted in an incorrect limit switch setting, a work order was created and performed to set the limit switches to the proper settings. This restored the pump start design features.

Station Procedure NPG-SPP-06.3 covered PMT requirements. Steps 3.2.2.3 and 3.2.3.A.1 required that plant operability requirements be considered in determining a required PMT. Also the procedure cautioned that a Surveillance Instruction may not be sufficient and that a supplemental PMT may be required in order to test all components or features affected by the activity. Procedure NPG – SPP 06.9.3, Post Modification Testing step 2.0.D stated that modification tests must cover other functions and operations of the systems to ensure that they have not been affected by the repair. Following completion of the maintenance, no supplemental post maintenance testing beyond the normal valve stroke surveillances was performed. The normal valve stroke surveillances did not verify that the limit switch settings would permit recirculation pump starts and operation.

Analysis. The failure to provide adequate work instructions for maintenance on the Unit 3 recirculation pump discharge valve motors which included appropriate testing as described in Procedure NPG – SPP 06.9.3 Post Modification Testing, was a performance deficiency. The performance deficiency was more than minor because it affected the equipment performance attribute of the Initiating Events Cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown operations. Specifically, two trains of equipment which provide for maintaining flow through the core during shutdown operations were unintentionally rendered inoperable. The inspector performed the initial significance determination using NRC Inspection Manual Chapter 0609, Appendix G, Attachment 3, “Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings.” The inspectors determined, per Attachment 3, that the finding was of very low safety significance because (1) RCS time to boil was longer than 2 hours and potential to reach RHR shutoff head was greater than 10 hours; (2) two diverse trains of RHR Shutdown cooling, low pressure Core Spray and Control Rod drive pumps were all available; (3) full credit was given for operator actions as they were actually demonstrated and all support equipment was available; and (4) containment venting was always available as the drywell hatch was open for the testing. The licensee initiated CRs 1151665 and 1151935 to address the inadequate post maintenance work instructions that resulted in the unexpected trip of the 3A and 3B Recirculation pumps. This finding had a human performance cross-cutting aspect because the licensee did not ensure that design documentation was correct and that work packages provided the proper tests to ensure a functional VFD / Recirculation pump trip logic. [H.7, Documentation].

Enforcement: This finding does not involve enforcement action because no violation of a regulatory requirement was identified. Because this finding does not involve a violation and is of very low safety significance, it is identified as a FIN (FIN 05000296/2016002-01, Failure to Provide Adequate Maintenance Work Instructions Results in Loss of Core Flow While Shutdown)

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors witnessed portions of, and/or reviewed completed test data for the following surveillance tests of risk-significant and/or safety-related systems to verify that the tests met technical specification surveillance requirements, UFSAR commitments, and in-service testing and licensee procedure requirements. The inspectors' review confirmed whether the testing effectively demonstrated that the SSCs were operationally capable of performing their intended safety functions and fulfilled the intent of the associated surveillance requirement. Documents reviewed are listed in the attachment. This activity constituted six Surveillance Testing inspection samples: four routine test, and two in-service tests as defined in Inspection Procedure 71111.22.

Routine Surveillance Tests:

- 3-SI-4.4.A.1, Unit 3 Standby Liquid Control Pump Functional Test
- Inspection of normally inaccessible 1C RHR heat exchanger service water side for fouling per licensee procedure NPG-SPP-09.14
- 2-SR-3.5.1.6(CS II), Unit 2 Core Spray Flow Rate Loop II
- 3-SR-3.8.1.7(3C), Diesel Generator '3C' 24 Hour Run

In-service Tests:

- 1-SR-3.5.3.3, Reactor Core Isolation Cooling (RCIC) System Rated Flow at Normal Operating Pressure
- 0-SI-4.5.C.1(D SMP), RHRSW Room D Sump Pump Test

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness (EP)

1EP2 Alert and Notification System Evaluation

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 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, siren maintenance, and siren testing. This inspection activity satisfied one inspection sample for the alert and notification system on a biennial basis as defined in Inspection Procedure 71114.02.

b. Findings

No findings were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System

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 Inspection Procedure 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 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 as defined in Inspection Procedure 71114.03.

b. Findings

No findings were identified.

1EP4 Emergency Action Level and Emergency Plan Changes

a. Inspection Scope

Since the last NRC inspection of this program area, two changes were made to the Radiological Emergency Plan and one change was made to the Emergency Action Levels, along with changes to several 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 Inspection Procedure 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 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 as defined in Inspection Procedure 71114.04.

b. Findings

No findings were identified.

1EP5 Maintenance of Emergency Preparedness

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 Inspection Procedure 71114, Attachment 05, 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 as defined in Inspection Procedure 71114.05.

b. Findings

Introduction: The inspectors identified a Green non-cited violation (NCV) of 10 CFR 50.54(q)(2), for the licensee's failure to declare a Notification of Unusual Event (NOUE) within 15 minutes of entry conditions being met. Specifically, on April 6, 2016, at 3:05 pm, Browns Ferry Unit 3 main control room (MCR) operators received a high-high radiation alarm on the main steam lines (MSL) that met Emergency Action Level (EAL) 1.4-U for declaring a NOUE.

Description: At 3:05 pm on April 6, 2016, the Browns Ferry Unit 3 MCR received a high-high alarm on MSL Radiation Monitor 3-RA-90-135C. At 3:26 pm, the MCR operators reduced power to 91% in accordance with (IAW) their annunciator response procedure. The power reduction reduced the radiation levels from above 1700 mR/hr to approximately 1200 mR/hr, which cleared the alarm. The licensee subsequently investigated the cause of the MSL high radiation alarm and determined that it was attributed to an oil leak from the 3B reactor feed pump that made its way into the pump's seal water lines. The licensee also determined that the oil coated the condensate

demineralizers which caused a chemical reaction that resulted in the production of elevated levels of radioactive isotopes Nitrogen-13 and Nitrogen-16.

The annunciator response procedure lists the alarm for the MSL high-high as 3-times (3X) background, but there was not an efficient mechanism for the control room staff to verify the set-point and confirm the alarm conditions. The licensee's Emergency Plan Implementing Procedure (EPIP)-1, Emergency Classification Procedure Event Classification Matrix, Section 3.1 [3] states, in part: "...if alarms are indeterminate and the existence cannot be reasonably discounted, the condition is considered authentic and the Shift Emergency Director (SED) should follow the indications provided." Contrary to the above, since the initial indications were met at 3:05 pm, the SED should have declared the NOUE prior to 3:20 pm. It was not until the senior resident inspector challenged the operators' that the licensee decided to investigate further and concluded, several days after the event, that the operators indeed should have declared a NOUE.

Analysis: The failure to declare a NOUE when an EAL entry criteria had been met as described in Emergency Plan Implementing Procedure (EPIP)-1, was considered a performance deficiency. This finding is more than minor because it was associated with the Emergency Preparedness cornerstone attribute of Emergency Response Organization Performance, and adversely affected the cornerstone objective of ensuring that a licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, on April 6, 2016, personnel did not declare a NOUE within 15 minutes of initial indications that EAL 1.4-U had been exceeded. The performance deficiency is associated with the Emergency Classification Planning Standard and is considered a Risk Significant Planning Standard (RSPS). The failure to declare a NOUE when directed by the EAL Matrix is considered a lost or degraded RSPS in accordance with Section 4 of Inspection Manual Chapter (IMC) 0609, Appendix B. Section 4.3.e of IMC 0609, Appendix B, provides the significance determination for a "Failure to Implement," and the performance deficiency was determined to be of very low safety significance (Green). The finding was associated with a cross-cutting aspect in the Procedure Adherence component of the Human Performance area because individuals did not follow processes, procedures and work instructions that would have led them to declare in a timely manner [H.8].

Enforcement: Title 10 CFR 50.54(q)(2) requires that a holder of a nuclear power reactor operating license under this part, shall follow and maintain the effectiveness of an emergency plan that meets the requirements of 10 CFR 50.47(b). Title 10 CFR 50.47(b)(4) requires a standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and state and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures. Contrary to the above, on April 6, 2016, the licensee failed to implement an emergency plan that met the standards in Title 10 CFR 50.47(b)(4) when they did not declare a NOUE within 15 minutes as described by their EAL scheme. Specifically, the licensee failed to declare a NOUE when conditions were met. Corrective actions included entering the issue into their CAP as CR 1159943, formally evaluating the decision-making process used during the event, and clarifying responsibilities for Declaration, Classification and Notification. Because this violation was of very low safety significance and was entered into the CAP, this violation is being treated as an NCV

consistent with Section 2.3.2.a of the NRC Enforcement Policy. (NCV 05000296/2016002-02, Failure to Declare Notification of Unusual Event)

1EP6 Drill Evaluation (IP 71114.06)

a. Inspection Scope

The inspectors observed an Emergency Planning (EP) Radiological Emergency Plan (REP) training drill that contributed to the licensee's Drill/Exercise Performance (DEP) and ERO performance indicator (PI) measures on May 11, 2016. This drill was intended to identify any licensee weaknesses and deficiencies in classification, notification, dose assessment and protective action recommendation (PAR) development activities. The inspectors observed emergency response operations in the Simulated Control Room and the Technical Support Center, to verify that event classification and notifications were done in accordance with EPIP-1, Emergency Classification Procedure, and licensee conformance with other applicable Emergency Plan Implementing Procedures. The inspectors attended the post-drill critiques to compare any inspector-observed weaknesses with those identified by the licensee in order to verify whether the licensee was properly identifying EP related issues and entering them in to the CAP, as appropriate. Documents reviewed are listed in the attachment. This activity constituted one Drill Evaluation sample as defined in Inspection Procedure 71114.06.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (IP 71124.06)

a. Inspection Scope:

Radioactive Effluent Processing Systems The inspectors walked-down selected components of the gaseous and liquid radioactive waste (radwaste) processing and effluent discharge systems. To the extent practical, the inspectors observed and evaluated the material condition of in-place waste processing equipment for indications of degradation or leakage that could constitute a possible release pathway to the environment. Inspected components included floor drain tanks, waste monitor tanks, radiation monitoring systems, and associated piping and valves. The inspectors interviewed licensee staff regarding equipment configuration and effluent monitor operation. The inspectors also walked down and reviewed surveillance test records for three trains of standby-gas treatment filters.

Effluent Monitoring and Discharge The inspectors observed the collection and processing of gaseous effluent samples from the Main Stack system. Technician proficiency in collecting, processing, and preparing the applicable release permits was evaluated. The inspectors reviewed recent liquid and gaseous release permits including pre-release sampling results, effluent monitor alarm setpoints, and public dose calculations. For the Main Stack Wide-Range Noble Gas Monitor and the Unit 1 Plant Vent Exhaust Radiation Monitor, the inspectors reviewed calibration and functional test records and evaluated traceability of radioactive calibration sources to National Institute

of Standards and Technology (NIST) standards. The inspectors also evaluated the licensee's capability to collect high-range post-accident effluent samples from these monitoring systems. The inspectors reviewed and discussed with licensee staff the methodology for determining vent and stack flow rates and compared current vent flows to design values in the Offsite Dose Calculation Manual (ODCM).

The inspectors reviewed the 2014 and 2015 Annual Radioactive Effluent Release Reports to evaluate reported doses to the public, review any anomalous events, and review ODCM changes. The inspectors also reviewed compensatory sampling data for time periods when selected radiation monitors were out of service. The inspectors reviewed the results of interlaboratory cross-checks for laboratory instruments used to analyze effluent samples. The inspectors also reviewed licensee effluent source term characterizations and changes to effluent release points. In addition, the inspectors evaluated recent land use census results

Problem Identification and Resolution The inspectors reviewed and discussed selected Corrective Action Program (CAP) documents associated with gaseous and liquid effluent processing and release activities. The inspectors evaluated the licensee's ability to identify and resolve the issues. The inspectors also reviewed recent self-assessment results.

Inspection Criteria Radwaste system operation and effluent processing activities were evaluated against requirements and guidance documented in the following: 10 CFR Part 20; 10 CFR Part 50 Appendix I; Technical Specifications (TS) Section 5; ODCM; Updated Final Safety Analysis Report (UFSAR) Section 9; Regulatory Guide (RG) 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants"; RG 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50 Appendix I"; and approved licensee procedures. Documents reviewed during the inspection are listed in the report Attachment.

This inspectors completed the required six samples as defined in Inspection Procedure 71124.06.

b. Findings

No findings were identified.

2RS7 Radiological Environmental Monitoring Program (REMP) (IP 71124.07)

a. Inspection Scope

REMP Implementation The inspectors reviewed the 2015 and 2014 Annual Environmental Operating Reports and the 2015 Annual Radioactive Effluent Release Report. Selected environmental measurements were reviewed for consistency with licensee effluent data, evaluated for radionuclide concentration trends, and compared with detection level sensitivity requirements as described in the ODCM. The inspectors assessed the licensee's response to any missed or anomalous environmental samples. The inspectors also reviewed the results of interlaboratory cross-checks for laboratory

instruments used to analyze environmental samples. Any changes to the ODCM, Land Use Census, or environmental program processes were discussed with licensee staff.

The inspectors observed routine collection of airborne particulate and iodine samples at selected locations as required by the licensee's ODCM. The inspectors noted the material condition of the continuous air samplers and environmental dosimeters. The inspectors also reviewed calibration and maintenance records for the environmental sampling equipment.

Meteorological Monitoring Program The inspectors observed the physical condition of the meteorological tower and its instrumentation and discussed equipment operability and maintenance history with licensee staff. The inspectors evaluated transmission of locally generated meteorological data to other licensee groups such as emergency operations personnel and main control room operators. Calibration records for the meteorological measurements of wind speed, wind direction, and temperature were reviewed. The inspectors also reviewed meteorological measurement data recovery for 2014 and 2015.

Ground Water Protection The inspectors reviewed the licensee's continued implementation of the industry's Ground Water Protection Initiative (Nuclear Energy Institute (NEI) 07-07) and discussed any changes to the program. The inspectors discussed program guidance for dealing with spills, leaks, and unexpected discharges with licensee staff and reviewed recent monitoring well results and any voluntary communications. The inspectors also reviewed recent entries into the 10 CFR 50.75(g) decommissioning file. The inspectors reviewed and discussed the licensee's program for monitoring of structures, systems, and components with the potential to release radioactive material to the environment. Potential effluent release points due to onsite surface water bodies were also evaluated.

Problem Identification and Resolution The inspectors reviewed CAP documents in the areas of radiological environmental monitoring, meteorological tower maintenance, and groundwater protection. The inspectors evaluated the licensee's ability to identify and resolve the issues. The inspectors also reviewed recent self-assessment results.

Inspection Criteria The inspectors evaluated REMP implementation, meteorological monitoring, and groundwater protection against the requirements and guidance contained in: 10 CFR Part 20; Appendices E and I to 10 CFR Part 50; TS Section 5.0; ODCM; UFSAR Chapter 2; RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment; Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program" – 1979; RG 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants", Rev. 1; NEI 07-07, "Industry Groundwater Protection Initiative – Final Guidance Document"; and approved licensee procedures. Documents reviewed during the inspection are listed in the report Attachment.

This inspectors completed the required three samples as defined in Inspection Procedure 71124.07.

b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

##### 4OA1 Performance Indicator (PI) Verification

###### .1 Cornerstone: Mitigating Systems

###### a. Inspection Scope

The inspectors reviewed the licensee's procedures and methods for compiling and reporting the following PIs. The inspectors examined the licensee's PI data for the specific PIs listed below for the second quarter of 2015 through the first quarter of 2016. The inspectors reviewed the licensee's data and graphical representations as reported to the NRC to verify that the data was correctly reported. The inspectors validated this data against relevant licensee records (e.g., CRs, Daily Operator Logs, Plan of the Day, Licensee Event Reports, etc.), and assessed any reported problems regarding implementation of the PI program. The inspectors verified that the PI data was appropriately captured, calculated correctly, and discrepancies resolved. The inspectors used the Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline, to ensure that industry reporting guidelines were appropriately applied. This activity constituted six PI inspection samples, as defined in Inspection Procedure 71151.

- Unit 1, 2, and 3 Mitigating Systems Performance Index (MSPI) for High Pressure Injection System (HPCI)
- Unit 1, 2, and 3 MSPI for Heat Removal System (RCIC)

###### b. Findings

No findings were identified.

###### .2 Cornerstone: Emergency Preparedness

###### a. Inspection Scope

The inspectors sampled licensee submittals relative to the PIs listed below for the period October 1, 2015, through March 31, 2016. 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 (ERO) 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 as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

.3 Cornerstone: Public Radiation Safety

a. Inspection Scope

The inspectors reviewed the Radiological Control Effluent Release Occurrences PI results for the Public Radiation Safety Cornerstone from May 2015 through May 2016. For the assessment period, the inspectors reviewed cumulative and projected doses to the public contained in liquid and gaseous release calculations and condition reports related to Radiological Effluent Technical Specifications/ODCM issues. Documents reviewed during the inspection are listed in the report Attachment. This inspection satisfied one inspection sample for PI verification as defined in Inspection Procedure 71151.

b. Findings

No findings were identified.

40A2 Problem Identification and Resolution of Problems (71152)

.1 Review of items entered into the Corrective Action Program:

a. Inspection Scope

As required by Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished by reviewing daily CR reports, and periodically attending Management Review Committee (MRC) and Plant Screening Committee (PSC) meetings.

b. Findings

No findings were identified.

.2 Focused Annual Sample Review #1 – Potential Part 21 condition for Masterpact circuit breakers failing to close:

a. Inspection Scope

The inspectors conducted a review of the status of the licensee's analysis for a potential Part 21 condition for Masterpact circuit breakers that have a continuous closed signal applied. In circuits with a continuous closed signal applied when the breaker is closed, a breaker anti-pump latch can become lodged against the close coil plunger. The purpose of the anti-pump latch is to protect the breaker from excessive rapid opening and closing from conflicting signals. With the anti-pump latch lodged in this fashion, the breaker may fail to close when required. The inspectors verified that the licensee was evaluating whether this potential Part 21 condition applied. Documents reviewed are listed in the attachment. This activity constituted one focused annual inspection sample as defined in IP 71152.

b. Findings

No findings were identified.

.3 Focused Annual Sample Review #2 – Control of contractor oversight for large projects and refueling outage work:

a. Inspection Scope

The inspectors conducted a review of the licensee program and guidance related to ensuring contractors work quality. Specifically, the inspectors reviewed the training, planning and qualification requirements for the NFPA 0805, Refueling activities, Dry Cask activities and MOV work activities. Guidance was contained in corporate procedure NPG-SPP-07.7, NPG CTS Role and Oversight of Supplemental Personnel. Documents reviewed are listed in the attachment. This activity constituted one focused annual inspection sample as defined in IP 71152.

b. Findings

No findings were identified.

.4 Semi-annual Trend Review

a. Inspection Scope

As required by Inspection Procedure 71152, the inspectors performed a review of the licensee's CAP and other associated programs and documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues, but also included licensee trending efforts and licensee human performance results. The inspectors' review nominally considered the six-month period of January through June 2016. The inspectors reviewed licensee trend reports and the Integrated Trend Reports from December 1, 2015, to June 1, 2016, in order to determine the existence of any adverse trends that the licensee may not have previously identified. This inspection constituted one Semi-annual Trend Review inspection sample. Documents reviewed are listed in the Attachment.

b. Observations and Findings

The licensee had identified trends and appropriately addressed them in their CAP. The inspectors observed that the licensee had performed a detailed review. The licensee routinely reviewed cause codes, involved organizations, key words, and system links to identify potential trends in their data. The inspectors compared the licensee process results with the results of the inspectors' daily screening. Trends that have been identified by the inspectors and reported to the licensee were appropriately entered into the licensee's trending program.

Noteworthy Licensee identified trends included:

- Increasing onsite Tritium trend (CR 1138969)
- Trend in Radiation Protection posting errors (1162617)
- Adverse Trend in Reactor Feed Pump failures (1167376)

Noteworthy NRC identified degrading trends included:

- Seasonal readiness preparations not ensuring all necessary equipment operating reliably for anticipated cold or hot weather
- Adverse trend in Control room and Shutdown Board room chillers failures
- Adverse trend in reporting component failures and events to the NRC

One violation was identified:

Failure to Report a Condition that Could Have Prevented Fulfillment of a Safety Function

Introduction: An NRC identified Severity Level IV NCV of 10 CFR 50.72(b)(3)(v) and 10 CFR 50.73(a)(2)(v) was identified for the licensee's failure to notify the NRC within 8 hours and submit a LER within 60 days of discovery of a condition that could have prevented the fulfillment of a safety function. Specifically, the licensee failed to notify the NRC that the High Pressure Coolant Injection (HPCI) system had been rendered inoperable due to an equipment failure.

Description: On March 17, 2016 the licensee conducted planned maintenance on the Unit 2 HPCI system to replace the valve packing material in the steam admission valve. The maintenance required the system to be depressurized and be taken out of service, which made the system inoperable. After the valve packing was installed, the licensee performed diagnostic testing of the motor operated valve on March 18, which required stroking of the valve. The diagnostic tests were completed satisfactorily and HPCI was returned to service on March 19 at 7:38 a.m. A final operability surveillance stroke time test per 2-SR-3.6.1.3.5(HPCI) was to be performed prior to declaring the system operable. When operators attempted to perform the surveillance at 10:24 a.m., the valve would not open. The inability of the valve to open would prevent steam from being admitted to the HPCI turbine, which would have rendered the system inoperable. Troubleshooting later revealed that the breaker thermal overloads had tripped and also that a breaker contactor in the valve closing circuit had become hot enough to fuse its contacts together, which prevented the valve from opening. The cause of the equipment failure was determined to be due to excessive valve stroking during the earlier diagnostic testing.

On March 22, 2015, the inspectors identified to the operations Shift Manager that the valve failure met the three conditions listed in section 3.2.7 of NUREG-1022 which described when an 8 hour and 60 day report per 10 CFR 50.72(b)(3)(v) and 10 CFR 50.73(a)(2)(v) are required. Specifically, the inspectors identified that the discovery of the unexpected breaker failure was a condition that would have resulted in the single-train HPCI system being declared inoperable. On March 24, CR 1153334 was generated to evaluate the reportability of the condition; however, the licensee's evaluation incorrectly determined that the condition was not reportable.

Analysis: The inspectors determined the failure to notify the NRC within 8 hours and submit a LER within 60 days of discovery of a condition that could have prevented the fulfillment of a safety function, was a performance deficiency. Specifically, the licensee failed to notify the NRC that the HPCI system had been rendered inoperable due to an equipment failure. The licensee's failure to provide the required notifications constitutes a traditional enforcement violation because it impacts the NRC's ability to carry out its regulatory function. The traditional enforcement violation was determined to be Severity Level IV because it matched example 6.9.d.9 of the NRC Enforcement Policy. Because the violation is a traditional enforcement violation, no cross-cutting aspect was assigned.

Enforcement: 10 CFR 50.72(b)(3)(v) and 10 CFR 50.73(a)(2)(v), require, in part, that licensees shall notify the NRC within 8 hours and submit a LER within 60 days of discovery of any event or condition that at the time of discovery could have prevented the fulfillment of the safety function of structures or systems that are needed to: (A) Shut down the reactor and maintain it in a safe shutdown condition; (B) Remove residual heat; (C) Control the release of radioactive material; or (D) Mitigate the consequences of an accident. Contrary to the above, the licensee failed to notify the NRC within 8 hours on March 19, 2016 and report by May 18, 2016 when they discovered the High Pressure Coolant Injection (HPCI) system had been rendered inoperable due to an equipment failure which met the reporting requirements of 10 CFR 50.72(b)(3)(v) and 10 CFR 50.73(a)(2)(v). As an immediate corrective action, the licensee entered the violation into the licensee's corrective action program as CR 1185268. This violation is being treated as an NCV consistent with Section 2.3.2 of the Enforcement Policy. (NCV 05000260/2016002-03, Failure to Report a Condition that Could Have Prevented Fulfillment of a Safety Function)

#### 4OA3 Follow-up of Events and Notices of Enforcement Discretion (71153)

##### .1 (Closed) Licensee Event Report (LER) 05000260/2015-002-01 High Pressure Coolant Injection System Inoperable due to Manual Isolation of Steam Leak

###### a. Inspection Scope

The inspectors had previously inspected the September 16, 2015 manual isolation of the Unit 2 High Pressure Coolant Injection (HPCI) system due to a leak on the steam admission valve. This inspection is documented in the Browns Ferry Inspection Report number 2016-01 (ML16134A224). This LER was a revision based on information provided to and inspected by the NRC based on updated licensee analysis of this incident. The inspectors reviewed this LER revision.

b. Findings

The enforcement aspects of this event are discussed in Browns Ferry Inspection Report number 2016-01 (ML16134A224). No new violations were identified in this LER. This LER is closed.

.2 (Closed) LER 050000296/2016-001-00 Inoperable Residual Heat Removal Pump Results in Condition Prohibited by Technical Specifications and Safety System Functional Failure

a. Inspection Scope

On January 19, 2016 it was discovered that the 3A RHR pump motor breaker transfer switch (MBTS) had malfunctioned which prevented the pump from being capable of automatically initiating and also from being manually started from the main control room. This loss of capability rendered the pump inoperable. An evaluation determined that the pump was inoperable for approximately eleven days from January 9, 2016 until January 20, 2016, which exceeded the TS Required Action times of TS LCO 3.5.1. The capability to start the pump manually from the local breaker was considered to be available during this timeframe. The cause of the MBTS failure was binding in the ball detent and position sprocket mechanism which prevented the switch from satisfactorily latching and making good electrical contact while in the 'NORMAL' position. The switch had been installed greater than its twenty-one year service life and had no preventive maintenance performed because the vendor manual guidance cautioned against the use of any lubricants and/or cleaning agents in any form. During the time of the 3A RHR Pump MBTS failure, the 3B and 3D RHR pumps were also inoperable for 48 minutes on January 14, 2016, which resulted in a RHR Safety System Functional Failure.

b. Findings

No findings were identified. This LER is closed.

4OA5 Other Activities

.1 Operation of an Independent Spent Fuel Storage Installation (ISFSI) (IP 60855.1)

a. Inspection Scope

The inspectors reviewed changes made to the ISFSI programs and procedures, including associated 10 CFR 72.48, "Changes, Tests, and Experiments," screens and evaluations to verify that changes made were consistent with the license or certificate of compliance. The inspectors reviewed records to verify that the licensee recorded and maintained the location of each fuel assembly placed in the ISFSI. The inspectors verified, by direct observation that the licensee performed fuel cask loading in a safe manner and in compliance with approved procedures. Documents reviewed are listed in the attachment. This activity constituted one semi-annual Operation of an ISFSI inspection sample, as defined in Inspection Procedure 60855.1.

b. Findings

No findings were identified.

.2 Failure to Meet the Deadline for Voluntary Reporting of Elevated Groundwater Tritium

a. Inspection Scope

During performance of Inspection Procedure 71124.07, "Radiological Environmental Monitoring Program (REMP)", the inspectors noted that on April 26, 2016, the licensee had detected elevated tritium levels of 36,444 pCi/L in groundwater monitoring well MW-01. Per NEI 07-07, this result exceeded the voluntary reporting threshold of 20,000 pCi/L for groundwater that is or could be used as drinking water. This sample result should have triggered a voluntary report to State and Local officials by close-of-business on April 27, 2016. However, no report was made until June 20, 2016 (Event Number: 52025), when groundwater well MW-08 also exceeded 20,000 pCi/L (22,400 pCi/L). This represents a deviation from the industry's Groundwater Protection Initiative as described by NEI 07-07, Objective 2.2, "Voluntary Communication".

b. Findings

No findings were identified.

.3 Follow-up On Alternative Dispute Resolution Confirmatory Orders (IP 92702)

a. Inspection Scope

The NRC staff performed this follow up inspection in accordance with IP 92702 for selected commitments in Confirmatory Order (ML14121A551) issued on May 1, 2014, following an alternate dispute resolution (ADR) session on April 3, 2014, to disposition two related traditional enforcement apparent violations; 1) Inaccurate Information Provided Concerning Onsite Emergency Response Organization Staffing Requirements and 2) Inappropriate Amendment of License.

The inspection objectives were to verify the licensee's implementation of commitments contained in the Order to provide assurance that (as appropriate):

- adequate corrective actions have been implemented for the traditional enforcement violations;
- the root causes of these enforcement actions have been identified;
- that generic implications have been addressed;
- that the licensee's programs and practices have been appropriately enhanced to prevent recurrence.

The following commitments were reviewed and closed:

- *b.i.6 TVA will implement, via an independent entity, an effectiveness review of the corrective actions completed to date with regard to the 10 CFR 50.9 and 10 CFR 50.90 Root Cause Analyses.*
- *b.ii.4 TVA will perform a detailed review of all procedures revised prior to August 15, 2014, during the Procedure Upgrade Project to ensure that the licensing basis information required by the revised SPP-01.1 and SPP-01.2 is identified. This review will include all licensing, administrative and governance procedures.*

*The revised procedures will institutionalize the licensing review process and provide sustainability from that point forward in the Procedure Upgrade Project.*

- *b.ii.5 TVA will complete training of BFN Engineering, Licensing and licensed Operators regarding the scope and hierarchy of licensing basis documents, lessons learned from circumstances associated with EA-14-005, and the associated change process. The training material will be available for NRC review*
- *b.ii.6 Through December 31, 2014, changes to BFN licensing commitments will be reviewed and approved by a second site licensing engineer in addition to review and approval by site licensing. The focus of this additional review will be to ensure that the correct regulatory change process(es) has/have been used. This action will be discontinued upon completion of the training encompassed in item 5 above.*
- *b.ii.7 TVA will review a sample of facility changes, based on plant risk and complexity, that have occurred from 2004 to May 2014, to determine whether these changes have been appropriately incorporated into the licensing basis documents. TVA's method of selecting facility changes to be sampled will be provided to the NRC by July 15, 2014. Any identified discrepancies will be dispositioned through the corrective action process. The results of this review will be made available to the NRC.*
- *b.ii.8 TVA will review a sample of BFN facility changes, based on plant risk and complexity, accomplished within the last 3 years and processed outside of the 10 CFR 50.59 process to determine whether these changes have been appropriately incorporated into the licensing basis documents. TVA's method of selecting facility changes to be sampled will be provided to the NRC by July 15, 2014. Any identified discrepancies will be dispositioned through the corrective action process. The results of this review will be made available to the NRC.*
- *b.ii.9 TVA will make a presentation to the 1) Regulatory Issue Working Group and 2) the Regulating Utility Group regarding the circumstances of the violations discussed above and the importance of leadership attention to the effective management of the current licensing basis and complete and accurate communications with the NRC. The presentation will be made available to the NRC in advance.*

The inspectors reviewed the licensee's RCAs associated with the violations in addition to other evaluations conducted in support of and as a result of the RCA. The inspectors reviewed corrective actions that were taken and implemented to address the identified causes. The inspectors verified that corrective actions planned and implemented were appropriate to address the causes and prevent recurrence and were consistent with the requirements of the Order.

b. Findings and Observations

No findings were identified.

4OA6 Meetings, Including Exit

.1 Exit Meeting Summary

On July 15, 2016, the resident inspectors presented the quarterly inspection results to Mr. Kevin Bronson, Sr. Site Vice President, and other members of the licensee's staff, who acknowledged the findings. The inspectors verified that all proprietary information was returned to the licensee.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee**

S. Bono, Site Vice President  
L. Hughes, General Plant Manager  
J. Paul, Nuclear Site Licensing Manager  
M. McAndrew, Manager of Operations  
L. Slizewski, Superintendent of Operations  
M. Kirschenheiter, Assistant Director for Site Engineering  
B. L. McCoy, Spent Fuel Storage Program Manager  
M. Oliver, Licensing Engineer  
E. Bates, Licensing Engineer  
D. Drummonds, Program Engineer  
L. Crutcher, Component Engineer  
M. Lawson, Radiation Protection Manager  
J. Smith, System Engineer  
P. Campbell, System Engineer  
J. Kulisek, EP Manager  
K. Skinner, System Engineer  
L. Holland, System Engineer  
D. Jackson, System Engineer  
D. Ford, System Engineer  
J. Addison, Manager of Drills and Exercises  
M. Clark, Emergency Preparedness Specialist  
J. Garner, Site Licensing  
W. Lee, Corporate Emergency Preparedness Director  
J. Parshall, EP Program Planning and Implementation Manager  
T. Scott, Site Quality Assurance Manager  
P. Summers, Plant Support Director  
S. Taubuki, Emergency Preparedness Specialist  
B. Tidwell, Emergency Preparedness Manager  
C. Vaughn, Operations Training Manager  
C. Hensley, Chemistry Manager  
B. Calkin, Site Licensing

## LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

### Opened and Closed

05000296/2016002-01	FIN	Failure to Provide Adequate Maintenance Results in Loss of Core Flow While Shutdown (Section 1R19)
05000296/2016002-02	NCV	Failure to Declare Notification of Unusual Event (1EP5)
05000260/2016002-03	NCV	Failure to Report a Condition that Could Have Prevented Fulfillment of a Safety Function (Section 4OA2.4)

### Closed

05000260/2015-002-01	LER	High Pressure Coolant Injection System Inoperable due to Manual Isolation of Steam Leak (Section 4OA3.1)
05000296/2016-001-00	LER	Inoperable Residual Heat Removal Pump Results in Condition Prohibited by Technical Specifications and Safety System Functional Failure (Section 4OA3.2)
05000259, 260, 296- 00	ORD	05/01/2014 Confirmatory Order Action b.i.6 (Section 4OA5.3)
05000259, 260, 296- 00	ORD	05/01/2014 Confirmatory Order Action b.ii.4 (Section 4OA5.3)
05000259, 260, 296- 00	ORD	05/01/2014 Confirmatory Order Action b.ii.5 (Section 4OA5.3)
05000259, 260, 296- 00	ORD	05/01/2014 Confirmatory Order Action b.ii.6 (Section 4OA5.3)
05000259, 260, 296- 00	ORD	05/01/2014 Confirmatory Order Action b.ii.7 (Section 4OA5.3)
05000259, 260, 296- 00	ORD	05/01/2014 Confirmatory Order Action b.ii.8 (Section 4OA5.3)
05000259, 260, 296- 00	ORD	05/01/2014 Confirmatory Order Action b.ii.9 (Section 4OA5.3)

## LIST OF DOCUMENTS REVIEWED

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

#### Procedures:

0-AOI-57-1E, Grid Instability  
0-GOI-200-3, Hot Weather Operations  
NPG-SPP-7.1.7, Station Seasonal Readiness  
TRO-EA-SOP-30.405, Nuclear Offsite Power Requirements  
TRO-TO-SPP-30.128, Superseded

#### Other Documents:

CR 1170536

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

#### Procedures:

0-GOI-300-5, Environmentally Qualified Doors, Rev 13

#### Drawings:

0-47E225-137, Harsh Environmental Data, Rev 5  
2-47E814-1 Flow Diagram Core Spray System, Rev 55  
1-47-E836-1-1 Unit 1 Flow diagram for raw service water and high pressure fire protection system, Rev 4

#### Other Documents:

Calculation ND-Q2999-970011, Reactor Building Environmental Analysis for High Energy Line Brakes, Rev 3  
Calculation R14920914110, Flooding in the Reactor Building Due to Breaks in the RWCU System, Revision 4  
VSDS Standard May Survey Report, Survey # M-20160311-24, B RWCU Pump Room, March 11, 2016  
VSDS Standard May Survey Report, Survey # M-20160518-23, A RWCU Pump Room, May 18, 2016  
CR 1161329   CR 1161330   CR 1168380   CR 1168949   CR 1169591  
CR 1174095   CR 1175745

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

#### Procedures:

NPG-SPP 18.4.7 Control of Transient Combustibles, Rev 5

#### Other Documents:

Fire Protection Report Volume 1, Rev 20  
Fire Protection Report Volume 2, Rev 52  
Fire Protection Report Volume 2, Rev 53  
NFPA 0805 Fire Protection Report Manual

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

NDN-000-999-2007-0031, IF – BFN Probabilistic Risk Assessment – Internal Flooding Analysis, Rev 0  
NDQ0999920076 Flooding in the Reactor Building Due to Breaks in the RWCU System, Rev 4  
CR 1144474

**Section 1R11: Licensed Operator Regualification**

Unit 2 Simulator Exercise Guide (SEG) OPL173S060, Security Event Response and Control Room Abandonment, Revision 16

Unit 2 SEG OPL 173S414, Fire Safe Shutdown Procedure's, Rev 1

**Section 1R12: Maintenance Effectiveness**

CR 1110412 CR 1133110 CR 1182208

Email from Maintenance Rule Coordinator about scoping requirements for Recirculation pumps Level 2 Evaluation for CR 1110412

Maintenance Rule (a)(1) evaluation and reliability plan for Unit 3 ATWS – RPT failures (Function 068-B)

Maintenance Rule (a)(1) evaluation for U1,2,3 CR 105 Contactors

Maintenance Rule (a)(1) evaluation for U3 Function 075-B

Maintenance Rule (a)(1) plan for U1,2,3 CR 105 Contactors

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

0-AOI-100-7, Severe Weather, Rev 36

NPG-SPP-07.3.4 Protected Equipment, Rev. 2

NPG-SPP-09.11.1 Equipment Out of Service Management, Rev. 10

**Other Documents:**

eSOMS Narrative Logs dated April 1, April 19, May 9 and May 18, and June 21, 2016

eSOMS Action Tracking Status for Units 1, 2 and 3 on April 1, April 19, May 9, May 18, and June 21, 2016

Browns Ferry Unit 1, 2, and 3 Equipment Out Of Service Report dated April 1, April 19, May 9, May 18, and June 21, 2016

**Section 1R15: Operability Evaluations****Procedures:**

0-OI-57A, Switchyard and 4160V AC Electrical System, Rev 157

NPG-SPP-22.302 Corrective Action Program Screening and Oversight, Rev 1

**Drawings:**

1-47E858-1 Units 1 & 0 Flow Diagram RHR Service Water System, Rev 72

**Other Documents:**

B31.1 USA Standard Code for Pressure Piping, 1967 Edition

DCN 51565 Installation of Electronic Voltage Regulator for Load Tap Changer motors

DCN 66071, 4kV and 480V Load Restrictions

EACE for CR 1154210

EDQ0-057-2004-0026, AC and DC Load Limitations for Units 1, 2, and 3 Operating, Rev 23

EDQ0057920034, 4.16kV and 480V Busload, Voltage Drop and Short Circuit Calculation, Rev 101

Equipment Apparent Cause Evaluation (EACE) for CR 1102016, Rev 0, 1 and 2

Fire Protection Report Volume 1, Rev 20

Fire Protection Report Volume 2, Rev 52

Fire Pump Surveillance data results from August 2008 until November 1, 2015

FSAR, Appendix O License Renewal Programs, Rev 26

MDQ002320100019, RHRSW System Hydraulic Analysis for Units 1, 2, & 3 Heat Exchangers, Rev 2

NDQ0999940013, Reliability Analysis of the Pre-Accident and Common Accident Signal Logic for BFN Units 1, 2 and 3, Rev 9

UFSAR Section 8.4, Normal Auxiliary Power System

CR 1102016 CR 1102418 CR 1154210 CR 1162713 CR 1163252 CR 1163822

CR 1165160 CR 1165168 PER 46252 PER 828936 CR 1178002

Past Operability Evaluation for CR 1165168

WO 03-001714-000

MDQ0000262016000558, Minimum Wall Thickness for HPFP Yard Main Fire Loop, Rev 0

### **Section 1R18: Plant Modifications**

CR 1165519

DCN 66071, 4kV and 480V Load Restrictions

Probabilistic Safety Assessment on Blocking Automatic Transfers to the Second Offsite Source

Prompt Determination of Operability for PER 994066

UFSAR Section 8.4, Normal Auxiliary Power System

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

Procedures:

0-SR-3.8.1.1(D) Diesel Generator D Monthly Operability Test

3-OI-68, Reactor Recirculation System

NPG-SPP-06.3, Pre-Post-Maintenance Testing, revision 0001

NPG-SPP-06.9.3, Post Modification Testing, revision 0006

Other Documents:

CR 1151665, VFD-068-3112, Variable Frequency Drive tripped when 3B Recirculation Pump started.

CR 1151935, Recirculation Pump 3B MOV rotor 4 was not set prior to LS-3 opening

G-50, Torque and Limit Switch Settings for Motor Operated Valves, revision 0008

Minor Maintenance WO 117684570

Operator logs for March 20, 2016

Technical Specification 3.4.8.B

Technical Specification Bases SR 3.5.1.5

### **Section 1R22: Surveillance Testing**

Procedures:

0-SI-4.5.C.1(D SMP), RHRSW Room D Sump Pump Test

1-SR-3.5.3.3, RCIC System Rated Flow at Normal Operating Pressure

2-SR-3.5.1.6(CS II), Unit 2 Core Spray Flow Rate Loop II

3-SR-3.8.1.7(3C), Diesel Generator '3C' 24 Hour Run

3-SI-4.4.A.1, Unit 3 SLC Pump Functional Test, Rev 57

Other Documents:

Heat Exchanger Visual Inspection and Evaluation form per NPG-SPP-09.14-1 of 1C RHR Heat Exchanger dated May 4, 2016.

WO 116797629 for CS 2-SR-3.5.1.6(CS II)

WO 116798894 for 3-SR-3.8.1.7(3C)

WO 117378609 for 0-SI-4.5.C.1(D SMP)

WO 117378627 for RCIC SR-3.5.3.3

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

#### Procedures:

EPDP-8, Emergency Preparedness Quality Assurance, Rev. 4  
 EPDP-10, Facilitation of the Alert and Notification System and Notification Tests, Rev. 6  
 EPDP-14, Evaluation of Changes to Alert and Notification Systems (ANS), Rev. 0  
 EPDP-17, NPG Emergency Plan Effectiveness Review (10 CFR 50.54(q)), Rev. 5  
 EPFS-9, Inspection, Service, and Maintenance of the Prompt Notification System (PNS) at Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants, Rev. 9  
 NPG-SPP-18.3.5, Equipment Important to Emergency Response, Rev. 4

#### Other Documents:

Documentation of Quarterly siren maintenance for 2<sup>nd</sup> quarter 2014 to 1<sup>st</sup> quarter 2016  
 Documentation of bi-weekly siren tests and maintenance for 2<sup>nd</sup> quarter 2014 to 1<sup>st</sup> quarter 2016  
 Siren Annual Maintenance records: 2014 to 2015  
 508, Electromechanical Siren Installation and Operating Instructions, Rev. 12/11  
 2015 & 2016 Browns Ferry Emergency Planning Calendar mailer to members of the public in the 10-mile EPZ  
 CR 973613 CR 1008361 CR 1134691 CR 1134696 CR 1149293 CR 1160115  
 CR 1168226

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

#### Procedures:

EPDP-3, Emergency Plan Exercises and Preparedness Drills, Rev. 13  
 EPIP-2, Notification of Unusual Event, Rev. 36  
 EPIP-6, Activation and Operation of the Technical Support Center (TSC), Rev. 37  
 EPIP-7, Activation and Operation of the Operations Support Center (OSC), Rev. 33  
 TRN-30, REP Training, Rev. 32

#### Other Documents:

Browns Ferry Nuclear Plant On-Shift Staffing Analysis Report, dated 12/10/12  
 Browns Ferry Nuclear Plant NEI 12-01 Phase 2 Extended Loss of Power ERO Staffing Analysis Report, Rev. 0, dated 1/23/15  
 Exercise Report Browns Ferry Augmentation Drill, dated 12/4/14  
 Exercise Report Browns Ferry Augmentation Drill, dated 5/11/15  
 Exercise Report Browns Ferry Augmentation Drill, dated 5/15/15  
 Selected Qualification Records for Key Position ERO Personnel  
 Various EP staff and ERO member training records  
 CR 963870 CR 1018295 CR 1018296 CR 1018297 CR 1044179 CR 1136856  
 CR 1158631

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

#### Procedures:

NP-REP Radiological Emergency Plan, Rev. 105 & 106  
 NP-REP Radiological Emergency Plan App. A, Browns Ferry Nuclear Plant, Rev. 105 & 106  
 EPDP-3, Alert, Rev. 37  
 EPDP-17, NPG Emergency Plan Effectiveness Review [10 CFR 50.54(q)], Rev. 5  
 EPIP-1, Emergency Classification Procedure, Rev. 52 & 53

Other Documents:

CECC 2014-050, EPDP-17, Att. 2 Screening Evaluation Form for change of location of JIC, dated 6/2/15  
 CECC 2014-050, EPDP-17, Att. 4 Effectiveness Evaluation Form for change of location of JIC, dated 6/2/15  
 CECC 2015-026, EPDP-17, Att. 2 Screening Evaluation Form for REP App. A, Rev. 106, dated 7/21/15  
 CECC 2015-045, EPDP-17, Att. 2 Screening Evaluation Form for removal of JIC Liaison position from the ERO, dated 10/30/15  
 CECC 2015-045, EPDP-17, Att. 4 Effectiveness Evaluation Form for removal of JIC Liaison position from the ERO, dated 10/30/15  
 CECC 2015-059, EPDP-17, Att. 2 Screening Evaluation Form for changes to the NP-REP (Generic) Rev. 106, dated 12/4/15  
 CECC 2015-060, EPDP-17, Att. 2 Screening Evaluation Form for wording changes to NP-REP (Generic) Rev. 106, dated 12/4/15  
 CECC 2015-061, EPDP-17, Att. 2 Screening Evaluation Form for addition of EPDP-3, "Emergency Plan Exercises & Preparedness Drills," to Section 16.3 of NP-REP (Generic) Rev. 106, dated 12/4/15  
 CECC 2016-017, EPDP-17, Attachment 2 Screening Evaluation Form for REP Appendix A, Rev.107, dated 5/19/16  
 CECC 2016-018, EPDP-17, Attachment 2 Screening Evaluation Form for REP Appendix A, Rev.107, dated 5/18/16  
 BFN-2015-023, EPDP-17, Att. 2 Screening Evaluation Form for EPIP-1 Rev. 52, dated 12/16/16  
 BFN-2016-026, EPDP-17, Att. 2 Screening Evaluation Form for EPIP-1, Rev. 53, dated 5/19/16  
 BFN-2016-029, EPDP-17, Att. 2 Screening Evaluation Form for EPIP-1, Rev. 53, dated 5/19/16  
 BFN-2016-030, EPDP-17, Att. 2 Screening Evaluation Form for EPIP-1, Rev. 53, dated 5/19/16  
 CR 940284 CR 977864 CR 1067432 CR 1106129 CR 1131140 CR 1132342  
 CR 1157129 CR 1180166 CR 1180169 CR 1180171

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

EPDP-1, Procedures, Maps, and Drawings, Rev. 11  
 EPDP-17, NPG Emergency Plan Effectiveness Review, Rev. 5  
 EPIP-1, Emergency Classification Procedure, Rev. 53  
 EPIP-6, Activation and Operation of the Technical Support Center, Rev.37  
 EPIP-7, Activation and Operation of the Operations Support Center, Rev.33  
 NPG-SPP-18.3, Emergency Preparedness, Rev. 12  
 NPG-SPP-18.3.5, Equipment important to Emergency Response, Rev. 4  
 NPG-SPP-18.3.7, Alternate Facility Activation and Operation, Rev. 2  
 NPG-SPP-22.300, Corrective Action Program, Rev. 6  
 NPG-SPP-22.301, Condition Report Initiation, Rev. 6  
 NPG-SPP-22.302, Corrective Action Program Screening, Rev. 9  
 NPG-SPP-22.303, Condition Report Actions, Closures, and Approval, Rev. 9  
 NPG-SPP-22.304, Condition Report Trending, Rev. 4  
 NPG-SPP-22.305, Level 2 Evaluation, Rev. 6  
 NPG-SPP-22.306, Level 1 Evaluation, Rev. 6  
 REP, Radiological Emergency Plan, (Generic Part), Rev. 106  
 REP, Radiological Emergency Plan, (Appendix A - BFN), Rev. 107

Other Documents:

Annual Review and Approval of ETE Update Levels, dated 12/11/15

BFN Self-assessment BFN-EP-SSA-15-002, Risk Significant External Inspection  
 BFN Self-assessment BFN-EP-SSA-16-001, Emergency Responder SCBA Qualification  
 Verification  
 BFN Self-assessment BFN-EP-SSA-16-102, Pre-NRC Baseline Inspection  
 Browns Ferry NOUE Event Report, dated 5/2/16  
 Browns Ferry Nuclear Plant- Quality Assurance Oversight Report QA-BF-16-010, dated 5/25/16  
 Drill Report Browns Ferry Off Year Report, dated 8/19/14  
 Drill Report Browns Ferry Graded Exercise, dated 11/11/15  
 Drill Report Browns Ferry SAMG Drill, dated 1/27/16  
 Evacuation Time Estimates for Browns Ferry Nuclear Power Plant Plume Exposure Pathway  
 Emergency Planning Zone, dated August 2013  
 Radiological Emergency Plan Effluent Radiation Monitor EAL calculations, dated 1/7/16  
 Site Audit Report SSA-1501 Radiological Emergency Preparedness Browns Ferry, dated  
 2/25/15  
 Various Inventories of Emergency Facilities, Emergency Equipment and Supplies for 1<sup>st</sup> Quarter  
 2016  
 Work Order 115705064, Wide Range Effluent Radiation Monitor System – Mid and High Range  
 Noble Gas Calibration, dated 5/20/15  
 Work Order 115869304, Wide Range Effluent Radiation Monitor System – Noble Gas  
 Calibration, dated 10/29/15  
 CR 972013 CR 982716 CR 983249 CR 992269 CR 1001273 CR 1018297  
 CR 1011323 CR 1020921 CR 1081855 CR 1086387 CR 1100545 CR 1101654  
 CR 1101656 CR 1101697 CR 1101700 CR 1101712 CR 1103755 CR 1111436  
 CR 1133821 CR 1157129 CR 1163146 CR 1165533

**Section 1EP6: Drill Evaluation (IP 71114.06)**

CR 1170676 CR 1170953 CR 1170704 CR 1170717 CR 1170719 CR 1170838  
 CR 1170725 CR 1170740 CR 1170747 CR 1170800 CR 1170802 CR 1170816  
 CR 1170843

**Section 2RS6: Radioactive Gaseous and Liquid Effluent Treatment**

**Procedures:**

Offsite Dose Calculation Manual, Rev. 22 and Rev. 23  
 CI-710, Liquid Permit Processing, Rev. 21  
 CI-712, Liquid Monthly Calculations, Rev. 12  
 CI-714, Particulate and Charcoal Filter Sampling and Analysis, Rev. 41  
 CI-716, Processing Gaseous Permits from Charcoal/Particulate Filters, Rev. 17  
 CI-720, Determining Vent Flow, Rev. 16  
 CI-721, Manual Liquid Release Permit Generation, Rev. 00  
 0-SI-4.8.A.1-1, Liquid Effluent Permit, Rev. 09  
 0-SI-4.8.A.5-1, Appendix I Dose Calculations – Liquid Effluents, Rev. 19  
 0-SI-4.8.B.2-1, Airborne Effluent Analysis – Particulate and Charcoal Filter Analysis, Rev. 42  
 0-SI-4.8.B.1.a.1, Airborne Effluent Release Rate, Rev. 58  
 0-SI-4.8.B.2-8, Airborne Effluent Analysis – Stack Noble Gas, Rev. 17  
 0-SI-4.8.B.3, Appendix I Dose Calculations – Airborne Effluents, Rev. 25  
 0-SI-4.8.C, Annual 40CFR190 Dose Calculation, Rev. 11  
 NPG-SPP-22.302, Corrective Action Program Screening, Rev. 9

**Other Documents:**

Annual Radioactive Effluent Release Report, 2014 and 2015  
 BFN-VRD-MI07-0030, Microdesigns, Inc., Calibration of the Wide-Range Gaseous Effluent

Radiation Monitoring System (WRGERMS), 08/31/89  
 Certificate of Gamma Standard Source, Cs-137 177-29-3, 08/01/86  
 Certificate of Calibration, Source 22695-135 Ba-133, 02/12/87  
 Effluent Monitor Out-of-service List, June 2014 – May 2016  
 WO 115869304, Wide Range Gaseous Effluent Rad Mon Sys – Mid & High Range Noble Gas Calibration, 11/05/15  
 WO 114630294, Wide Range Gaseous Effluent Rad Mon Sys – Mid & High Range Noble Gas Calibration, 12/04/12  
 WO 115378045, Rx Bldg Vent Exhaust Rad Mon Calibration and Functional Test 1-RM-90-250, 12/16/14  
 WO 116907681, Rx Bldg Vent Exhaust Rad Mon Calibration and Functional Test 1-RM-90-250, 07/10/15  
 WO 115528159, RCW Rad Mon (1-RM-90-132D) Calibration and Functional Test, 03/07/14  
 WO 115433665, RCW Rad Mon (1-RM-90-132D) Calibration and Functional Test, 01/09/15  
 WO 115755949, Airborne Effluents – Main Stack Mon Sys Calibration, 05/28/15  
 WO 116986591, Airborne Effluents – Main Stack Mon Sys Calibration, 08/04/15  
 WO 113150722, SGT Filter Pressure Drop Test & In Place Leak Test – Train A, 11/07/12  
 WO 115240014, SGT Filter Pressure Drop Test & In Place Leak Test – Train A, 09/26/14  
 WO 113816413, SGT Filter Pressure Drop Test & In Place Leak Test – Train B, 12/21/12  
 WO 115756003, SBGTS Iodine Removal Efficiency – Train B, 02/06/15  
 WO 114313192, SGT Filter Pressure Drop Test & In Place Leak Test – Train C, 03/24/13  
 WO 115869445, SBGTS Iodine Removal Efficiency – Train C, 05/22/15  
 WO 116796700, Airborne Effluent Release Rate, 05/07/16  
 Gaseous Radioactive Waste Release Permit no. 160276.030.016.G  
 Gaseous Radioactive Waste Release Permit no. 160303.037.020.G  
 Gaseous Radioactive Waste Release Permit no. 160295.031.016.G  
 Gaseous Radioactive Waste Release Permit no. 160311.041.021.G  
 Liquid Radioactive Waste Release Permit no. 150173.004.110.L  
 Liquid Radioactive Waste Release Permit no. 160001.002.001.L  
 Results of Radiochemistry Interlaboratory Cross-Check Program, 3<sup>rd</sup> Quarter 2015 – 1<sup>st</sup> Quarter 2016  
 2015 Part 61 CWPS, DAW, RWCU, Thermex Analyses  
 Special Report for the Bypass of the Gaseous Radwaste Offgas Charcoal Absorbers, 12/23/14  
 BFN-RP-SSA-16-002, RP Public Radiation Safety Baseline Snapshot Self-Assessment Report, 02/05/16  
 BFN-CEM-SSA-15-006, Liquid Effluent Monitoring Snapshot Self-Assessment Report, 07/01/15  
 CR 849316 CR 861975 CR 934551 CR 956279 CR 970739 CR 974829  
 CR 981336 CR 1012875 CR 1101799 CR 1148656 CR 1153528

### **Section 2RS7: Radiological Environmental Monitoring Program (REMP)**

#### **Procedures:**

Offsite Dose Calculation Manual, Rev. 23  
 CI-420, Collection of Radiological Environmental Monitoring Samples, Rev. 8  
 CI-421, Well Sampling and Maintenance, Rev. 13  
 NPG-SPP-05.14, Guide for Communicating Inadvertent Radiological Spills/Leaks to Outside Agencies, Rev. 4  
 EPFS-4, Environmental Data Station Meteorological Sensor Exchange, Rev. 20  
 EPFS-6, Calibration of Environmental Data Station Data Logger and Sonic Channels, Rev. 16  
 Instruction No. 450.01-005, Calibration of Air Temperature Sensors – Nuclear, Rev. 4  
 NPG-SPP-22.302, Corrective Action Program Screening, Rev. 9

Other Documents:

2014 Annual Radiological Environmental Operating Report  
 2015 Annual Radiological Environmental Operating Report  
 2015 Annual Radioactive Effluent Report  
 Meteorological Data Recoverability Report, 2014 – 2015  
 Risk Ranked Structures, Systems, and Components  
 Work Order 116690732  
 Work Order 116795748  
 Meteorological Monitoring Instrument Report of Calibration, Ultrasonic Wind Sensor B0830001, 9/22/14, 9/17/15  
 Meteorological Monitoring Instrument Report of Calibration, Ultrasonic Wind Sensor B2310005, 2/12/15, 9/17/15  
 Meteorological Monitoring Instrument Report of Calibration, Ultrasonic Wind Sensor B4410001, 7/8/15, 10/19/15  
 Meteorological Monitoring Instrument Report of Calibration, RTD 205498, 8/21/14, 10/1/15  
 Meteorological Monitoring Instrument Report of Calibration, RTD 205510, 8/21/14, 10/1/15  
 Meteorological Monitoring Instrument Report of Calibration, RTD 205523, 8/21/14, 10/1/15  
 Calibration Data Sheets, Radiological Environmental Monitoring Air Sampler Gas Meter Serial Nos. 1030568, 1030570, 1030580, 1030601, 1030581, 1030569, 1030603; 9/4/14, 8/26/15  
 Calibration Data Sheets, Radiological Environmental Monitoring Air Sampler Gas Meter Serial Nos. 1030571, 1040145, 1030582, 14436698, 1030574, 17074896, 1030583; 9/4/14, 8/25/15  
 Browns Ferry 50.75(g) entries from Jun2 1, 2014 – June 1, 2016  
 Groundwater Monitoring Well Results, 10/23/15 – 5/27/16  
 BFN-RP-SSA-16-002, RP Public Radiation Safety Baseline Self-Assessment  
 BFN-CEM-SSA-15-002, Groundwater Protection Program, NEI 07-07, Self-Assessment  
 CR 1031186 CR 1066646 CR 1149617 CR 1164659 CR 885869 CR 915148  
 CR 993178 CR 997291

**Section 40A1: Performance Indicator (PI) Verification**Procedures:

FAQ for NEI 99-02 Regulatory Assessment Performance Indicators as of February 9, 2015  
 NEI 99-02 Regulatory Assessment Performance Indicator Guideline, Rev 7  
 Unit 1, 2, and 3 MSPI Basis Documents, Rev 17, 16, 15 respectively

Other Documents:

HPCI Maintenance Rule Availability and Reliability data  
 RCIC Maintenance Rule Availability and Reliability data  
 Gaseous Radioactive Waste Release Permit no. 160312.030.017.G  
 Gaseous Radioactive Waste Release Permit no. 160277.031.015.G  
 Liquid Radioactive Waste Release Permit no. 160001.002.001.L  
 Semiannual Radioactive Effluent Release Report 2016 – Gaseous Effluents, 05/31/16

**Section 40A2: Identification and Resolution of Problems**Procedures:

NPG SPP 07.3, Work Activity, Risk Management Process, Revision 15  
 NPG-SPP-03.5, Regulatory Reporting Requirements, Rev 12  
 NPG-SPP-07.7, NPG CTS Role and Oversight of Supplemental Personnel  
 NPG-SPP-19.4, Refueling and Steam Generator Alliance Services  
 NPG-SPP-22.201, Oversight of the Human Performance Program  
 NUREG 1022, Event Reporting Guidelines: 10 CFR 50.72 and 50.73, Rev 3

Drawings:

2-45E714-2 Wiring Diagram 250V DC Reactor MOV Board 2A Schematic Diagram, Rev 30

Other Documents:

AZZ Nuclear Technical Bulletin TB-12-007, Revision 0 Masterpact Breakers Fail to Close  
 NLI-QA-3500 Report of potential 10 CFR Part 21 Condition, Masterpact Replacement Breaker  
 Fail to Close Operation, Rev 1

River Bend Station Special Inspection Report 05000458/2015010

CR 1142808 CR 1146299 CR 1151321 CR 1153334 CR 1160196 CR 1165557

CR 1185268

Past Operability Evaluation for 1153334

WO 117679885

WO 115366028

WO 1153068

WO 115366078

WO 115372045

**Section 4OA3: Event Follow-up**Procedures:

2-POI-74-1, RHR System Piping Flushes, Rev 23

Other Documents:

CR 1126697

EACE for CR 1126697

POE for CR 1126697

**Section 4OA5: Other Activities**Procedures:

HPP-2245-100 & 200, BFN Hi-STORM FX/MPC Pre-Operation Inspection, Revision 7

HPP-2245-300, MPC Sealing, Revision 7

HPP-2245-400, MPC Transfer, Revision 5

HPP-2245-500, Hi-STORM FW Site Transportation, Revision 5

MSI 0-079-DCS035, Dry Cask Storage Campaign Guidelines, Revision 17

MSI 0-079-DCS043, Dry Cask Campaign Review Program, Revision 8

OPDP-1 Conduct of Operations Rev. 0031 & 0035

Other Documents:

Current Campaign MPC Loading Maps – MPCFW-021, 022, 023, 024, 025, 026 & 027.

Independent Spent Fuel Storage Installation Certificate of Compliance, 72.1014

Independent Spent Fuel Storage Installation Manual

Condition Report CR 1058728, Foreign Material found in fuel assemble JLB423

Previous Campaign (July 2015): MPC Loading Maps – MPCFW- 020, 019, 018, 107, 016, -  
 015, 003, 014, 013, 004, 002, 001.

Special Nuclear Material Inventories for MPC February 23, 2016

Condition Reports: 790109, 896301, 925914, 838977, 838972, 988162, 838977, 935471,  
 988162, 925914, 838977, 907411, 901307, 863323

115881677 Commitment Completion Form (R20 140718 053).

115881648 Commitment Completion Form (R20 141203 102).

115864926 Commitment Completion Form (R20 140718 052).

115864910 Commitment Completion Form (R20 140825 065).

115864896 Commitment Completion Form (R20 141022 091).

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115849754 Commitment Closure Form (R20 151204 110).  
115839725 Commitment Completion Form (R20 141003 088).

## LIST OF ACRONYMS

ADAMS	-	Agencywide Document Access and Management System
ADS	-	Automatic Depressurization System
ARM	-	area radiation monitor
CAD	-	containment air dilution
CAP	-	corrective action program
CCW	-	condenser circulating water
CFR	-	Code of Federal Regulations
COC	-	certificate of compliance
CR	-	condition report
CRD	-	control rod drive
CS	-	core spray
DCN	-	design change notice
EECW	-	emergency equipment cooling water
ED		Electronic dosimeter
EDG	-	emergency diesel generator
FE	-	functional evaluation
FPR	-	Fire Protection Report
FSAR	-	Final Safety Analysis Report
HRA		High Radiation Area
HPCI	-	high pressure coolant injection
IP		Inspection Procedure
IMC	-	Inspection Manual Chapter
LHRA		Locked High Radiation Area
LER	-	licensee event report
NCV	-	non-cited violation
NEI		Nuclear Energy Institute
NIST		National Institute of Standards and Technology
NRC	-	U.S. Nuclear Regulatory Commission
NSTS		National Source Tracking System
ODCM	-	Off-Site Dose Calculation Manual
OSLD		Optically Stimulated Luminescence Dosimeter
PCM		Personnel Contamination Monitor
PER	-	problem evaluation report
PCIV	-	primary containment isolation valve
PI	-	performance indicator
PM		Portal Monitor
QA		Quality Assurance
Radwaste		Radioactive Waste
RCA		Radiologically Controlled Area
RCE	-	Root Cause Evaluation
RCIC	-	reactor core isolation cooling
RCW	-	Raw Cooling Water
REMP	-	Radiological Environmental Monitoring Program
RG	-	Regulatory Guide
RHR	-	residual heat removal
RHRSW	-	residual heat removal service water
RPT		Radiation Protection Technician
RS		Radiation Safety
RTP	-	rated thermal power

RPS	- reactor protection system
RWP	- radiation work permit
SAM	Small Article Monitor
SDP	- significance determination process
SBGT	- standby gas treatment
SLC	- standby liquid control
SNM	- special nuclear material
SR	- service request
SRV	- safety relief valve
SSC	- structure, system, or component
TI	- Temporary Instruction
TIP	- transverse in-core probe
TRM	- Technical Requirements Manual
TS	- Technical Specification(s)
UFSAR	- Updated Final Safety Analysis Report
URI	- unresolved item
VHRA	Very High Radiation Area
WO	- work order