



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

August 14, 2012

Mr. Joseph W. Shea  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
1101 Market Street, LP 4B-C  
Chattanooga, TN 37402-2801

**SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC INTEGRATED INSPECTION  
REPORT 05000259/2012003, 05000260/2012003, 05000296/2012003,  
05000259/2012502, 05000260/2012502, AND 05000296/2012502**

Dear Mr. Shea:

On June 30, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Browns Ferry Nuclear Plant, Units 1, 2, and 3. The enclosed inspection report documents the inspection results which were discussed on July 10, August 10 and 14th, 2012, with Mr. Keith Polson and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, orders, and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

One NRC identified and 3 self revealing findings of very low safety significance (Green) were identified during this inspection. Three of these findings were determined to involve violations of NRC requirements. Further, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. The NRC is treating the violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy. If you contest these non-cited violations, 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: (1) the Regional Administrator, Region II; (2) the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and (3) the NRC Resident Inspector at the Browns Ferry Nuclear Plant.

In addition, if you disagree with any cross-cutting aspect assignment in the 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, Region II, and the NRC Resident Inspector at the Browns Ferry Nuclear Plant.

J. Shea

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In accordance with 10 CFR 2.390 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 Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

***/RA/***

Eugene F. Guthrie, Chief  
Special Project, Browns Ferry  
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 05000259/2012003,  
05000260/2012003, 05000296/2012003

cc w/encl. (See page 3)

J. Shea

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Letter to Joseph W. Shea from Eugene Guthrie dated August 14, 2012

SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC INTEGRATED INSPECTION  
REPORT 05000259/2012003, 05000260/2012003, 05000296/2012003,  
05000259/2012502, 05000260/2012502, AND 05000296/2012502

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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.: 05000259/2012003, 05000260/2012003, 05000296/2012003,  
05000259/2012502, 05000260/2012502, 05000296/2012502

Licensee: Tennessee Valley Authority (TVA)

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

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

Dates: April 1, 2012, through June 30, 2012

Inspectors: D. Dumbacher, Senior Resident Inspector  
C. Stancil, Senior Resident Inspector  
P. Niebaum, Resident Inspector  
L. Pressley, Resident Inspector  
M. Speck, Senior Emergency Preparedness Inspector (1EP2, 1EP3,  
1EP5, 4OA1)  
R. Hamilton, Senior Health Physicist (2RS1, 2RS2, 2RS6, 4OA1)  
C. Dykes, Health Physicist (2RS7)  
R. Kellner, Health Physicist (2RS8)  
M. Coursey, Reactor Inspector (1R08)

Approved by: Eugene F. Guthrie, Chief  
Reactor Projects Special Branch  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000259/2012003, 05000260/2012003, 05000296/2012003, 05000259/2012502, 05000260/2012502, 05000296/2012502; 04/01/2012 –06/30/2012; Browns Ferry Nuclear Plant, Units 1, 2 and 3; Operability Evaluations, Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation, and Event Follow-Up.

The report covered a three month period of inspection by resident and regional inspectors. Four findings were identified. The significance of most findings is identified by their color (Green, White, Yellow, and Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP); and, the cross-cutting aspects were determined using IMC 0310, "Components Within the Cross-Cutting Areas". Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Revision 4, dated December 2006.

### NRC Identified and Self-Revealing Findings

#### Cornerstone: Initiating Events

- Green. A self-revealing finding (FIN) was identified for the licensee's failure to perform preventive maintenance on the Unit 3 Main Control Room (MCR) annunciator power supplies. As a result, a power supply failed which led to a fire in annunciator panel 3-X-55-5A in the Unit 3 control room. The licensee initiated actions to extinguish the fire, replace the two affected power supplies and develop a preventive maintenance program to replace the power supplies every ten years. Additional corrective actions to replace all power supplies that have been installed for more than four years are pending. This was captured in the licensee's corrective action program as problem event report (PER) 496592.

The performance deficiency was determined to be more than minor because it was considered sufficiently similar to example 4.f of Inspection Manual Chapter (IMC) 0612, Appendix E, for an issue that resulted in a fire hazard in a safety-related area of the plant. The finding was associated with the Initiating Events Cornerstone and required a phase 3 analysis in accordance with IMC 0609 because the finding increased the likelihood of, and actually caused, a fire in the Unit 3 control room. The phase 3 analysis determined that without an impact to additional plant equipment, or a major impact on human action failure rates, the finding was determined to be Green. The cause of this finding was related to the cross cutting aspect of Problem Identification in the Corrective Action Program component of the Problem Identification and Resolution area because the licensee should have recognized the electrolytic capacitors were installed beyond their recommended service life and scheduled replacement prior to their failure [P.1(a)]. (Section 4OA3.6)

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### Cornerstone: Mitigating Systems

- Green. An NRC-identified non-cited violation (NCV) of the Technical Specifications 5.4.1.a was identified for the licensee's failure to maintain an Emergency Equipment Cooling Water (EECW) pump flood barrier in accordance with written procedures which resulted in the inoperability of two other safety related pumps. The licensee immediately restored the flood protection configuration of the C Residual Heat Removal Service Water (RHRSW) pump room by properly re-installing the flood protection cover and permanently stenciled the aluminum plate with the required procedure for installation. The licensee entered this issue into their corrective action program as PER 532050.

The finding was more than minor because it was associated with the Mitigating Systems cornerstone attribute of Protection Against External Events, and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of RHRSW pumps to perform their intended safety function during a design basis flooding event. Specifically, the improper re-installation of an external flood protection cover resulted in the inoperability of two Residual Heat Removal Service Water (RHRSW) pumps. The significance of this finding was evaluated in accordance with the IMC 0609 Attachment 4, Phase 1- Initial Screening and Characterization of Findings, which required a Phase 3 analysis because the finding involved the degradation of equipment designed to mitigate a flooding event and it was risk significant due to external initiating event core damage sequences. The finding was determined to be Green because of the short exposure time, and the low likelihood of the flood. The cause of this finding was directly related to the cross cutting aspect of Supervisory Oversight in the Work Practices component of the Human Performance area, because of the foreman's assumption that workers knew to restore the flood protection cover to meet procedural requirements without a formal pre-job brief [H.4(c)]. (Section 1R15)

### Cornerstone: Public Radiation Safety

- Green. A self-revealing non-cited violation (NCV) of 10 CFR 71.5, Transportation of Licensed Material, was identified by inspectors for the licensee's failure to comply with Department of Transportation (DOT) regulations during shipment of radioactive materials. Specifically, the licensee failed to ensure proper packaging of two DOT 7A Type A packages as required by Department of Transportation (DOT) regulations in 49 CFR 173.475, Quality Control Requirements Prior To Each Shipment Of Class 7 (Radioactive) Materials. This issue has been entered into the licensee's corrective action program as SR 570902.

The finding was more than minor because it is associated with the Public Radiation Safety Cornerstone, Plant Facilities/Equipment and Instrumentation attribute, involving transportation packaging and adversely affected the cornerstone objective, to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian nuclear reactor operation. Specifically, the failure to correctly secure the package

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contents to prevent movement could have resulted in damage or failure of the container during transportation. The finding was determined to be of very low safety significance (Green) because it did not involve radiation limits being exceeded, a package breach, a certificate of compliance issue, a low-level burial ground non-conformance, or a failure to make emergency notifications. The cause of this finding was directly related to the cross cutting aspect of Documents, Procedures and Component Labeling in the Resources component of the Human Performance area because the licensee did not effectively incorporate package design specifications into their transportation program to ensure that all internal restraining devices are correctly installed to secure the CRDM in place to prevent damage to the transport package. (H.2(c)) (Section 2RS8)

- Green. A self-revealing non-cited violation (NCV) of 10 CFR 71.5, Transportation of Licensed Material, was identified by inspectors for the licensee's failure to comply with Department of Transportation (DOT) regulations during shipment of radioactive materials. Specifically, the licensee failed to ensure proper closure of a DOT 7A Type A package as required by Department of Transportation (DOT) regulations in 49 CFR 173.475, Quality Control Requirements Prior To Each Shipment Of Class 7 (Radioactive) Materials. This issue has been entered into the licensee's corrective action program as SR 571151.

The finding was more than minor because it is associated with the Public Radiation Safety Cornerstone, Plant Facilities/Equipment and Instrumentation attribute, involving transportation packaging and adversely affected the cornerstone objective, to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian nuclear reactor operation. Specifically, the failure to apply the correct torque to the package closure bolts could have resulted in incomplete sealing of the container or failure of the cover bolts during transportation. The finding was determined to be of very low safety significance (Green) because it did not involve radiation limits being exceeded, a package breach, a certificate of compliance issue, a low-level burial ground non-conformance, or a failure to make emergency notifications. The cause of this finding was directly related to the cross cutting aspect of Documents, Procedures and Component Labeling in the Resources component of the Human Performance area because the licensee did not effectively incorporate the vendor provided container loading and shipping instructions into their work package and transportation program to ensure correct torque values were used to close the shipping container. (H.2(c)) (Section 2RS8).

## REPORT DETAILS

### Summary of Plant Status

Unit 1 operated at full power for most of the report period except for an unplanned downpower on June 29, 2012, to 75 percent power to reduce load on the B Phase Main Bank Transformer due to a lifting oil pressure relief. The unit returned to full power on June 30, 2012.

Unit 2 operated at full power for most of the report period except for one planned and one unplanned downpower. On April 20, 2012, the unit performed a planned downpower to 66 percent power for rod pattern adjustment, scram time testing and turbine valve testing. The unit returned to full power on April 22nd. On May 15, 2012, the unit performed an unplanned downpower to 92 percent power to insert control rod 30-51 for scram outlet valve repair and returned to full power the same day.

Unit 3 operated at full power for most of the report period except for one planned downpower, one manual and two automatic scrams, and one unplanned downpower. On April 6, 2012, the unit was shutdown for a scheduled refueling outage that lasted 49 days. The unit was restarted on May 19th. On May 22nd, an automatic scram occurred from 19.5 percent power with the main turbine generator offline due to a 3A Unit Station Service Transformer differential relay trip caused by incorrect relay setting. On May 24, 2012, during reactor startup and heatup an unplanned manual scram occurred as a result of a partial control rod insertion caused by a combination of a signal spike and an inappropriate operator downrange on separate intermediate power range monitors. The unit restarted the same day. On May 29, 2012, a main generator current transformer manufactured and installed with reverse polarity caused an automatic scram from 75 percent power. The unit restarted on June 2nd and returned to full power on June 5th. On June 6th, the unit performed an unplanned downpower from 96 percent power to 75 percent power to remove the 3B condensate booster pump with high moisture in its oil system from service. The unit returned to full power on June 8, 2012.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### 1R01 Adverse Weather Protection

##### .1 Offsite and Alternate Alternating Current (AC) Power Systems Readiness

##### a. Inspection Scope

Prior to the summer season, inspectors reviewed electrical power design features, onsite risk and work management procedures, and corporate transmission and power supply procedures to verify appropriate operational oversight and assurance of continued availability of offsite and alternate AC power systems. Inspectors verified that communications protocols existed between the transmission system operator and Browns Ferry Nuclear Plant for coordination of off-normal and emergency events affecting the plant, event details, estimates of return-to-service times, and notifications of grid status changes. Inspectors also verified that procedures included controls to

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adequately monitor both offsite AC power systems (including post-trip voltages) and onsite alternate AC power systems for availability and reliability. Furthermore, inspectors interviewed onsite licensed operators and offsite transmission personnel to determine their understanding and implementation of the power monitoring and assessment process. Inspectors reviewed the material condition of offsite AC power systems and onsite alternate AC power systems to the plant, including switchyard and transformers. This review included review of outstanding work orders affecting these systems and a walkdown of the switchyard with operations personnel to ensure the systems will continue to provide appropriate “as designed” capabilities. This activity constituted one Offsite and AC Readiness sample.

b. Findings

No findings were identified.

.2 Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

Prior to and during the onset of hot weather conditions, the inspectors reviewed the licensee’s implementation of 0-GOI-200-3, Hot Weather Operations. The inspectors also reviewed the Hot Weather Discrepancy Log; and discussed implementation of 0-GOI-200-3 with responsible Operations personnel and management. Furthermore, the inspectors conducted walkdowns of potentially affected risk significant equipment systems located in the Unit 1 and 2 Diesel Generator Building, and the Unit 3 Diesel Generator Building. The inspectors also performed a walkdown of the Standby Gas Treatment (SBGT) Building. This activity constituted one Readiness for Seasonal Extreme Weather sample.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial Walkdown

a. Inspection Scope

The inspectors conducted three partial equipment alignment walkdowns to evaluate the operability of selected redundant trains or backup systems, listed below, while the other train or subsystem was inoperable or out of service. The inspectors reviewed the functional systems descriptions, Updated Final Safety Analysis Report (UFSAR), system operating procedures, and Technical Specifications to determine correct system lineups for the current plant conditions. The inspectors performed walkdowns of the systems to verify that critical components were properly aligned and to identify any discrepancies which could affect operability of the redundant train or backup system. This activity constituted three Equipment Alignment inspection samples.

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- Unit 1&2 'A' Emergency Diesel Generator
- Unit 3 Residual Heat Removal System - Division II
- Unit 1 Reactor Core Isolation Cooling (RCIC) System

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Fire Protection Tours

a. Inspection Scope

The inspectors reviewed licensee procedures, Nuclear Power Group Standard Programs and Processes NPG-SPP-18.4.7, Control of Transient Combustibles, and NPG-SPP-18.4.6, Control of Fire Protection Impairments, and conducted a walkdown of the four 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. Furthermore, 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. This activity constituted four Fire Protection inspection samples.

- Unit 2 Reactor Building Elevations 519, 541, and 565 west of column line R11 (FZ 2-1)
- Unit 3 Reactor Building, EL 593' and residual heat removal (RHR) heat exchanger rooms, EL 565', and 593' near column R15-S and R21-S (FZ 3-3)
- Unit 1, Control Building, EL 593' (FA 16)
- Unit 1,2, and 3 Turbine Building Deluge Sprinkler Control Stations Affecting Control Bay (FA 25)

b. Findings

No findings were identified.

1R07 Heat Sink Performance

.1 Annual Review

a. Inspection Scope

The inspectors examined activities associated with Unit 3 RHR Heat Exchangers. The inspectors also reviewed design basis documents, calculations, test procedures, maintenance procedures and preventive maintenance procedures and results to evaluate the licensee's program for maintaining heat sinks in accordance with the licensing basis. Specifically inspectors reviewed modifications performed on the Unit 3 RHR Heat Exchanger Flanges. Inspectors reviewed available performance testing documentation of the 3A and 3C RHR Heat Exchangers.

In addition, the inspectors reviewed the licensee's implementation of the GL 89-13 program. Inspectors reviewed associated PERs and corrective actions to verify that the licensee was identifying issues and correcting them. The inspectors performed walkdowns of key components of the Unit 3 RHR system to verify material conditions were acceptable and physical arrangement matched procedures and drawings. This activity constituted one Annual Heat Sink sample.

b. Findings

No findings were identified.

1R08 Inservice Inspection (ISI) Activities (71111.08G, Unit 3)

a. Inspection Scope

Non-Destructive Examination (NDE) Activities and Welding Activities: From April 16 to April 20, 2012, the inspectors conducted an on-site review of the implementation of the licensee's Inservice Inspection (ISI) Program for monitoring degradation of the reactor coolant system, emergency feedwater systems, risk-significant piping and components, and containment systems in Unit 3. The inspector's activities included a review of non-destructive examinations (NDEs) to evaluate compliance with the applicable edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC), Section XI (Code of record: 2001 Edition with 2003 Addenda), and to verify that indications and defects (if present) were appropriately evaluated and dispositioned in accordance with the requirements of the ASME Code, Section XI, acceptance standards.

The inspectors directly observed the following NDE mandated by the ASME Code to evaluate compliance with the ASME Code Section XI and Section V requirements and, if any indications and defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement.

- UT Exam of Weld DRHR-03-03, 3-FCV-74-53, Low Pressure Coolant Injection (LPCI) Loop I Inlet
- UT Exam of Weld DSRHR-03-04, 3-HCV-74-55, 24 in. inlet for Recirculation Loop B

The inspectors reviewed records of the following NDEs mandated by the ASME Code Section XI to evaluate compliance with the ASME Code Section XI and Section V requirements and, if any indications and defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement.

- VT Exam of RPV-WASH-3-50, Reactor Pressure Vessel Stud Washer
- UT Exam of weld DRHR-03-12, 3-FCV-74-67, LPCI Loop II Inlet
- EVT of BFN-3-RPV-068-RA048 Standpipe in Unit 3 Steam Separator
- EVT of BFN-3-RPV-068-RA050 U3 Feedwater Sparger End Brackets

The inspectors reviewed associated documents for the welding activities referenced below in order to evaluate compliance with procedures and the ASME Code. The inspectors reviewed the work order, repair and replacement plan, weld data sheets, welding procedures, procedure qualification records, welder performance qualification records, and NDE reports.

- Work Order 04-719493-003, 3-FCV-073-016 HPCI Turbine Steam Supply Valve
- Work Order 08-718716-004, Replace Strain Gauges on MS Lines

During non-destructive surface and volumetric examinations performed since the previous refuelling outage, the licensee did not identify any relevant indications that were analytically evaluated and accepted for continued service. Therefore, no NRC review was completed for this inspection procedure attribute.

Identification and Resolution of Problems: The inspectors performed a review of a sample of ISI-related problems which were identified by the licensee and entered into the corrective action program as Problem Evaluation Reports (PERs). The inspectors reviewed the PERs to confirm the licensee had appropriately described the scope of the problem, and had initiated corrective actions. The review also included the licensee's consideration and assessment of operating experience events applicable to the plant. The inspectors performed this review to ensure compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements. The corrective action documents reviewed by the inspectors are listed in the report attachment.

b. Findings

No findings were identified.

## 1R11 Licensed Operator Requalification

### .1 Resident Inspector Quarterly Review

#### a. Inspection Scope

On June 11, 2012, the inspectors observed an as-found licensed operator requalification simulator examination according to Unit 2 Simulator Exercise Guide OPL173.S039. The scenario involved Partial Loss of Reactor Building Closed Cooling Water, Loss of I & C Bus B, Anticipated Transient without Scram (ATWS), Lower Water Level (C-5) for Power Control with Bypass Valves.

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 Abnormal Operating Instructions (AOIs), and Emergency Operating Instructions (EOIs)
- Timely and appropriate Emergency Action Level declarations per Emergency Plan Implementing Procedures (EPIP)
- Control board operation and manipulation, including high-risk operator actions
- Command and Control provided by the Unit Supervisor and Shift Manager

The inspectors attended the post-examination critique to assess the effectiveness of the licensee evaluators and to verify 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). This activity counts for one Observation of Requalification Activity inspection sample.

#### 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 such as OPDP-1, Conduct of Operations, NPG-SPP-10.0, Plant Operations and GOI-100-12, Power Maneuvering.

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Inspectors utilized activities such as post maintenance testing, surveillance testing and refueling and other outage 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 License Operator Requalification inspection sample and one Control Room Observation inspection sample.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness

.1 Routine

a. Inspection Scope

The inspectors reviewed three specific structures, systems and components (SSC) within the scope of the Maintenance Rule (MR) (10 CFR 50.65) 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 (i.e., Ten Point Plan). The inspectors also compared the licensee's performance against site procedure NPG-SPP-3.4, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting; Technical Instruction 0-TI-346, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting; and NPG-SPP-03.1, Corrective Action Program. The inspectors also reviewed, as applicable, work orders, surveillance records, 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. This activity constituted three Maintenance Effectiveness inspection samples.



- FIN work process during U3R15 refueling outage, various Work Orders (WO's)
- Unit 1, 2 and 3 Intermediate Range Monitors – System 092
- Unit Common Residual Heat Removal Service Water (RHRSW) Pump Room Watertight Door Functional Failures

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

.1 Risk Assessment and Management of Risk

a. Inspection Scope

For planned online work and/or emergent work that affected the combinations of risk significant systems listed below, the inspectors examined five 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 (RMAs) were conducted as required by 10 CFR 50.65(a)(4), applicable plant procedures, and BFN Equipment to Plant Risk Matrix. Furthermore, as applicable, the inspectors verified the actual in-plant configurations to ensure accuracy of the licensee's risk assessments and adequacy of RMA implementation. This activity constituted five Maintenance Risk Assessment inspection samples.

- Planned refueling outage work on both loops of Unit 3 RHR, 3B Fuel Pool Cooling pump, Unit 3 500KV off-site power, 3C EDG, 1A Condenser Circulating Water Pump, 1A Control Bay chiller and AHU, B Fire Pump, RCW Booster Pumps 2A and 3A, C3 EECW Pump, and C RHRSW Common Header
- Emergent work on 'D' Emergency Diesel Generator (EDG) for troubleshooting and corrective maintenance, Unit 2 'C' Residual Heat Removal (RHR) Heat Exchanger OOS for piping leak repair, Intake Pumping Station Vent Fan A and B work, and Common Switchyard Centered LOOP High Risk due to Unit 3 Transformer activities.
- Planned work and yellow risk on Unit 3, Div. I and Div. II RHR, CS Div II, 3C and 3D EDG, 3B Fuel Pool Cooling (FPC) Pump, 3C and 3D 4kV Shutdown Boards and Standby Gas Treatment (SBGT) Train C
- Planned Unit 3 refueling outage yellow risk associated with Div. I RHR and CS OOS. Unit 1/2 risk associated with RHR Heat Exchanger 2C and RHRSW Pump A3 OOS and, Common Switchyard Centered LOOP High Risk due to Unit 3 Transformer activities.
- Planned Unit 2 risk with High Pressure Coolant Injection pump and D EDG OOS

b. Findings

No findings were identified.

1R15 Operability Evaluationsa. Inspection Scope

The inspectors reviewed the six operability/functional evaluations listed below to verify technical adequacy and ensure that the licensee had adequately assessed TS operability. The inspectors also reviewed applicable sections of the UFSAR to verify that the system or component remained available to perform its intended function. In addition, where appropriate, the inspectors reviewed licensee procedure NEDP-22, Functional Evaluations, to ensure that the licensee's evaluation met procedure requirements. Furthermore, 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 also reviewed PERs on a daily basis to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. This activity constituted six Operability Evaluation inspection samples.

- RHRSW Rooms Appendix R Fire Barrier Impacted by Tarpaulin (PER 492957)
- Emergency Equipment Cooling Water (EECW) check valve not fully closed (PER 520497)
- RHRSW Pump Room Watertight Door BFN-0-DOOR-260-C-RHRSW Degraded (PER 469640)
- Past Operability for C3 Emergency Equipment Cooling Water (EECW) Pump Foundation Hole Flood Protection Cover Inadequate Installation (PER 532050)
- Units 1,2 and 3 EECW yard drain basins partially blocked, (PER 569282)
- Unit 1 HPCI Turbine Stop Valve, 1-FCV-073-0018, Failed to Trip (PER 539040)

b. Findings

Two findings were identified. One finding is documented as a licensee identified violation in Section 4OA7.

- 1) Introduction: The NRC identified a Green non-cited violation (NCV) of Technical Specification 5.4.1.a for the licensee's failure to maintain an Emergency Equipment Cooling Water (EECW) pump flood barrier in accordance with written procedures which resulted in the inoperability of two other safety related pumps.

Description:

The safety related Residual Heat Removal Service Water (RHRSW) pumps are housed in the A, B, C, and D rooms of the intake pumping station. UFSAR Section 12.2.7.1.1 states, in part, that each room is designed to protect the RHRSW pumps from water and wave forces resulting from a probable maximum flood (PMF) scenario. During

maintenance activities, the licensee maintained the design flood protection configuration through implementation of properly written work instructions.

The C3 Emergency Equipment Cooling Water (EECW) pump is located in the C RHRSW pump room with two similarly designed C1 and C2 RHRSW pumps. On March 26, 2012, the licensee had removed C3 pump from service for maintenance. The C3 pump and motor had been disassembled and the pump column removed from the intake sump pit through the pump base plate and foundation leaving an approximate 22 inch diameter hole. The hole was protected against flooding by a temporary ¼ inch thick aluminum cover plate, over a rubber gasket and secured with 8 foundation bolts. The flood cover was prescribed by work order 112744581 and implemented by maintenance procedures MCI-0-023-PMP002, Maintenance of EECW and RHRSW Pumps, and MCI-0-023-PMP003, Emergency Equipment Cooling Water and Residual Heat Removal Service Water Pump Removal and Installation.

On April 2, 2012, maintenance personnel removed the flood protection cover to facilitate an inspection. Personnel re-installed the cover with only two bolts and nuts run down to approximately one inch from being fully secured. On April 5, 2012, inspectors identified and informed the licensee of the inadequate flood protection barrier. The licensee immediately re-installed the flood protection cover in accordance with maintenance procedures. As an added corrective action, the licensee permanently stenciled the aluminum plate with the required procedure for installation. The licensee determined that the workers had re-installed the flood protection cover following the inspection assuming that it was only for foreign material exclusion. The licensee also determined that the foreman did not direct an adequate pre-job brief and assumed the workers knew of the procedural flood requirements. Furthermore, the licensee evaluated the inadequate flood barrier for past operability and concluded that the C RHRSW pump room would have flooded in the event of a PMF and that the other two RHRSW pumps in the room, C1 and C2, would be made nonfunctional. The licensee credited the slow progression of a PMF flood rise (four days and eight hours) to allow time to adequately install the flood protection cover, and therefore, prevent the loss of the RHRSW pumps. These actions were contained in licensee abnormal operating instruction 0-AOI-100-3, Flood Above Elevation 558'.

Analysis: The licensee's failure to maintain an Emergency Equipment Cooling Water (EECW) pump flood barrier in accordance with written procedures was a performance deficiency. The finding was more than minor because it was associated with the Mitigating Systems cornerstone attribute of Protection Against External Events, and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of RHRSW pumps to perform their intended safety function during a design basis flooding event. Specifically, the improper re-installation of an external flood protection cover resulted in the inoperability of two RHRSW pumps. The significance of this finding was evaluated in accordance with the IMC 0609 Attachment 4, Phase 1- Initial Screening and Characterization of Findings, which required a Phase 3 analysis because the finding involved the degradation of equipment designed to mitigate a flooding event and was risk significant due to external initiating event core damage sequences. A Phase 3 SDP analysis was performed by the regional Senior Reactor Analyst using a modified NRC plant model. The model had been modified to calculate

the impact on the plant from external flooding due to the failure of the RHRSW flood doors. The plant model was solved for a loss of condenser heat sink, with the initiating event frequency set to 5E-3 as a conservative estimate for the external flood. Also assumed was the unavailability of the power conversion system, since the circ water pumps, and their power supplies would be flooded. Condensate was assumed lost when the turbine building floods. RHRSW pumps and EECW pumps in the flooded RHRSW room were failed by model changes for different flood door failure basic events. This analysis failed only the C room door, which duplicated the impact of an unsecured flood barrier. For the 4 day exposure time, the result was several orders of magnitude below the CDF or LERF threshold for a finding of significance. The finding is Green because of the short exposure time, and the low likelihood of the flood.

The cause of this finding was directly related to the cross cutting aspect of Supervisory Oversight in the Work Practices component of the Human Performance area, because of supervision's assumption that workers knew to restore the flood protection cover to meet procedural requirements without a formal pre-job brief [H.4(c)].

Enforcement: TS 5.4.1.a. required that written procedures recommended in RG 1.33, Revision 2, Appendix A, shall be established, implemented, and maintained. Item 9.a of RG 1.33, Appendix A, stated, in part, that maintenance affecting the performance of safety-related equipment be properly performed in accordance with written procedures or documented instructions appropriate to the circumstances. Contrary to the above, between April 2, and April 5, 2012, the licensee failed to properly perform maintenance procedures MCI-0-023-PMP002 and MCI-0-023-PMP003, Section 5.0.K. Specifically, the licensee failed to maintain a flood barrier during maintenance on C3 EECW Pump which resulted in the inoperability of C1 and C2 RHRSW Pumps. Because this finding is of very low safety significance (Green) and because it was entered into the licensee's corrective action program as PER 532050, this violation is being treated as a non-cited violation consistent with the NRC Enforcement Policy. This violation was applicable to U1, U2 and U3 and is identified as NCV 05000259, 260, 296/2012003-01, Failure to Maintain Flood Barrier Results in Inoperable Safety Related Pumps.

## 1R18 Plant Modifications

### a. Inspection Scope

The inspectors reviewed the two modifications listed below to verify regulatory requirements were met, along with procedures, as applicable, such as NPG-SPP-9.3, Plant Modifications and Engineering Change Control; NPG-SPP-9.5, Temporary Alterations; and NPG-SPP-6.9.3, Post-Modification Testing. The inspectors also reviewed the associated 10 CFR 50.59 screenings and evaluations and compared each against the UFSAR and TS to verify that the modifications did not affect operability or availability of the affected systems. Furthermore, the inspectors walked down each modification to ensure that it was installed in accordance with the modification documents and reviewed post-installation and removal testing to verify that the actual impact on permanent systems was adequately verified by the tests. This activity constituted two Plant Modification inspection samples.

- Temporary Alteration Control Form (TACF) 1-12-001-073, Removed Thermal Insulation Attached to BFN-1-FCV-073-0016, HPCI Steam Supply Valve
- Design Change Notice (DCN) 70549, Unit 3 Reactor Water Level Flood-Up Transmitter and Indication Loop Replacement

b. Findings

No findings were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors witnessed and reviewed the six 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, and that the procedure had been properly reviewed and approved. The inspectors also reviewed the test data, to verify that test results adequately demonstrated restoration of the affected safety function(s). The inspectors verified that PMT activities were conducted in accordance with applicable WO instructions, or licensee procedural requirements. Furthermore, the inspectors verified that problems associated with PMTs were identified and entered into the CAP. This activity constituted six Post Maintenance Test inspection samples.

- Unit 3: Reactor Vessel Head Tensioning and subsequent Pressure Test per MSI-0-001-VSL001, Reactor Vessel Head Disassembly and Reassembly; 3-SI-3.3.1.A, ASME Section XI System Leakage Test of the Reactor Pressure Vessel and Associated Piping; 3-SR-3.4.9.1(1), Reactor Heatup and Cooldown Rate Monitoring; and 3-SR-3.4.9.1(2), Reactor Vessel Shell Temperature and Reactor Coolant Pressure Monitoring During In-Service Hydrostatic or Leak Testing
- Unit 1/2 Common: PMT for Replacement of Common 'D' EDG Woodward Governor Speed Stop Micro Switches, OI-82, Standby Diesel Generator System and WO 113480917
- Unit 1: PMT for Repair of HPCI Stop Valve, WO 113426235
- Unit 3: PMT for 3C EDG Generator Replacement per 3-SR-3.8.1.7(3C), Diesel Generator '3C' 24-hour Run WO 112472092
- Unit 3: PMT for the 3-FCV-074-0048, RHR Shutdown Cooling Valve wedge replacement performed under WO 111044044
- Unit 3: PMT for the 'B' outboard MSIV (3-FCV-001-0027) valve repack performed under WO 113394369

b. Findings

No findings were identified.

## 1R20 Refueling and Other Outage Activities

### .1 Unit 3 Scheduled Refueling Outage (U3R15)

#### a. Inspection Scope

During April 7 to May 26, 2012, the inspectors examined critical outage activities to verify that they were conducted in accordance with technical specifications, applicable procedures, and the licensee's outage risk assessment and management plans through the end of the reporting period. Some of the more significant inspection activities conducted by the inspectors were as follows:

#### Outage Risk Assessment

Prior to the Unit 3 scheduled 30 day U3C15 refueling outage that began on April 7, the inspectors attended outage risk assessment team meetings and reviewed the Outage Risk Assessment Report to verify that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing an outage plan that assured defense-in-depth of safety functions were maintained. The inspectors also reviewed the daily U3C15 Refueling Outage Reports, including the Outage Risk Assessment Management (ORAM) Safety Function Status, and regularly attended the twice a day outage status meetings. These reviews were compared to the requirements in licensee procedure NPG-SPP-07.2, Outage Management, and technical specifications. These reviews were also done to verify that for identified high risk significant conditions, due to equipment availability and/or system configurations, contingency measures were identified and incorporated into the overall outage and contingency response plan. Furthermore, the inspectors frequently discussed risk conditions and designated protected equipment with Operations and outage management personnel to assess licensee awareness of actual risk conditions and mitigation strategies.

#### Shutdown and Cooldown Process

The inspectors witnessed the shutdown and cooldown of Unit 3 in accordance with licensee procedures OPDP-1, Conduct of Operations; 3-GOI-100-12A, Unit Shutdown from Power Operations to Cold Shutdown and Reduction in Power During Power Operations; and 3-SR-3.4.9.1(1), Reactor Heatup or Cooldown Rate Monitoring.

#### Decay Heat Removal

The inspectors reviewed licensee procedures 3-OI-74, Residual Heat Removal System (RHR); 3-OI-78, Fuel Pool Cooling and Cleanup System; and Abnormal Operating Instruction 0-AOI-72-1, Alternate Decay Heat Removal System Failures; and conducted a main control room panel and in-plant walkdowns of system and components to verify correct system alignment. During planned evolutions that resulted in an increased outage risk condition of "Yellow" for shutdown cooling, inspectors verified that the plant conditions and systems identified in the risk mitigation strategy were available. In addition, the inspectors reviewed controls implemented to ensure that outage work was

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not impacting the ability of operators to operate spent fuel pool cooling, RHR shutdown cooling, and/or Alternate Decay Heat Removal (ADHR) system. Furthermore, the inspectors conducted several walkdowns of the ADHR system during operation with the fuel pool gates removed.

### Critical Outage Activities

The inspectors examined outage activities to verify that they were conducted in accordance with technical specifications, licensee procedures, and the licensee's outage risk control plan. Some of the more significant inspection activities accomplished by the inspectors were as follows:

- Walked down selected safety-related equipment clearance orders (i.e., tag orders)
- Verified Reactor Coolant System (RCS) inventory controls, especially during evolutions involving operations with the potential to drain the reactor vessel (OPDRV)
- Verified electrical systems availability and alignment
- Monitored important control room plant parameters (e.g., RCS pressure, level, flow, and temperature) and technical specifications compliance during the various shutdown modes of operation, and mode transitions
- Evaluated implementation of reactivity controls
- Reviewed control of containment penetrations and overall integrity
- Examined foreign material exclusion controls particularly in proximity to and around the reactor cavity, equipment pit, and spent fuel pool
- Routine tours of the control room, reactor building including areas normally inaccessible during power operations, refueling floor, torus and drywell.

### Reactor Vessel Disassembly and Refueling Activities

The inspectors witnessed selected activities associated with reactor vessel disassembly, and reactor cavity flood-up and drain down in accordance with 3-GOI-100-3A, Refueling Operations (Reactor Vessel Disassembly and Floodup). Also, on numerous occasions, the inspectors witnessed fuel handling operations during the two Unit 3 reactor core fuel shuffles performed in accordance with technical specifications and applicable operating procedures. Inspectors also observed control rod unlatching and relatching for control rod drive mechanism change-outs. In addition, the inspectors verified specific fuel movements as delineated by the Fuel Assembly Transfer Sheets (FATF). Furthermore, the inspectors also witnessed and performed a 100 percent core verification examination of the video verification of the final completed reactor core.

### Drywell Closeout

On May 17, 2012, the inspectors reviewed the licensee's conduct of 3-GOI-200-2, Section 5.3 Drywell Closeout, and performed an independent detailed closeout inspection of the Unit 3 drywell.

### Torus Closeout

On May 12, 2012, the inspectors reviewed the licensee's conduct of procedure 3-GOI-200-2, Section 5.4 Torus Closeout, and performed an independent detailed closeout inspection of the Unit 3 torus (suppression pool and chamber). In addition inspectors reviewed the Foreign Material Exclusion (FME) log for any discrepancies.

### Restart Activities

The inspectors specifically conducted the following:

- Witnessed Unit 2 reactor pressure vessel head tensioning in accordance with MSI-0-001-VSL001, Reactor Vessel Disassembly and Reassembly
- Witnessed heatup and pressurization of Unit 3 reactor pressure vessel in accordance with 3-SI-3.3.1.A, ASME Section XI System Leakage Test of the Reactor pressure Vessel and Associated Piping, and reviewed reactor coolant heatup/pressurization data per 3-SR-3.4.9.1(1), Reactor Heatup and Cooldown Rate Monitoring, and 3-SR-3.4.9.1(2), Reactor Vessel Shell Temperature & Reactor Coolant Pressure Monitoring During In-Service Leak Testing
- Reviewed Reactor Coolant Heatup/Pressurization to Rated Temperature and Pressure per 3-SR-3.4.9.1(1), Reactor Heatup and Cooldown Rate Monitoring
- Reviewed and verified completion of selected items of 0-TI-270, Refueling Test Program, Attachment 2, Startup Review Checklist
- Reviewed 2-SR-3.6.1.1.1(OPT-A) Primary Containment Total Leak Rate - Option A, Revision 11
- Witnessed Unit 3 approach to criticality and power ascension per 3-GOI-100-1A, Unit Startup, 3-SR-3.3.1.1.5, SRM and IRM Overlap Verification, and 3-GOI-100-12, Power Maneuvering

### Corrective Action Program

The inspectors reviewed PERs generated during refueling outage U3C15 and periodically attended Corrective Action Review Board (CARB) and PER Screening Committee (PSC) meetings to verify that initiation thresholds, priorities, mode holds, operability concerns and significance levels were adequately addressed. Resolution and implementation of corrective actions of several PERs were also reviewed for completeness. This constitutes one Refueling Outage activity inspection sample.

#### b. Findings

No findings were identified.

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1R22 Surveillance Testinga. Inspection Scope

The inspectors witnessed portions of, and/or reviewed completed test data for the following seven 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. This activity constituted seven Surveillance Testing inspection samples: one inservice test, three routine, two containment isolation valve and one reactor coolant system leak detection test. .

In-Service Tests:

- 2-SI-4.4.A.1, Standby Liquid Control Pump Functional Test

Routine Surveillance Tests:

- 3-SR-3.8.1.9(3D OL), Diesel Generator 3D Emergency Load Acceptance Test with Unit 3 Operating
- 3-SR-3.5.1.8, HPCI Main and Booster Pump Set Developed Head and Flow Rate Test at 150 psig Reactor Pressure, Rev. 13 performed on May 16, 2012
- 3-SI-4.7.A.2.g-3/74g, Unit 3 Primary Containment Local Leak Rate Test (LLRT) RHR Shutdown Cooling Suction: Penetration X-12

Containment Isolation Valve Tests:

- 3-SR-3.6.1.3.10(B), Primary Containment Local Leak Rate Test (LLRT) Main Steam Line B: Penetration X-7B
- 3-SI-4.7.A.2.a-f, Primary Containment Integrated Leak Rate test (CILRT), Rev. 10

Reactor Coolant System Leak Detection Tests:

- 2-SI-4.2.E-1(B), Drywell Equipment Drain Sump Flow Integrator Calibration

b. Findings

No findings were identified.

## Cornerstone: Emergency Preparedness

1EP2 Alert and Notification System Evaluationa. Inspection Scope

The inspectors evaluated the adequacy of the licensee's methods for testing the alert and notification system in accordance with NRC Inspection Procedure 71114, Attachment 02, Alert and Notification System (ANS) Evaluation. The applicable planning standard, 10 CFR Part 50.47(b)(5) and its related 10 CFR Part 50, Appendix E, Section IV.D 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. This inspection activity satisfied one inspection sample for the alert and notification system on a biennial basis.

b. Findings

No findings were identified.

1EP3 Emergency Preparedness Organization Staffing and Augmentation Systema. 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 Preparedness 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.

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. The inspectors toured facilities and reviewed equipment and facility maintenance records to assess licensee's adequacy in maintaining them. In addition, the inspectors reviewed licensee procedures and training for the evaluation of changes to the emergency plans.

The inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment 05, Maintenance of Emergency Preparedness. The applicable 10 CFR 50.47(b) planning standards and 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 Maintenance of Emergency preparedness on a biennial basis.

### b. Findings

No findings were identified.

## 1EP6 Drill Evaluation

### a. Inspection Scope

During the report period, the inspectors observed an Emergency Preparedness (EP) drill that contributed to the licensee's Drill/Exercise Performance (DEP) and Emergency Response Organization (ERO) performance indicator (PI) measures on June 13, 2012, to identify any 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 certain Emergency Response Facilities to verify that event classification and notifications were done in accordance with EPIP-1, Emergency Classification Procedure and other applicable Emergency Plan Implementing Procedures. The inspectors also attended the post-drill critique to compare any inspector-observed weakness with those identified by the licensee in order to verify whether the licensee was properly identifying weaknesses. This inspection activity satisfied one inspection sample for the Drill Evaluation of emergency preparedness

### b. Findings

No findings were identified.

## 2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety (OS)

### 2RS1 Radiological Hazard Assessment and Exposure Control

#### a. Inspection Scope

Radiological Hazard Assessment: The inspectors reviewed a number of radiological surveys, including those performed for airborne areas, of locations throughout the facility including the Unit 3 (U3) drywell, Unit 1 (U1), Unit 2 (U2), and U3 reactor buildings, the turbine building, and the independent spent fuel storage installation (ISFSI). The inspectors also walked down many of the same areas and select radioactive material storage locations with a survey instrument, evaluating material condition, postings, and radiological controls. Of specific interest was the Condensate Storage Tank area which due to a liquid radwaste processing problem created an actual radiation area outside the building, near on-going work. The inspectors observed jobs in radiologically risk-significant areas including high radiation areas and areas with, or with the potential for, airborne activity. The inspectors evaluated the surveys in relation to the identified hazards for sufficient detail and frequency.

Instructions to Workers: During plant walk downs, the inspectors observed labeling and radiological controls on containers of radioactive material. The inspectors also reviewed radiation work permits (RWP) used for accessing high radiation areas and airborne areas, verifying that appropriate work control instructions and electronic dosimeter (ED) setpoints had been provided and to assess the communication of radiological control requirements to workers. The inspectors reviewed selected ED dose and dose rate alarms, to verify workers properly responded to the alarms and that the licensee's review of the events was appropriate. The inspectors observed pre-job RWP briefings and health physics technician coverage of workers. The inspectors reviewed the various methods being used to notify workers of changing or changed radiological conditions.

Contamination and Radioactive Material Control: The inspectors observed the release of potentially contaminated items from the radiologically controlled area (RCA) and from contaminated areas such as the drywell. The inspectors also reviewed the procedural requirements for, and equipment used to perform, the radiation surveys for release of personnel and material. During plant walk downs, the inspectors evaluated radioactive material storage areas and containers, including satellite RCAs and the low level radwaste facility, assessing material condition, posting/labeling, and control of materials/areas. In addition, the inspectors reviewed the sealed source inventory and verified labeling, storage conditions, and leak testing of selected sources. The inspectors verified if Category 1 and 2 sealed sources had been appropriately reported to the National Source Tracking System and physically verified the presence and controls of these sources. The sources were verified to be physically present and in proper working order.

Radiological Hazards Control and Work Coverage: The inspectors evaluated licensee performance in controlling worker access to radiologically significant areas and monitoring jobs in-progress associated with the Unit 3 refueling outage. Established radiological controls were evaluated for selected tasks including diver area setup for torus underwater coatings inspection and desludging activities, equipment staging for control rod drive work, reactor water cleanup sludge sampling, and work to support the extended power uprate for Unit 3. The inspectors evaluated the effectiveness of radiation exposure controls, including air sampling, barrier integrity, engineering controls, and postings through a review of both internal and external exposure results. The inspector followed up on two minor airborne radioactivity events.

During walk downs with a radiation survey meter, the inspectors independently verified if ambient radiological conditions were consistent with licensee performed surveys, RWPs, and pre-job briefings; observed the adequacy of radiological controls; and observed controls for radioactive materials stored in the spent fuel pool. ED alarm set points and worker stay times were evaluated against area radiation survey results for drywell and refueling floor activities.

Risk-Significant High Radiation Area and Very High Radiation Area Controls: The inspectors discussed the controls and procedures for locked-high radiation areas (LHRAs) and very high radiation areas (VHRAs) with health physics supervisors and the radiation protection manager. During plant walk downs, the inspectors verified the posting/locking of LHRA/VHRA areas.

Radiation Worker Performance and Radiation Protection Technician Proficiency The inspectors observed radiation worker performance through direct observation, via remote camera monitoring, and via telemetry. These jobs were performed in high radiation, airborne, and/or contaminated areas. The inspectors also observed health physics technicians providing field coverage of jobs and providing remote coverage.

Problem Identification & Resolution: Licensee Corrective Action Program (CAP) documents associated with radiation monitoring and exposure control were reviewed and assessed. This included review of selected Problem Evaluation Reports (PERs) related to radworker and health physics technician performance. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with procedure NPG-SPP-3.1, Corrective Action Program, Rev. 2. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Licensee CAP documents reviewed are listed in Section 2RS1 of the Attachment.

Radiation protection activities were evaluated against the requirements of Updated Final Safety Analysis Report (UFSAR) Section 12; Technical Specification Sections 5.4 and 5.7; 10 Code of Federal Regulations (CFR) Parts 19 and 20; and approved licensee procedures. Radiological control activities for ISFSI areas were evaluated against 10 CFR Part 20, 10 CFR Part 72, and TS details. Records reviewed are listed in Section 2RS1 of the Attachment.

The inspectors completed 1 sample, as described in Inspection Procedure (IP) 71124.01.

b. Findings

No findings were identified.

2RS6 Radioactive Gaseous and Liquid Effluent Treatment

a. Inspection Scope

Program Reviews: The inspectors reviewed the 2010 and 2011 Annual Radiological Effluent Release Report documents for consistency with the requirements in the Offsite Dose Calculation Manual (ODCM) and Technical Specifications. Unexpected results were followed up to determine the cause. Radioactive effluent monitor operability issues were discussed with plant staff. The inspectors reviewed the ODCM changes made since the last inspection against the guidance in NUREG-1301 and RG 1.109, RG 1.21, and RG 4.1.

Walk-Downs and Observations: The inspectors walked-down selected components of the gaseous and liquid discharge systems to ascertain material condition, configuration and alignment. To the extent practical, the inspectors observed the material condition of abandoned in place liquid waste processing equipment for indications of degradation or leakage that could constitute a possible release pathway to the environment. The inspectors also observed the collection and analysis of gaseous effluent samples (noble gas, iodine, particulates) from the plant stack. The inspectors walked-down portions of the Standby Gas Treatment System, to ascertain material condition, configuration, and alignment. In addition, the inspectors reviewed the most recent HEPA and charcoal filtration surveillance testing results for each train of the standby gas treatment system.

Sampling and Analyses: In addition to observing collection of gaseous effluent samples from the plant stack, the inspectors observed a chemistry technician verifying plant stack flow rates. The results of the chemistry count room's inter-laboratory comparison program were reviewed and discussed with cognizant licensee personnel.

Dose Calculations: The inspectors reviewed several gas release permits, and monthly gaseous/liquid effluent dose calculation summaries. The magnitudes of the releases were determined to be a small fraction of the applicable limits. The inspectors reviewed the contributions to public dose from the abnormal releases. The site's 10 CFR 61 analysis was reviewed for expected nuclide distribution from the aspects of quantifying effluents, the treatment of hard to detect nuclides, determining appropriate calibration nuclides for instruments and whole body counting libraries. The inspectors also reviewed the licensee's most recent Land Use Census results and changes in the ODCM since the last inspection.

Ground Water Protection: The licensee's implementation of the Industry Ground Water Protection Initiative was reviewed for changes since the last inspection as well. Groundwater sampling results obtained since the last inspection were reviewed.

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Licensee response, evaluation, and follow-up to spills and leaks since the last inspection were reviewed in detail.

Problem Identification and Resolution: Selected corrective action program documents associated with the effluent monitoring and control program, including problem evaluation reports (PERs) and audits, were reviewed and assessed. The inspectors verified that problems were being identified at an appropriate threshold and resolved in accordance with procedure NPG-SPP-3.1, Corrective Action Program, Rev. 2 and Rev. 3.

Documents reviewed are listed in Section 2RS6 and 2RS7 of the report Attachment. The inspectors completed one sample as required by inspection procedure 71124.06.

b. Findings

No findings were identified.

2RS7 Radiological Environmental Monitoring Program (REMP)

a. Inspection Scope

REMP Status and Results: The inspectors discussed changes and reviewed the ODCM and the Annual Radiological Environmental Operating Report documents issued for calendar year (CY) 2010 and CY 2011. The inspectors also reviewed and evaluated REMP contract laboratory cross-check program results, and current procedural guidance for environmental sample collection and processing. Inspectors reviewed the Annual Radiological Effluent Release Report for CY 2010 & CY 2011 under section 2RS6.

Equipment Walk-down: The inspectors observed sample collection activities of selected air sampling stations as specified per procedure. The inspectors observed equipment material condition and verified operability, including verification of flow rates/total sample volume results, for the weekly airborne particulate filter and iodine cartridge change-outs at selected atmospheric sampling stations. The material condition and placement of environmental thermoluminescent dosimeters and water sampling stations were verified by direct observation at select ODCM locations. Land use census results actions for missed samples including compensatory measures and availability of replacement equipment were discussed with environmental technicians and knowledgeable licensee staff. Inspectors also reviewed calibration and maintenance surveillance records for the installed environmental air sampling stations.

Procedural guidance, program implementation, quantitative analysis sensitivities, and environmental monitoring results were reviewed against 10 CFR Part 20; Appendix I to 10CFR Part 50; TS Sections 6.8 Procedures and Programs and 6.9, Reporting Requirements; ODCM, Rev. 15; RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment; and the Branch Technical Position, An Acceptable Radiological Environmental Monitoring Program - 1979. Documents reviewed are listed in Section 2RS7 of the Attachment.

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Meteorological Monitoring Program: The inspectors walked-down the meteorological tower and observed local data collection equipment readouts. The physical condition of the tower and the instruments were observed and equipment operability, and maintenance history were discussed with responsible licensee staff. The transmission of locally generated meteorological data to the main control room operators was also verified. The inspectors reviewed applicable tower instrumentation calibration records for the meteorological measurements of wind speed, wind direction, and temperature, and evaluated measurement data recovery for CY 2010 and CY 2011.

Licensee procedures and activities related to meteorological monitoring were evaluated against: ODCM; FSAR; RG 1.23, Meteorological Monitoring Programs For Nuclear Power Plants, and ANSI/ANS-2.5-1984, Standard for Determining Meteorological Information at Nuclear Power Sites. Documents reviewed are listed in Section 2RS7 of the Attachment.

Problem Identification and Resolution: The inspectors reviewed selected PERs in the areas of environmental monitoring and meteorological monitoring. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with NPG-SPP 3.1, Corrective Action Program, Rev. 2. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Documents reviewed are listed in Sections 2RS6 & 2RS7 in the Attachment.

The inspectors completed one sample as required by inspection procedure 71124.07.

b. Findings

No findings were identified.

2RS8 Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation

a. Inspection Scope

Waste Processing and Characterization: During inspector walk-downs, accessible sections of the liquid and solid radioactive waste (radwaste) processing systems were assessed for material condition and conformance with system design diagrams. Inspected equipment included floor drain tanks; phase separator tanks; resin and filter packaging components; and abandoned evaporator equipment. The inspectors discussed component function, processing system changes, and radwaste program implementation with licensee staff.

The 2010 and 2011 Annual Radiological Effluent Release Report and radionuclide characterizations for select waste streams from 2010, and each major waste stream from 2012 were reviewed and discussed with radwaste staff. For cleanup waste phase separator resin, reactor water cleanup resin, Thermex resin, and dry active waste (DAW) the inspectors evaluated analyses for hard-to-detect nuclides, reviewed the use of scaling factors, and examined quality assurance comparison results between licensee

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waste stream characterizations and outside laboratory data. Waste stream mixing and concentration averaging methodology for resins and filters was evaluated and discussed with radwaste staff. The inspectors also reviewed the licensee's procedural guidance for monitoring changes in waste stream isotopic mixtures.

Radwaste processing activities and equipment configuration were reviewed for compliance with the licensee's Process Control Program (PCP) and UFSAR, Chapter 9. Waste stream characterization analyses were reviewed against regulations detailed in 10 CFR Part 20, 10 CFR Part 61, and guidance provided in the Branch Technical Position on Waste Classification (1983). Reviewed documents are listed in Section 2RS8 of the Attachment.

Radioactive Material Storage: During walk-downs of radioactive material storage areas in the radwaste building and outdoor low-level storage yard, the inspectors observed the physical condition and labeling of storage containers and the posting of Radioactive Material Areas. The inspectors also reviewed licensee procedural guidance for storage and monitoring of radioactive material.

Radioactive material and waste storage activities were reviewed against the requirements of 10 CFR Part 20. Reviewed documents are listed in Section 2RS8 of the report Attachment.

Transportation: The inspectors directly observed preparation activities for shipment of a high integrity container (HIC) of resin. The inspectors noted package markings and placarding, performed independent dose rate measurements, and interviewed shipping technicians regarding Department of Transportation (DOT) regulations.

Selected shipping records were reviewed for consistency with licensee procedures and compliance with NRC and DOT regulations. The inspectors reviewed emergency response information, DOT shipping package classification, waste classification, radiation survey results, and evaluated whether receiving licensees were authorized to accept the packages. Licensee procedures for opening and closing Type A shipping containers were compared to manufacturer requirements. In addition, training records for selected individuals currently qualified to ship radioactive material were reviewed.

Transportation program implementation was reviewed against regulations detailed in 10 CFR Part 20, 10 CFR Part 71, 49 CFR Parts 172-178, as well as the guidance provided in NUREG-1608. Training activities were assessed against 49 CFR Part 172 Subpart H. Documents reviewed during the inspection are listed in Section 2RS8 of the Attachment.

Problem Identification and Resolution: The inspectors reviewed PERs in the area of radwaste/shipping. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with procedure NPG-SPP-3.1, Corrective Action Program, Rev. 2 and Rev. 3. The inspectors also evaluated the scope of the licensee's internal audit program and reviewed recent assessment results. Licensee corrective action program documents reviewed are listed in Section 2RS8 of the Attachment.

The inspectors completed one sample as required by inspection procedure 71124.08.

b. Findings

.1 Failure to adequately secure radioactive shipping container contents for transport

Introduction: A self-revealing Green Non-Cited Violation (NCV) of 10 CFR 71.5, Transportation of Licensed Material, was identified for the licensee's failure to ensure proper packaging of two DOT 7A Type A packages as required by 49 CFR 173.475(e), Quality Control Requirements Prior To Each Shipment Of Class 7 (Radioactive) Materials.

Description: On March 22, 2010, the licensee shipped control rod drive mechanisms (CRDMs) to GE Hitachi Nuclear (GEH) for refurbishment in six Department of Transportation (DOT) approved Type A boxes. Each box contained four CRDMs. In a letter dated September 17, 2010, GEH informed the licensee that their receipt inspection of containers 1343-S and 966-S on April 23, 2010, identified that pig shield containment lid restraint bars designed to secure the CRDMs and pig shields in place were not installed and were laying loose in the bottom of the container. The licensee documented the issue in PER 236118. Licensee investigation determined that the radwaste packaging inspector failed to follow procedural requirements and verify that the CRDMs were properly secured within the container to prevent movement during shipping. The inspectors reviewed the Container Certification, container closure procedure for the CRDM boxes, licensee radioactive material shipment procedures, and engineering documents concerning the container meeting DOT 7A requirements. The inspectors noted that although the container closure procedure did not specifically address internal packaging and the restraint bars, the container certification states that "All contents must be securely positioned to prevent shifting during normal conditions of transport.", and that site procedural guidance requires verification that the contents of the package have been secured and satisfies the requirements of 10 CFR 71.87, prior to shipment.

Analysis: The failure to properly secure, or adequately block or brace the material within a Class 7 (radioactive) materials package to prevent movement during transport prior to shipment was determined to be a performance deficiency. Specifically, the licensee failed to follow established site procedures and applicable documents provided by the package vendor for package inspection and verification to ensure materials are secured within containers. The finding was more than minor because it is associated with the Public Radiation Safety Cornerstone, Plant Facilities/Equipment and Instrumentation attribute, involving transportation packaging and adversely affected the cornerstone objective to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian nuclear reactor operation. Specifically, the failure to correctly secure the package contents to prevent movement could have resulted in damage or failure of the container during transportation. The significance of the finding was evaluated using IMC 0612, Appendix D, "Public Radiation Safety Significance Determination Process". The issue was evaluated using the Public Radiation Safety flowchart because it involved radioactive material control, specifically, transportation. The finding was determined to be of very low safety significance (Green) because it did not involve radiation limits being

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exceeded, a package breach, a certificate of compliance issue, a low-level burial ground non-conformance, or a failure to make emergency notifications.

The cause of this finding was directly related to the cross cutting aspect of Documents, Procedures and Component Labeling in the Resources component of the Human Performance area because the licensee did not effectively incorporate package design specifications into their transportation program to ensure that all internal restraining devices are correctly installed to secure the CRDM in place to prevent damage to the transport package. [H.2(c)]

Enforcement: 10 CFR 71.5, Transportation of Licensed Material, required, in part, that each licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport.

49 CFR 173.475(e), Quality Control Requirements Prior To Each Shipment Of Class 7 (Radioactive) Materials, required, in part, that before each shipment of any Class 7 (radioactive) materials package, the offeror must ensure, by examination or appropriate tests, that each special instruction for filling, closing, and preparation of the packaging for shipment has been followed. Licensee procedure RWTP-100, "Radioactive Material/Waste Shipments", contains package inspection and verification requirements to ensure materials are secured within containers.

Contrary to the above, on March 22, 2010, the licensee failed to comply with the applicable requirements of DOT regulation 49 CFR 173.475(e) for transport of licensed material. Specifically, the licensee failed to follow Container Certification guidance, in that the CRDMs were not properly packaged and secured inside two CRDM shipping containers as required by licensee procedure RWTP-100. Because this violation was of very low safety significance and it was entered into the licensee's CAP (SR 570902), this violation is being treated as an NCV, in accordance with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000259, 260, 296/2012003-02; Failure to Properly Prepare a DOT Type A Package for Transport)

## .2 Failure to Implement DOT Type A Package Closure Requirements

Introduction: A self-revealing Green Non-Cited Violation (NCV) of 10 CFR 71.5, Transportation of Licensed Material, was identified for the licensee's failure to properly close a DOT 7A Type A packages as required by DOT 49 CFR 173.475(f) Quality Control Requirements Prior To Each Shipment Of Class 7 (Radioactive) Materials.

Description: On September 7, 2011, the licensee shipped a DOT approved Type 'A' shipping container, containing an ISP surveillance capsule, to MP Machinery and Testing, LLC (MPM) for analysis of the contents. In a letter dated September 9, 2011, MPM informed the licensee that upon arrival at the MPM facility the closure bolts on the shipping container were found to be undertorqued at 30 ft-lbs torque, not 390 ft-lbs torque as specified in the DOT Package Certification provided by MPM. The licensee

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documented the issue in PER 431446. Licensee investigation determined that the ISP surveillance capsule shipping container closure bolts did not have the correct torque applied due to inadequate procedure guidance, unfamiliarity of the workers with the task, and a lack of procedure use and adherence. Preparation of the surveillance capsule for shipment occurred over several months, the Technical Instruction was revised during the period, and the container instructions provided by the vendor were not used during loading activities. The inspectors reviewed the DOT Package Certification, container loading and shipping instructions, Technical Instruction for obtaining and packaging the Reactor Vessel Test Specimens (both revisions), and the work order used to remove and package the ISP surveillance capsule for shipment. The inspectors noted that although detailed instructions for loading and closure of the container were provided by the vendor, the instructions and required container closure torque values were not included, or referenced, in the Technical Instruction or the work package.

Analysis: The failure to properly close a Class 7 (radioactive) materials package was determined to be a performance deficiency. Specifically, the licensee failed to follow established site procedures and applicable vendor documents for closing the package resulting in inadequate torque of the shipping container closure bolts. The finding was more than minor because it is associated with the Public Radiation Safety Cornerstone, Plant Facilities/Equipment and Instrumentation attribute, involving transportation packaging and adversely affected the cornerstone objective to ensure adequate protection of public health and safety from exposure to radioactive materials released into the public domain as a result of routine civilian nuclear reactor operation. Specifically, the failure to apply the correct torque to the package closure bolts could have resulted in incomplete sealing of the container or failure of the cover bolts during transportation. The significance of the finding was evaluated using IMC 0612, Appendix D, "Public Radiation Safety Significance Determination Process". The issue was evaluated using the Public Radiation Safety flowchart because it involved radioactive material control, specifically, transportation. The finding was determined to be of very low safety significance (Green) because it did not involve radiation limits being exceeded, a package breach, a certificate of compliance issue, a low-level burial ground non-conformance, or a failure to make emergency notifications

The cause of this finding was directly related to the cross cutting aspect of Documents, Procedures and Component Labeling in the Resources component of the Human Performance area because the licensee did not effectively incorporate the vendor provided container loading and shipping instructions into their work package and transportation program to ensure correct torque values were used to close the shipping container. [H.2(c)]

Enforcement: 10 CFR 71.5, Transportation of Licensed Material, required, in part, that each licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall comply with the applicable requirements of the DOT regulations in 49 CFR Parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport.

49 CFR 173.475(f) Quality Control Requirements Prior To Each Shipment Of Class 7 (Radioactive) Materials, required, in part, that each closure, valve, or other opening of the containment system through which the radioactive content might escape is properly closed and sealed.

Contrary to the above, on September 7, 2011, the licensee failed to comply with the applicable requirements of DOT regulation 49 CFR 173.475(f) for transport of licensed material. Specifically, the licensee failed to properly close an opening in the containment system of a Class 7 (radioactive) materials package. Because this violation was of very low safety significance and it was entered into the licensee's CAP (SR 571151), this violation is being treated as an NCV, in accordance with Section 2.3.2 of the NRC Enforcement Policy. (NCV 05000259, 260, 296/2012003-03; Failure to Implement DOT Type A Package Closure Requirements)

#### 4. OTHER ACTIVITIES

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness

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

Cornerstone: Mitigating Systems

##### .1 Safety System Functional Failures; Mitigating Systems Performance Indicator- Heat Removal (Reactor Core Isolation Cooling)

##### a. Inspection Scope

The inspectors reviewed the licensee's procedures and methods for compiling and reporting the following Performance Indicators (PIs), including procedure NPG-SPP-02.2 Performance Indicator Program. The inspectors examined the licensee's PI data for the specific PIs listed below for the second quarter 2011 through first quarter of 2012. 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 also validated this data against relevant licensee records (e.g., PERs, Daily Operator Logs, Plan of the Day, Licensee Event Reports, etc.), and assessed any reported problems regarding implementation of the PI program. Furthermore, the inspectors met with responsible plant personnel to discuss and go over licensee records to verify that the PI data was appropriately captured, calculated correctly, and discrepancies resolved. The inspectors also 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 mitigating systems performance indicator inspection samples.

- Unit 1 Safety System Functional Failures
- Unit 2 Safety System Functional Failures
- Unit 3 Safety System Functional Failures

- Unit 1 Mitigating Systems Performance Index - Reactor Core Isolation Cooling
- Unit 2 Mitigating Systems Performance Index - Reactor Core Isolation Cooling
- Unit 3 Mitigating Systems Performance Index - Reactor Core Isolation Cooling

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

Cornerstone: Barrier Integrity

##### a. Inspection Scope

The inspectors reviewed the licensee's procedures and methods for compiling and reporting the Performance Indicators (PI) listed below, including procedure SPP-3.4, Performance Indicator for NRC Reactor Oversight Process for Compiling and Reporting PIs to the NRC. The inspectors reviewed the raw data for the PITs listed below for the 1<sup>st</sup> through 4<sup>th</sup> quarters of 2006. The inspectors compared the licensee's raw data against graphical representations and specific values reported to the NRC in the 4<sup>th</sup> quarter 2006 PI report to verify that the data was correctly reflected in the report. The inspectors also reviewed the past history of PERs for any that might be relevant to problems with the PI program. Furthermore, the inspectors met with responsible chemistry and engineering personnel to discuss and go over licensee records to verify that the PI data was appropriately captured, calculated correctly, and discrepancies resolved. The inspectors reviewed Nuclear Energy Institute 99-02, Regulatory Assessment Performance Indicator Guideline, to verify that industry reporting guidelines were applied.

- RCS Activity for Units 2 and 3
- RCS Leakage for Units 2 and 3

##### b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

##### a. Inspection Scope

The inspectors sampled licensee submittals relative to the PIs listed below for the period October 1, 2011, and March 31, 2012. 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 6, were used to confirm the reporting basis for each data element.

- Emergency Response Organization (ERO) Drill/Exercise Performance
- ERO Drill Participation
- Alert and Notification System Reliability

For the specified review period, the inspector 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 Emergency Preparedness inspection samples for PI verification on an annual basis.

b. Findings

No findings were identified.

Cornerstone: Occupational Radiation Safety

a. Inspection Scope

The inspectors reviewed Performance Indicator (PI) data collected from January 1, 2011, through March 31, 2012, for the Occupational Exposure Control Effectiveness PI. For the reviewed period, the inspectors assessed CAP records to determine whether high radiation area, VHRA, or unplanned exposures, resulting in TS or 10 CFR 20 non-conformances, had occurred during the review period. In addition, the inspectors reviewed selected personnel contamination event data, internal dose assessment results, and ED alarms for cumulative doses and/or dose rates exceeding established set-points. The reviewed data were assessed against guidance contained in Nuclear Energy Institute 99-02, "Regulatory Assessment Indicator Guideline," Rev. 6. The reviewed documents relative to these PI reviews are listed in Sections 2RS1 and 4OA1 of the Attachment.

b. Findings

No findings were identified.

Public Radiation Safety (PS) Cornerstone

The inspectors reviewed the Radiological Effluent Technical Specification/Offsite Dose Calculation Manual Radiological Effluent Occurrences PI results from June 18, 2010 through May 2012. The inspectors reviewed PERs, liquid and gaseous effluent release permits, effluent dose data, and licensee procedural guidance for classifying and reporting PI events. Reviewed documents are listed in Sections 2RS6 of the Attachment.

The inspectors completed 1 of the required samples for IP 71151.

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b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems

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

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 PER and Service Request (SR) reports, and periodically attending Corrective Action Review Board (CARB) and PER Screening Committee (PSC) meetings.

.2 Annual Follow-up of Selected Issues – Operations with a Potential for Draining the Reactor Vessel (OPDRVs)

a. Inspection Scope

The inspectors reviewed the licensee's response to the NRC's EMG-11-03, Enforcement Guidance Memorandum on Dispositioning Boiling Water Reactor Licensee Noncompliance with Technical Specification Containment Requirements During Operations with a Potential for Draining the Reactor Vessel (OPDRVs). The inspectors focused on the changes made to licensee procedure 3-POI-200.5, Operations with Potential for Draining the Reactor Vessel/Cavity and discussed OPDRVs with Operations staff. The inspectors reviewed the Main Control Room (MCR) operating logs to verify OPDRVs were identified by the MCR operating crew and appropriate action taken were necessary. The inspectors also walked down portions of the alternate reactor water level control make-up and let-down line line-ups to verify they were established in accordance with the licensee's procedures. Documents reviewed are listed in the Attachment. This activity constituted one in-depth selected issue.

b. Assessment and Observations

No findings were identified.

.3 Semiannual Review to Identify Trends

a. Inspection Scope

As required by Inspection Procedure 71152, the inspectors performed a review of the licensee's CAP implementation and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review included the results from daily screening of individual PERs (see Section 4OA2.1 above), licensee trend reports and trending efforts, and independent searches of the PER database and WO history. The inspectors' review nominally considered the six-month period of January 2012 through June 2012, although some searches expanded beyond

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these dates. Additionally, the inspectors' review also included the Integrated Trend Reports (ITR) from the first and second quarters of fiscal year 2012. The licensee reports covered the period of October 1, 2011, to March 31, 2012. Furthermore, the inspectors verified that adverse or negative trends identified in the licensee's PERs, periodic reports and trending efforts were entered into the CAP. Inspectors interviewed the appropriate licensee staff and also reviewed procedures, NPG-SPP-02.8, Integrated Trend Review and NPG-SPP-02.7, PER Trending.

The purpose of the licensee's integrated trend reviews was to identify the top site and departmental issues (gaps to excellence) requiring management attention. Other objectives were to provide status of the top issues and their progress to resolution, identify continuing issues, emerging trends and issues to be monitored, review progress towards resolving past top issues, review issues identified by external organizations such as the NRC, INPO, Nuclear Safety Review Board (NSRB), QA, etc., and determine why they were not identified by line organizations. This activity constituted one semiannual trend review inspection sample.

b. Findings and Observations

No findings were identified, but the inspectors identified a number of observations as discussed below.

Inspectors observed licensee-identified issues and trends in both the first and second quarter ITRs that were identical or similar in nature. Inspectors reviewed the repeat issues to assess the licensee's progress of corrective actions associated with the issues and trends identified. Some of the more notable site/departmental issues were as follows:

- Corrective Action Program (CAP): The CAP has not been considered as a core business function by the station. Improvement is needed with problem identification, cause evaluations and timely completion of corrective actions. This issue was documented in PERs 346645 and 471366.
- Human Performance/Standards: Human performance practices resulted in consequential events, specifically: procedure use and adherence, procedure quality, accountability, human performance fundamentals, and the observation program. This issue was documented in PERs 410308 and 491985.
- Procedure Use and Adherence: The first quarter 2012 ITR included this in the Human Performance area (Issue #2) and developed actions to drive rigorous use of procedures throughout all organization. The second quarter 2012 ITR included this with the Procedure/Work Order Quality/Procedure Use and Adherence area (Issue #2). This issue was documented in PERs 410308 and 491985.

The second quarter ITR contained fifteen fundamental problem statements that were developed as a result of the 95003 supplemental inspection. The process is intended to determine the root organizational and/or cultural causes of these issues. Corrective actions were under development for these fifteen problem areas at the end of the reporting period.

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The inspectors conducted an independent review of the licensee's CAP to identify potential adverse trends. The inspectors identified a potential adverse trend with the licensee's control of transient combustible materials in plant areas. A review of PERs from January 2012 to June 2012 revealed twelve PERs associated with transient and excessive combustible materials in plant areas however, a PER that identified this as a trend was not identified by the licensee staff. The inspectors discussed this issue with the appropriate licensee staff and PER 577382 was initiated to document this as an adverse trend.

#### 4OA3 Event Follow-up

##### .1 Unit 3 Automatic Reactor Scram Following Refueling Outage

###### a. Inspection Scope

On May 22, 2012, while recovering from a refueling outage with control rod and main turbine generator off-line testing in progress, Unit 3 automatically scrammed from 19.5 percent power. Unit 3 scrammed due to a loss of offsite power when an inadvertent actuation of 3A Unit Station Service Transformer (USST) differential relay 387SA resulted from an incorrect relay setting. Inspectors promptly responded to the control room and verified that the unit was stable in Mode 3 (Hot Shutdown), and confirmed that all safety-related mitigating systems had operated properly. Inspectors evaluated safety equipment and operator performance before and after the event by examining existing plant parameters, strip charts, plant computer historical data displays, operator logs, and the critical parameter trend charts used for the post-trip report. Inspectors also interviewed responsible on-shift operations personnel, examined the implementation of the applicable annunciator response procedures and abnormal operating instructions, including 3-AOI-100-1, Reactor Scram, and reviewed the written notification made in accordance with 10 CFR 50.72. Inspectors discussed the preliminary cause of the incorrect relay setting with responsible Operations and Engineering personnel and monitored Plant Oversight Review Committee (PORC) event review and restart meetings. This review included only initial event follow-up.

###### b. Findings

No findings were identified.

##### .2 Unit 3 Manual Reactor Scram Following Refueling Outage

###### a. Inspection Scope

On May 24, 2012, Unit 3 was manually scrammed from Mode 2 (less than 1% rated power) when operators ranged down the Intermediate Range Monitor (IRM) 'H' instrument, instead of up, resulting in half scram on Reactor Protection System (RPS) 'B' trip system. The half scram was being reset after IRM 'H' was properly ranged. As the operator adjusted the reset scram switch, a spike on IRM 'A' was received on the RPS 'A' trip system, resulting in a partial rod insertion. When the operator identified multiple

rods inserting, the actions of the Reactor Scram Procedure, 3-AOI-100-1, were followed and a manual scram was inserted. The inspectors evaluated safety equipment and operator performance before and after the event by examining existing plant parameters, strip charts, plant computer historical data displays, operator logs, the alarm typewriter Sequence of Events printout, and the critical parameter trend charts in the post-trip report. The inspectors interviewed responsible on-shift Operations personnel, examined the implementation of annunciator response and abnormal operating procedures, (including 3-AOI-100-1, Reactor Scram) and reviewed the written notification made in accordance with 10 CFR 50.72. This review included only initial event follow up.

b. Findings

No findings were identified

.3 Unit 3 Automatic Reactor Scram and Forced Outage

a. Inspection Scope

On May 29, 2012, Unit 3 automatically scrammed from 78 percent power due to a power to load unbalance (i.e., main generator load reject) automatic trip of the main turbine generator from an A-B phase trip of the main transformer differential relay 387T. The licensee identified the cause of the differential relay trip to be a B phase current transformer manufactured and installed with opposite polarity. Preliminarily, the licensee revealed that factory acceptance and field testing failed to detect the manufacturing defect of reverse polarity. Inspectors promptly responded to the control room and verified that the unit was stable in Mode 3 (Hot Shutdown), and confirmed that all safety-related mitigating systems had operated properly. Inspectors evaluated safety equipment and operator performance before and after the event by examining existing plant parameters, strip charts, plant computer historical data displays, operator logs, and the critical parameter trend charts used for the post-trip report. Inspectors also interviewed responsible on-shift operations personnel, examined the implementation of the applicable annunciator response procedures and abnormal operating instructions, including 3-AOI-100-1, Reactor Scram, and reviewed the written notification made in accordance with 10 CFR 50.72. Inspectors discussed the preliminary cause of the failed acceptance and installation testing with responsible Operations and Engineering personnel. This review included only initial event follow-up.

Operators commenced restart of Unit 3 (i.e., entered Mode 2) on June 2 and achieved full power on June 6, 2011. During this short forced outage the inspectors examined the conduct of critical outage activities pursuant to technical specifications, applicable procedures, and the licensee's risk assessment and maintenance plans. Some of the more significant outage activities monitored, examined and/or reviewed by the inspectors were as follows:

- Plant Oversight Review Committee (PORC) event review and restart meetings.
- Reactor startup and power ascension activities per 3-GOI-100-1A, Unit Startup
- Reactor vessel and coolant heatup per 3-SR-3.4.9.1(1), Reactor Heatup and Cooldown Rate Monitoring

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- Outage risk assessment and management
- Control and management of forced outage and emergent work activities

### Corrective Action Program

The inspectors reviewed PERs generated during the Unit 3 forced outage and attended management review committee meetings to verify that initiation thresholds, priorities, mode holds, and significance levels were assigned as required.

#### b. Findings

No findings were identified

#### .4 (Closed) Licensee Event Report (LER) 05000296/2011-003-00, Automatic Reactor Scram Due to a Main Turbine Generator Load Reject.

##### a. Inspection Scope

On September 28, 2011, Unit 3 automatically scrammed from 100 percent power due to a power to load unbalance (i.e., main generator load reject) automatic trip of the main turbine generator (MTG) caused by a broken debris screen. The initial follow-up of this event by the inspectors was documented in Section 4OA3.10 of IR 05000296/2011004. The inspectors reviewed the applicable LER that was issued on November 28, 2011, and its associated PER 440539, which included the root cause analysis (RCA) and corrective actions. The licensee concluded that the direct cause of the Unit 3 turbine trip and scram was the isolated-phase bus C debris screen failure.

##### b. Findings

No findings were identified

#### .5 (Closed) Licensee Event Report (LER) 05000259,296 /2011-009-02, As-Found Undervoltage Trip for the Reactor Protection System 1A1 Relay that Did Not Meet Acceptance Criteria During Several Surveillances

##### a. Inspection Scope

The inspectors reviewed Revision 2 of LER 05000259/2011-009 dated April 25, 2012, PER 486780, and the associated operability determination, and corrective action plans. This revised LER was submitted to provide the results of the licensee's completed investigation and evaluation of a second Reactor Protection System (RPS) relay that did not meet its acceptance criteria during previous surveillance testing for the same reason. The original LER 05000259/2011-009-00 dated December 5, 2011, the revised LER 05000259/2011-009-01 dated January 31, 2012, applicable PERs 413140 and 442914, including root cause analysis, operability determination and corrective action plans, were reviewed by the inspectors and documented in Sections 4OA3.1 and 4OA7 of NRC IR

05000259/2012002. As a result of this prior review, the licensee had identified one violation of NRC requirements associated with Unit 1 RPS 1A1 relay.

On January 6, 2012, while performing an operability determination for the Unit 3 reactor protection system (RPS) 3C1 relay undervoltage trips, the licensee determined that the as-found undervoltage trip setpoint for the Unit 3 relay was less than the required acceptance criteria during several technical specification surveillances. Seven of the last thirteen surveillance test results were below the technical specification acceptance criteria. Therefore, based on performance history, the RPS 3C1 relay was determined to be inoperable from June 9, 2006, to February 2, 2012, when the relay was replaced. The licensee determined the previous root cause and corrective actions were applicable in that the surveillance test program did not require past operability reviews when out of calibration technical specification conditions were corrected during surveillances.

The inspectors reviewed the second LER revision and verified that the supplemental information provided in the LER was complete and accurate and that the information was not of a significant nature to warrant any change to the original LER finding.

This licensee identified violation constitutes an additional example as documented in NRC IR 05000259/2012002 and is not an individual non-cited violation. Further corrective actions for this additional example are expected to be taken in conjunction with corrective actions for the previous violation.

b. Findings

One finding for the original and Revision 1 of the LER was previously identified in Section 4OA7 of NRC IR 05000259/2012002. No additional findings were identified. The revised LER is considered closed.

.6 (Closed) Licensee Event Report (LER) 05000296/2012-001-00, Annunciator Panel Power Supply Fire in Unit 3 Control Room

a. Inspection Scope

On January 26, 2012, Unit 3 main control room operators smelled smoke and observed a flame coming from the bottom of an annunciator panel 3-XA-55-5A power supply. Fire Operations personnel arrived on the scene within five minutes. The affected circuit breaker was opened and fire extinguished within ten minutes. Operations personnel increased plant monitoring to compensate for indications that lost their alarming functions when the circuit breaker was opened. The fire damage was limited to the failed annunciator power supply and the power supply directly above it. The inspectors reviewed the details surrounding this event, interviewed operations and engineering personnel involved with this issue and reviewed the licensee's apparent cause determination report. This was captured in the licensee's corrective action program as problem event report (PER) 496592. This LER is closed.

b. Findings

Introduction: A self-revealing Green finding (FIN) was identified for the licensee's failure to perform preventive maintenance on the Unit 3 Main Control Room (MCR) annunciator power supplies. As a result, a power supply failed which led to a fire in annunciator panel 3-XA-55-5A in the Unit 3 MCR.

Description: On January 26, 2012, Unit 3 main control room operators smelled smoke and observed a flame coming from the bottom of an annunciator panel power supply. Within ten minutes, the Fire Brigade responded to the MCR and the circuit breaker was opened for the affected power supply which extinguished the fire. Damage was confined to two power supplies in annunciator panel 3-XA-55-5A. The damaged power supplies were replaced on January 27, 2012 in accordance with Work Order (WO) 113155456. Corrective action document PER 496592 identified the direct cause of the annunciator power supply failure as an overcurrent condition caused by a failed electrolytic capacitor. This PER referenced EPRI recommendations to change out components with electrolytic capacitors on a time based frequency. TVA's apparent cause concluded the power supply (capacitor), installed for thirty four (34) years, experienced an age related failure due to a lack of preventive maintenance.

Age-related failures of electrolytic capacitors have been documented in the industry. Electric Power Research Institute (EPRI) document, TR-112175, Capacitor Application and Maintenance Guide, dated August 1999, stated that capacitor change outs are performed between 7 and 15 years depending on vendor recommendations and plant operating experience. Another EPRI document, Power Supply Maintenance and Application Guide (1003096), dated December 2001, stated that many of the power supplies that failed had been in service greater than 15 years on average. Since 2008 three PERs have been entered in TVA's CAP that document similar failures of these annunciator power supplies on both Unit 2 and 3 main control room panels. PER 391479 was initiated in June 2011 to evaluate the equipment reliability classification of these power supplies. Corrective actions to evaluate the annunciator power supply preventive maintenance strategy were in progress when the fire occurred.

These power supplies were classified as Quality-Related, Non-Critical, Low Duty-Cycle, Mild Service Condition in accordance with licensee procedure NPG-SPP-09.18.2, Equipment Reliability Classification. Licensee procedure TVA-NQA-PLN89-A, Nuclear Quality Assurance Plan stated that the nuclear maintenance program including corrective and preventive maintenance shall ensure that quality-related structures, systems and components are maintained at a level sufficient to perform their intended functions.

Analysis: The failure to perform preventive maintenance on the Unit 3 annunciator power supplies prior to their age related failure was a performance deficiency. Specifically, TVA procedure TVA-NQA-PLN89-A, Nuclear Quality Assurance Plan stated that the nuclear maintenance program including corrective and preventive maintenance shall ensure that quality-related structures, systems and components are maintained at a level sufficient to perform their intended functions. These power supplies were classified as Quality-Related according to TVA procedure NPG-SPP-09.18.2, Equipment

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Reliability Classification. As a result of the performance deficiency, a Unit 3 MCR annunciator power supply was left in service for 34 years, failed due to an aged electrolytic capacitor and resulted in an over-current related fire. The performance deficiency was determined to be more than minor because it was considered sufficiently similar to example 4.f of Inspection Manual Chapter (IMC) 0612, Appendix E, for an issue that resulted in a fire hazard in a safety-related area of the plant. The finding was associated with the Initiating Events Cornerstone and initially characterized according to IMC 0609, Significance Determination Process (SDP), Attachment 4, Phase 1 - Initial Screening and Characterization of Findings. The results of this analysis required a phase 3 evaluation in accordance with IMC 0609 because the finding increased the likelihood of and actually caused a fire in the Unit 3 MCR. The regional Senior Reactor Analyst performed a Phase 3 analysis for the issue. Pictures were provided to an NRC contractor who provides expertise in fire damage for the agency. It was determined that the configuration of the fire would not likely result in damage to anything of significance because the metal box that the annunciator's power supplies are located in, would prevent propagation of the fire beyond the box. It is also unlikely that enough heat or smoke could be created to require control room evacuation, which would impact the human actions that would be performed to shut down the plant. Without an impact to additional plant equipment, or a major impact on human action failure rates, the finding was determined to be Green. The cause of this finding was related to the cross cutting aspect of Problem Identification in the Corrective Action Program component of the Problem Identification and Resolution area, because the licensee was aware of three previous failures of these power supplies in July 2009 and should have recognized that the electrolytic capacitors, installed beyond their recommended service life, required replacement prior to failure [P.1(a)].

Enforcement: Enforcement action does not apply because the performance deficiency did not involve a violation of regulatory requirements since the main control room annunciator power supplies were not safety-related. Because the finding does not involve a violation, was entered into the licensee's corrective action program as PER 496592, and has very low safety significance, it is identified as FIN 05000296/2012003-04, Failure to Perform Preventive Maintenance on the Unit 3 Main Control Room Annunciator Power Supplies.

#### 40A6 Meetings, Including Exit

##### .1 Exit Meeting Summary

On April 13, 2012, regional inspectors presented the results of the Occupational Radiation Safety inspection to Mr. P. Summers, Director Safety and Licensing, and other members of the licensee's staff.

On April 20, 2012, regional inspectors presented the results of the Unit 3 Inservice Inspection to members of the licensee's staff.

On June 22, 2012, regional inspectors presented the results of the Public Radiation Safety inspection to Mr. K. Polson, Site Vice President, and other members of the licensee's staff, who acknowledged the findings. On July 03, 2012, regional inspectors

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presented changes to the inspection results via telephone to Mr. S. Bono, General Manager Site Operations, and other members of the licensee's staff, who acknowledged the changes.

On June 29, 2012, regional inspectors presented the results of the Emergency Preparedness inspection to Mr. S. Bono, General Manager Site Operations, and other members of the licensee's staff.

On July 10, August 10 and 14th, 2012, the resident inspectors presented the results of the quarterly integrated onsite inspection to Mr. K. Polson, Site Vice President, and other members of the licensee's staff, who acknowledged the findings.

All proprietary information reviewed by the inspectors as part of routine inspection activities were properly controlled, and subsequently returned to the licensee or disposed of appropriately.

#### 40A7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which met the criteria of the NRC Enforcement Policy, for being dispositioned as a Non-Cited Violation:

- A violation of Technical Specification 5.4.1.a was identified by the licensee for the failure to establish adequate work instructions to ensure proper installation of the gap setting between the actuator stem and valve stem of Unit 1 HPCI, (High Pressure Coolant Injection), turbine stop valve, 1-FCV-073-0018. On April 19, 2012, during the performance of a quarterly surveillance test the turbine stop valve, 1-FCV-073-0018, failed to close upon repeated demands. A Phase 3 analysis determined the significance of the finding was very low safety significance (Green) The regional Senior Reactor Analyst performed a Phase 3 SDP analysis on the finding. The risk was dominated by the unavailability of the HPCI during the repair time after discovery of the Stop Valve issue. The finding was determined to be GREEN in the SDP, primarily due to the short period of time it was fully non-functional. The licensee initiated PER 539040 to enter the issue into their corrective action program.



## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

T. Adkins, Manager EP Systems  
S. Bono, Plant General Manager Site Operations  
C. Boschet, QA Manager  
J. Boyer, Acting Assistant Director of Engineering  
B. Bruce, Acting Systems Engineering Manager  
D. Campbell, SM  
S. Clement, Operations Fire Protection  
M. Durr, Director of Engineering  
M. Ellet, Maintenance Rule Coordinator  
J. Emens, Nuclear Site Licensing Manager  
A. Feltman, Emergency Preparedness Manager  
J. Ferguson, Radiation Protection Support Superintendent  
C. Gannon, Plant Manager  
H. Higgins, Acting Licensed Operator Requalification Supervisor  
D. Hughes, Operations Manager  
S. Kelly, Work Control Manager  
D. Kettering, Electrical Systems Engineering Manager  
J. Kimberlin, FIN Manager  
R. King, Design Engineering Manager  
W. Lee, Corporate EP Manager  
R. Norris, Radiation Protection Manager  
S. Norris, Engineering Supervisor  
P. Parker, Site Security Manager  
J. Parshall, Manager, EP Program Planning and Implementation  
K. Polson, Site Vice President  
E. Quidley, EDG Project Manager  
M. Rasmussen, Operations Superintendent  
H. Smith, Fire Protection Supervisor  
R. Stowe, Equipment Reliability Manager  
P. Summers, Director of Safety and Licensing  
J. Underwood, Chemistry Manager  
C. Vaughn, Operations Superintendent  
S. Walton, Electrical Maintenance Superintendent  
M. Wilson, Director of Training  
A. Yarbrough, BOP System Engineering Supervisor

## LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

### Opened and Closed

05000259,260,296/2012-003-01	NCV	Failure to Maintain Flood Barrier Results in Inoperable Safety Related Pumps (Section 1R15.)
05000259,260,296/2012003-02	NCV	Failure to Properly Prepare a DOT Type A Package for Transport) (Section 2RS8)
05000259,260,296/2012003-03;	NCV	Failure to Implement DOT Type A Package Closure Requirements) (Section 2RS8)
05000260,296/2012003-04	FIN	Failure to Establish Preventive Maintenance for Unit 2 and 3 Main Control Room Annunciator Power Supplies (Section 4OA3.6)

### Closed

05000296/2011-003-00	LER	Automatic Reactor Scram Due to a Main Turbine Generator Load Reject (Section 4OA3.4)
05000259,296/2011-009-02	LER	As-Found Undervoltage Trip for the Reactor Protection System 1A1 Relay that Did Not Meet Acceptance Criteria During Several Surveillances (Section 4OA3.5)
05000296/2012-001-00	LER	Annunciator Panel Power Supply Fire in Unit 3 Control Room (Section 4OA3.6)

### Discussed

None

## LIST OF DOCUMENTS REVIEWED

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

0-GOI-300-4, Switchyard Manual, Rev. 85  
0-OI-30F, Common DG Building Ventilation, Rev. 30  
0-OI-30F/ATT-1, Attachment 1 Valve Lineup Checklist, Rev. 28  
0-OI-30F/ATT-1A, Attachment 1A Valve Lineup Checklist Unit 3, Rev. 28  
0-OI-30F/ATT-2, Attachment 2 Panel Lineup Checklist, Rev. 29  
LCEI-CI-C9, Procedure for Walkdown of Structures for Maintenance Rule, Rev. 5  
NPG-SPP-10.2, Clearance Procedure to Safely Control Energy, Rev. 3  
OPDP-2, Switchyard Access and Switching Order Execution, Rev. 6  
PER 390201, Concrete Piers in Switchyard Showing Signs of Degradation  
PER 534276, Conflicting information on 161-kv grid status during U3R15 outage  
PER 536136, U3 Transformer Project Material Storage Area Poses U2 Concern  
PER 538016, Intake has no working ventilation fans  
PER 539365, Switchyard Deficiencies  
PER 539371, 500kV and 161kV Concrete Pedestals  
PER 539580, Transformer Yard Discrepancies  
PER 539581, Ground Soft in Transformer Yard  
PER 539582, Concrete Pedestal Degraded in Transformer Yard  
PER 539583, Transformer Yard 500kV Tower Damaged  
PER 546871, Hot Weather procedure  
PER 566119, Freeze protection heater still in place  
PER 568461, Hot weather procedure  
PSO PER 546093, Transformer Yard 500 kV P.O. Structure Damage  
TRO-TO-SPP-30-128, Browns Ferry Nuclear Plant Grid Operating Guide, Rev. 13  
TVA-SPP-10.010, NERC Standard Compliance Processes Shared by TVA's Nuclear Power and Energy Delivery Organizations, Rev. 0  
UFSAR-8.4, Normal auxiliary Power System, Amendment 23  
WO 113419591, Hand switch stuck in slow position  
WO110926526, Plant air wash pump

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

0-47E861-1, Flow & Control Diagram Diesel Starting Air System Diesel Generator A, Rev. 17  
0-OI-82/ATT-1A, Standby Diesel Generator A, Valve Lineup Checklist, Rev. 100  
0-OI-82/ATT-2A, Standby Diesel Generator A, Panel Lineup Checklist, Rev. 100  
0-OI-82/ATT-3A, Standby Diesel Generator A, Electrical Lineup Checklist, Rev. 100  
0-OI-82/ATT-4A, Standby Diesel Generator A, Instrument Inspection Checklist, Rev. 101  
1-OI-71, Reactor Core Isolation Cooling System, Rev. 14  
1-OI-71/ATT-1, RCIC System, Valve Lineup Checklist, Rev. 13  
1-OI-71/ATT-2, RCIC System, Panel Lineup Checklist, Rev. 13  
1-OI-71/ATT-3, RCIC System, Electrical Lineup Checklist, Rev. 13  
3-OI-74, Residual Heat Removal System, Revision 0104  
3-OI-74/ATT-1, Valve Lineup Checklist Unit 3, Revision 0086  
3-OI-74/ATT-2, Panel Lineup Checklist, Revision 0086  
3-OI-74/ATT-3, Electrical Lineup Checklist, Revision 0087  
DWG 1-47E813-1, Flow Diagram RCIC System, Rev. 33

Technical Requirements Manual Section 3.5.3, Equipment Area Coolers  
 Technical Requirements Manual Section 3.5.4, Maintenance of Filled Discharge Piping  
 Updated Final Safety Report Section 4.8, Residual Heat Removal System

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

0-SI-4.11.E.1.B(2), Safety Related Fire Hose Replacement, Rev 08  
 0-SI-4.11.E.1.B(2)/ATT-1, Attachment 1 Fire Hose Replacement Data Sheet, Rev. 08  
 0-TI-470, Temporary Wiring And Electrical Equipment (600 Volt Or Less), Rev. 1  
 Active FPIP's dated 5/1/2012  
 Active FPIP's List, 06/01/2012  
 DWG 0-47W216-51, Fire Protection – 10 CFR 50 Appendix R, Fire Area Compartmentation and Zone Drawings, Rev. 7  
 DWG 0-47W216-56, Fire Protection – 10 CFR 50 Appendix R, Fire Area Compartmentation and Zone Drawings, Plan EL 593.0 & 586.0, Rev. 7  
 Fire Hazard Analysis Fire Zone 3-3  
 Fire Protection Report Vol. 1, Fire Hazards Analysis, Rev. 11  
 Fire Protection Report Vol. 2, Rev. 48  
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 Fire Protection Report, Volume 2, Section IV, Pre-Plan No. RX2-519 Torus Area and HPCI Room  
 Fire Protection Report, Volume 2, Section IV, Pre-Plan No. RX2-519 NW  
 Fire Protection Report, Volume 2, Section IV, Pre-Plan No. RX2-519 SW  
 Fire Protection Report, Volume 2, Section IV, Pre-Plan No. RX2-565  
 FP-0-000-INS001(A), Inspection of Portable and Wheel Type Fire Extinguisher Stations (Reactor Building), Rev. 17  
 FP-0-000-INS001(A)/ATT-2, Attachment 2 Inspection Check/Data Sheet Dry Chemical (12 yrs) Co2 (5 yrs) Halon (12 yrs) Charging Cylinder (5 yrs), Rev. 17  
 FP-0-000-INS012, Fire Watch Expectations, Rev. 1  
 FP-0-000-INS019, Fire Protection Weekly Inspection, Rev. 13  
 NPG-SPP-09.17, Temporary Equipment Control, Rev. 1  
 NPG-SPP-18.4.6, Control of Fire Protection Impairments, Rev. 0  
 PER 545547, Room on 1C Hallway Contain Excessive Combustibles  
 PER 546065, Multiple Extension Cords Plugged Into One Another on 1C Hallway  
 PER 546188, Roving Fire Watch Route Sheet  
 Pre-Fire Plan for Browns Ferry Nuclear Plant – Reactor Building Unit 3, pre-plan No. RX3-593  
 Pre-Fire Plan for Browns Ferry Nuclear Plant – Reactor Building Unit 3, pre-plan No. RX3-565  
 TVA Safety Manual Chapter 2, Procedure 1004, Extension Cords and Attachments, Rev. 4

### **Section 1R07: Annual Heat Sink Performance**

0-TI-322, RHR Heat Exchanger Performance Testing, Rev. 0  
 0-TI-364, ASME Section XI System Pressure Tests, Rev. 6  
 0-TI-389, Raw Water Fouling and Corrosion Control, Rev. 16  
 0-TI-522, Program for Implementing NRC Generic Letter 89-13, Rev. 1  
 0-TI-63, RHRSW Flow Blockage Monitoring, Rev. 25  
 DCN T38580A, Repair 3A and 3C RHR Heat Exchanger Flange Leaks Using Furmanite Sealing Compound, Rev. A  
 DWG 0-47E452-1, Mechanical Residual Heat Removal System, Rev. 15  
 DWG 3-47W452-10, Mechanical Residual Heat Removal System, Rev. 15

DWG 69-D-160-03, Tube Sheet Details, Rev. 6  
 EDC 69311A, Repair of 3B and 3D RHR Heat Exchanger Flange Leaks, Rev. A  
 EPRI NP-7552, Heat Exchanger Performance Monitoring Guidelines, Dec. 1991  
 Evaluation of Temporary Sealing Compound used as a replacement gasket, Dated 5/8/2012  
 MCI-0-000-LKS001, On-Line leak Sealing, Rev. 15  
 MCI-0-074-HEX001, Maintenance of RHR Heat Exchangers, Rev. 23  
 NPG-SPP-09.7, Corrosion Control Program, Rev. 2  
 N-VT-4, System Pressure Test Visual Examination Procedure, Rev. 23  
 P.S. 4.M.4.3 (R4), General Engineering Specification, G-29B, Online Leak Sealing, Rev. 4  
 PER 543035, Temporary Furmanite repairs on RHR HX 3A, 3C, and 3D are not being tracked  
 PM 500103065, Inspect / Clean RHRSW Pump Pit  
 PM 500108601, PM Performance of 0-TI-63, RHRSW Flow Blockage Monitoring, for  
 1-HEX-74-900A & C.  
 PM 500116540, PM Performance of 0-TI-63 for 2-HEX-74-900A and 2-HEX-74-900C  
 PM 500116541, PM Performance of TI-63 for 2-HEX-74-900B and 2-HEX-74-900D  
 PM 500126928, Clean BFN-3-HEX -074-0900A Heat Exchanger  
 PM 500126929, PM Performance of 0-TI-63, RHRSW Flow Blockage Monitoring, for  
 3-HEX-74-900A & C  
 PM 500126931, Clean BFN-3-HEX -074-0900B Heat Exchanger  
 PM 500126932, PM Performance of 0-TI-63 for 3-HEX-74-900B and 3-HEX-74-900D.  
 PM 500126933, Disassemble, Clean, Inspect BFN-3-HEX -074-0900C  
 PM 500126935, Disassemble, Clean, Inspect BFN-3-HEX -074-0900D.  
 PM 500133228, PM Perform TI-63 for 1-HEX-74-0900B and D  
 WO 08-712116, Repair Leak, 3D RHR Heat Exchanger  
 WO 112857671, Test RHR Heat Exchanger 3A and 3C  
 WO 95-20541-000 (3A and 3C)

### **Section 1R11: Licensed Operator Requalification**

2-AOI-57-5B, Loss of Instrument & Control Bus  
 2-AOI-70-1, Loss of Reactor Building Closed Cooling Water  
 2-C-5, Level/Power Control  
 2-EOI-1, Reactor Pressure Vessel Control

### **Section 1R12: Maintenance Effectiveness**

0-AOI-100-3, Flood Above Elevation 558', Rev. 35  
 0-AOI-100-3, Flood Above Elevation 558', Rev. 35  
 0-TI-346, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting –  
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 0-TI-346, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting –  
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 Cause Determination Evaluation 1041, May 31, 2011  
 Design Criteria BFN-50-7023, Residual Heat Removal Service Water (RHRSW) System  
 Design Criteria BFN-50-7067, Emergency Equipment Cooling Water (EECW) System  
 Design Criteria BFN-50-C-7101, Protection from Wind, Tornado Wind, Tornado  
 Depressurization, Tornado Generated Missiles, and External Flooding  
 FSAR Section 10.10, Emergency Equipment Cooling Water (EECW) System, BFN-24  
 FSAR Section 10.9, RHR Service Water System, BFN-24  
 FSAR Section 10.9, RHR Service Water System, BFN-24

FSAR Section 12.2.7.1.2, Principle Structures and Foundations, Personnel Access Doors, BFN-24

FSAR Section 12.2.7.1.2, Principle Structures and Foundations, Personnel Access Doors, BFN-24

FSAR Section 2.4, Hydrology, Water Quality, and Aquatic Biology, BFN-24

FSAR Section 2.4, Hydrology, Water Quality, and Aquatic Biology, BFN-24

MCI-0-023-PMP002, Maintenance of EECW and RHRSW Pumps, Rev. 52

MCI-0-023-PMP003, Emergency Equipment Cooling Water and Residual Heat Removal Service Water Pump Removal and Installation, Rev. 12

MCI-0-023-PMP004, EECW and RHRSW Pump Impeller Adjustment, Rev. 05 and 06

MPI-0-260-DRS001, Inspection and Maintenance of Doors

NPG-SPP-03.4, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting – 10CFR50.65, Rev. 0

NPG-SPP-06.10, NPG Fix It Now (FIN) Team Process, Rev. 0

NPG-SPP-07.1, On-Line Work Management, Rev. 05

PER 234151, Unit 2 IRM scram signal

PER 310544, Gaps in A and D RHRSW Pump Room Flood Doors

PER 383975, Reliability of RHRSW Pump Room Door Seals

PER 402414, IRM (a)(1) plan

PER 469640, BFN-0-DOOR-260-C-RHRSW, Aggregate Impact of RHRSW Pump Room Doors

PER 470350, BFN-0-DOOR-260-C-RHRSW May Not Seal

PER 481145, B and D RHRSW Pump Room Watertight Doors Were Found Closed and Locked, But Not Mechanically Restrained

PER 482838, RHRSW B Pump Room Door Failed Chalk Test

PER 482867, RHRSW D Pump Room Door Failed Chalk Test

PER 524957, Review past 48 months of IRM data for MR failures.

PER 532050, NRC Identified C3 EECW Pump Foundation Hole Flood Protection Cover Inadequately Installed

PER 546734, Lack of specified torque value for pump coupling bolts

PER 561666, NRC Walkdown Identified RHRSW Door Issues

PER 563567, Site Tolerance of Degraded/Nonconforming Issue

PER 563727, RHRSW Intake Structure Doors Have Not Been Evaluated for MR (a)(1)

PER 566123, Document Former NRC Senior Resident Observation

Plant Level Event Data from Mar. 2010 to Feb. 2012

SR 565020, Inaccurate Past Operability Due to CAP Input

SR 568840, NRC Identified – Failure to Accurately Document NRC Observations in CAP

SR 569912, Inconsistency in Flood Cover Description Between Maintenance Procedures Technical Specification and Basis 3.7.1 Residual Heat Removal Service Water (RHRSW) System, Amendment 234

Technical Specification and Basis 3.7.2 Emergency Equipment Cooling Water (EECW) System and Ultimate Heat Sink (UHS), Amendment 234

U1,2,3 Maintenance Rule Data from Nov. 2009 to Feb. 2012

Units 1,2,3 System 092 (IRMs) Health Reports from 10/1/2011 to 1/31/2012

Unplanned Scram Data from Mar. 2010 to Feb. 2012

WO 111457995, Repair BFN-0-DOOR-260-C-RHRSW

WO 111835839, D RHRSW Upper Dog Catching and Missing Dog

WO 111926930, B RHRSW Dogs Lower Linkage Disconnected

WO 112744581, C3 EECW Pump Vibes in Alert, Troubleshoot and Repair

WO 112972845, Impeller gap adjustment of A3 EECW pump  
 WO 113062982, Repair BFN-0-DOOR-260-B-RHRSW  
 WO 113062984, Repair BFN-0-DOOR-260-D-RHRSW  
 WO 113228273, Why is A RHRSW Door Locked – Door Doesn't Fully Close  
 WO 113348314, C RHRSW Lower Left Dragging and Scraping Metal  
 WO 113446620, Performance of 3-SI-4.5.C.1(2) – EECW Pump Operation  
 WO 113456059, Raw Cooling Water Leak on 3B CRD Pump  
 WO 113474206, Performance of 3-SI-4.5.C.1(2) – EECW Pump Operation  
 WO 113475937, 'D' Diesel Generator came up to 500 rpm  
 WO 113483626, Troubleshoot BFN-0-RLY-082-D/ALM  
 WO 113486500, Diesel Generator 'D' Air Pressure Alarm Relay

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

1-OI-73, High Pressure Coolant Injection System, Rev. 22  
 1-SR-3.3.3.1.4(G), Verification of Remote Position Indicators for HPCI System Valves, Rev. 2  
 1-SR-3.5.1.7, HPCI Main and Booster Pump Set Developed Head and Flow Rate Test at Rated  
 Reactor Pressure, Rev. 21  
 BFN Unit 3 Defense in Depth Assessment May 4, 2012  
 BFN Unit 3 Defense in Depth Assessment, April 15, 16, 17, 18, 2012  
 BFN-ODM-4.18, Protected Equipment, Rev. 6  
 Browns Ferry Nuclear Plant Outage Risk Assessment Report, Unit 3 Cycle R15, Rev. 1  
 DWG 1-47E812-1, Rev. 34  
 DWG 68-XC-71, Schutte & Koerting Co. Manufacturing Drawing  
 EOOS Report, Unit 2, dated May 7, 2012  
 MCI-0-073-VLV001, HPCI Turbine Stop Valve – FCV 73-18 Disassembly, Inspection, Rework  
 and Reassembly, Revs. 12, 13  
 MSI-1-073-GOV001, HPCI Turbine Overspeed Trip Test, Rev. 7  
 NPG-SPP-7.0, Work Management  
 NPG-SPP-07.1, On Line Work Management, Rev. 5  
 NPG-SPP-07.2, Outage Management, Rev. 2  
 NPG-SPP-07.2.11, Shutdown Risk Management, Rev. 2  
 NPG-SPP-07.2.11, Shutdown Risk Management, Rev. 2  
 NPG-SPP-07.3, Work Activity Risk Management Process, Rev. 07  
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 NPG-SPP-09.11, Probabilistic Risk Assessment (PRA) Program, Rev. 01  
 NPG-SPP-09.11.1, Equipment Out of Service (EOOS) Management, Rev. 04  
 NPG-SPP-7.2.11, Shutdown Risk Management, Rev. 2  
 ORAM Model Change Form, April 18, 2012  
 ORAM Sentinel Outage Safety Assessment, April 18, 2012  
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 Outage Risk Assessment Report, U3 Cycle R15, Rev. 1  
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 PER 539556, HPCI Turbine Main Pump Vibration  
 PER 541156, HPCI Oil Tank Level Low  
 PER 541727, HPCI Gland Exhauster Pump Breaker  
 PER 547134, Shutdown Risk Management, Filling out DID Checklist Once per 24 Hours  
 PMT-0-000-MEC001, Leak Checks on Tube Fitting, Threaded, Flanged, Bolted or Welded  
 Connections, Rev. 7

SR 541069, Adjust Sensitivity on Incipient Fire Detector  
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 WO 113426235, HPCI Turbine Stop Valve Failed to Trip  
 WO 113426235, HPCI Turbine Stop Valve PMT Step Text  
 WO 113429679, Task 10: 1-FCV-073-0018, Rev. 0  
 WO 113435872, HPCI Main & Booster Pump Head & Flow Rate Test  
 WO 113440357, HPCI Oil Tank Level Low  
 WO 113441055, Verification of Remote Position Indicators  
 WO 113445422, Adjust Sensitivity on Incipient Fire Detector

**Section 1R15: Operability Evaluations**

0-17W300-9, Mechanical Isometric drawing for EECW drains, Rev. 0  
 0-GOI-200-1, Freeze Protection Inspection, Rev. 69  
 0-TI-346, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting –  
 10CFR50.65, Rev. 37  
 1-47E859-1, Flow Diagram Emergency Equipment Cooling Water, Rev. 81  
 1-47E859-1, Flow Diagram for EECW system Unit 1, Rev. 82  
 2-47E859-1, Flow Diagram for EECW system Unit 2, Rev. 31  
 3-47E859-1, Flow Diagram for EECW system Unit 1, Rev. 38  
 3-SI-4.5.C.1(2), EECW Pump Operation, Rev. 119  
 BFN-50-7067, General Design Criteria Document for the EECW system, Rev. 18  
 BFN-50-C-7067, EECW System Design Criteria, Rev. 18  
 Calculation MDN0026910163, Combustible Load Table, Rev. 42  
 DCN 69957, Appendix R Pump House Tunnel Fire Barrier, Rev. A  
 DWG 2-47E600-53A, Mechanical Instruments and Controls, Rev. 3  
 EPI-0-000-FRZ001, Freeze Protection Program for RHRSW Pump Rooms and Diesel  
 Generator Building, Rev. 19  
 Fire Protection Report Volume 1, Fire Hazards Analysis for Fire Area 25, Rev. 11  
 FSAR Section 10.9, RHR Service Water System, BFN-24  
 FSAR Section 12.2.7.1.2, Principle Structures and Foundations, Personnel Access Doors,  
 BFN-24  
 FSAR Section 2.4, Hydrology, Water Quality, and Aquatic Biology, BFN-24  
 MPI-0-260-DRS001, Inspection and Maintenance of Doors  
 NPG-SPP-09.0, Engineering, Rev. 1  
 NPG-SPP-09.3, Plant Modifications and Engineering Change Control, Rev. 6  
 Past Operability Form for PER 492957, Tarps on RHRSW Rooms  
 PER 310544, Gaps in A and D RHRSW Pump Room Flood Doors  
 PER 372194, FPR Justification on Intake Pumping Station Fire Barriers  
 PER 469640, BFN-0-DOOR-260-C-RHRSW, Aggregate Impact of RHRSW Pump Room Doors  
 PER 470350, BFN-0-DOOR-260-C-RHRSW May Not Seal  
 PER 481145, B and D RHRSW Pump Room Watertight Doors Were Found Closed and Locked,  
 But Not Mechanically Restrained  
 PER 492957, Tarps on RHRSW Rooms  
 PER 500804, Immediate Actions Taken for PER 492957 Not Documented  
 PER 520497, EECW check valve appears to be seeping and repressurizing pipe  
 PIC 70445, System 26, PER 372194 Corrective Action – IPS Fire Seals, Rev. 0  
 Prompt Determination of Operability (PDO) for 0-CKV-067-0502, Rev. 0  
 Prompt Determination of Operability for PER 569282



SR 482359, RHRSW B Pump Room Door Failed Chalk Test  
 SR 482401, RHRSW D Pump Room Door Failed Chalk Test  
 SR 560210, NRC Walkdown Identified RHRSW Door Issues  
 SR 563000, Site Tolerance of Degraded/Nonconforming Issue  
 SR 563507, RHRSW Intake Structure Doors Have Not Been Evaluated for MR (a)(1)  
 SR 565020, Document Former NRC Senior Resident Observation  
 WO 111457995, Repair BFN-0-DOOR-260-C-RHRSW

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

3-ARP-9-3E, Panel 9-3, 3XA-55-3E, Rev. 26  
 3-GOI-100-3A, Refueling Operations (RX Vessel Disassembly and Floodup), Rev. 56  
 3-GOI-100-3B, Refueling Operations (RX Cavity Letdown and Vessel Re-Assembly), Rev. 50  
 3-SIMI-3A, Reactor Feedwater System Index, Rev. 32  
 ACE PER 427252(330400) Initial Cavity Flood-up Overflow into Ventilation Ducts  
 LCL-3-L-03-055, Reactor Water level Flood-Up Calibration, Rev. 5  
 Minor Mod DCN 70549, Reactor Water Level Flood-Up Transmitter and Indication Loop Replacement, Rev. A  
 NPG-SPP-09.4, 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments, Rev. 5  
 NPG-SPP-09.5, Temporary Alterations, Rev. 2  
 NPG-SPP-9.3, Plant Modifications and Engineering Change Control, Rev. 6  
 NPG-SPP-9.4, 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments, Rev. 5  
 ODMI-2012-0004, FCV-73-16 Leakage  
 PER 427252, Initial Cavity Flood-up Overflow into Ventilation Ducts, (PER 330400)  
 PER 565572, U1 HPCI Steam Admission Valve Leakage  
 PER 565577, U1 HPCI Steam Admission Valve Leakage  
 PER 569927, Opportunity for Operations Turnover Improvement  
 PER 571068, Potential Grease Degradation  
 SII-3-L-03-055, 500" Reactor Water Level A Refuel Range LT-3-55 Special Calibration for Vented Vessel and Fuel Pool Flood-Up, Rev. 2  
 TACF 1-12-001-073, Thermal Insulation Attached to BFN-1-FCV-073-0016, HPCI Steam Supply Valve, Rev. 0  
 TACF 2-12-001-073, Thermal Insulation Attached to BFN-2-FCV-073-0016, HPCI Steam Supply Valve, Rev. 0  
 VTD-OT01-0020, OTEK Corp. Ops Manual for HI-Q Programmable Controllers, Rev. 3  
 WO 112971110, WO Request for DCN 70549 to Implement 3-55 Loop Modification on U3  
 WO 113275768, Implement TACF 1-12-001-073 to remove insulation from BFN-1-FCV-073-0016  
 WO 113322598, Implement TACF 2-12-001-073 to remove insulation from BFN-2-FCV-073-0016

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

0-OI-82, Standby Diesel Generator System, Rev. 129  
 0-SR-3.8.1.1(D), Diesel Generator D Monthly Operability Test, Rev. 39  
 0-TI-106, General Leak Rate Test Procedure, Rev. 14, performed on April 9, 2012  
 0-TI-360, Containment Leak Rate Programs, Rev. 33  
 0-TI-362, Inservice Testing of Pumps and Valves, Rev. 29  
 3-45E779-41, Wiring Diagram, 480V Shutdown Auxiliary Power Schematic Diagram, Rev. 19  
 3-45E779-51, Wiring Diagram, 480V Load Shed Div II Schematic Diagram, Rev. 19

3-47E801-1-ISI, ASME Section XI, Flow Diagram Main Steam Code Class Boundaries, Rev. 19  
 3-SI-3.3.1.A, ASME Section XI System Leakage Test of the Reactor Pressure Vessel and  
 Associated Piping, Rev. 21  
 3-SR-3.4.9.1(1), Reactor Heatup and Cooldown Rate Monitoring, Rev. 21  
 3-SR-3.4.9.1(2), Reactor Vessel Shell Temperature and Reactor Coolant Pressure Monitoring  
 During In-Service Hydrostatic or Leak Testing, Rev. 15  
 3-SR-3.6.1.3.10(B) Primary Containment Local Leak Rate Test Main Steam Line B: Penetration  
 X-7B  
 3-SR-3.6.1.3.10(B-OUTBD), Primary Containment Local Leak Rate Test Main Steam Line B  
 Outboard Penetration X-7B, Rev. 06, performed on April 8, 2012  
 3-SR-3.8.1.1(3C) Diesel Generator '3C' Monthly Operability Test, Rev. 42, performed on May  
 15, 2012  
 3-SR-3.8.1.7(3C), Diesel Generator '3C' 24 Hour Run, Rev. 21, performed on April 24, 2012  
 ECI-0-000-RLY003, Replacement of Relays, Rev. 21  
 EII-0-000-TCC106, Troubleshooting, Doc. and Config. Control of Elect. Activities, Rev. 62  
 MCI-0-000-PCK001, Generic Maintenance Instructions for Valve Packing, Rev. 26  
 MCI-0-074-VLV002, Residual Heat Removal Motor Operated Valves, FCV-74-47, 48, 53 and 67  
 Disassembly, Inspection, Rework and Reassembly  
 MCI-0-082-GOV001, Standby Diesel Engine Governor Removal and Installation, Rev. 9  
 MCR logs  
 MMDP-1, Maintenance Management System  
 MSI-0-001-VSL001, Reactor Vessel Disassembly and Reassembly, Rev. 100  
 NPG-SPP-06.3, Pre-/Post-Maintenance Testing  
 PER 143225, High Vibration on Generator end bearing on 3D DG  
 PER 538810, Restart NOI U3RF15-002: RPV Head Deformation due to Foreign Object  
 PER 541788, High Vibrations on 3C DG  
 PER 548753, Extent of Condition for D DG, (3A)  
 PER 548755, Extent of Condition for D DG, (3B)  
 PER 548756, Extent of Condition for D DG, (3C)  
 PER 548757, Extent of Condition for D DG, (3D)  
 PER 553585, Hydro Procedure Discrepancy  
 SR 532953, 3-FCV-1-27 failed as-found LLRT  
 SR 542421, Smooth Indication Noted on the Top Surface of RPV Flange During U3R15  
 SR 546885, Address 3C DG axial vibration  
 SR 547405, As-found LLRT rotameter did not meet required accuracy  
 SR 548237, Four Studs Not Pulled While Tensioning the U3 RPV Head  
 VTD-W290-0050, Instruction Manual for Woodward EG-B10C Governor Actuator, Rev. 2  
 WO 112472092, Generator Replacement Testing for 3C EDG  
 WO 112505164, Perform as-left LLRT for B outboard MSIV, Penetration X-7B  
 WO 113324169, Reassemble Generator for 3C EDG  
 WO 113394336, Re-torque Valve Packing on 3-FCV-001-0027 (B Outboard MSIV)  
 WO 113429130, 3-BKR-231-0003B/3C needs cell switch adjustment  
 WO 113475937, D D/G Came Up To 500 RPM When Started During 0-SR-3.8.1.1(D)  
 WO 113480500, D/G 'D' Monthly Operability Test  
 WO 113480917, Replace D D/G Governor Speed Stop Micro Switches  
 WO 113483626, Troubleshoot/Repair/Replace BFN-0-RLY-082-D/ALM  
 WO 113483967, D D/G Dryer Assembly High DP Causing Excessive Blow Down  
 WO 113484062, D D/G Dryer Assembly High DP Causing Excessive Blow Down

WO 113484918, Lost Terminating Screw  
 WO 113484954, Extent of Condition for D DG, (3A)  
 WO 113484954, Extent of Condition for D DG, (3B)  
 WO 113484957, Extent of Condition for D DG, (3C)  
 WO 113484958, Extent of Condition for D DG, (3D)  
 WO 113486500, Troubleshoot/Repair/Replace DG D Air Pressure Alarm Relay  
 WO Instructions PMT for 113480917, Rev. 0

**Section 1R20: Refueling and Other Outage Activities**

0-47E820-1, Flow Diagram Control Rod Drive Hydraulic System, Rev. 32  
 0-OI-2B, Condensate Storage and Transfer System, Rev. 76  
 0-GOI-100-3A, Refueling Operations (In-Vessel Operations)  
 0-GOI-100-3B, Operations in Spent Fuel Pool Only  
 0-GOI-100-3C, Fuel Movement Operations During Refueling  
 0-GOI-100-3C, Fuel Movement Operations During Refueling, Attachment 6, Core Verification  
 3-47E804-1, Flow Diagram Condensate, Rev. 45  
 3-47E818-1, Flow Diagram Condensate Storage and Supply, Rev. 27  
 3-47E820-2, Flow Diagram Control Rod Drive Hydraulic System, Rev. 19  
 3-47E855-1, Flow Diagram Fuel Pool Cooling System, Rev. 24  
 3-AOI-100-1, Reactor Scram, Scram Reports, Rev. 58  
 3-GOI-100-12A, Unit Shutdown from Power Operations to Cold Shutdown and Reduction in Power During Power Operations  
 3-GOI-100-1A, Unit Startup, Rev. 99  
 3-GOI-200-2, Primary Containment Initial Entry and Closeout, Rev. 34  
 3-OI-78, Fuel Pool Cooling and Cleanup System, Rev. 60  
 3-OI-85, Control Rod Drive System, Rev. 75  
 3-POI-78, Reactor Water Letdown During Refueling Outages Using Submersible Pump/Filter, Rev. 06  
 3-SR-3.1.1.5(A), Control Rod Coupling Integrity Check, Att. 5, Startup Sequence, Rev. 25  
 3-SR-3.4.9.1(1), Reactor Heatup or Cooldown Rate Monitoring  
 3-TI-179, CILRT Data Acquisition System Setup, Rev. 8  
 3-TO-2012-0003; Clearance 3-001-0009B  
 3-TO-2012-0003; Clearance 3-068-0023A  
 3-TO-2012-0003; Clearance 3-071-0010  
 3-TO-2012-0003; Clearance 3-075-0009  
 3-TO-2012-0003; Clearance 3-075-0013  
 Browns Ferry Nuclear U3R15 Core Verification for BOC16 dated 4/10/2012  
 MMDP-11, Erection of Scaffolds / Temporary Wolf Platforms and Ladders, Rev. 3  
 MMTP-102, Erection of Scaffolds / Temporary Work Platforms and Ladders, Revs. 2 & 7  
 NPG-SPP-09.17, Temporary Equipment Control, Rev. 1  
 OPDP-1, Conduct of Operations, Rev. 23  
 PER 542193, Lock High Radiation Area Key  
 PER 542874, Unacceptable Housekeeping Practices in U3 RWCU HX Room  
 PER 543083, Housekeeping Inspection of 3B Reactor Water Cleanup Pump Room  
 PER 547169, U3 RWCU Equipment Drain Screens  
 PER 547172, U3 RWCU Pump Room Equipment Drain Screen  
 PER 549286, 3D Diesel Generator 7-Day Tank Leaking From Inspection Port  
 PER 554943, Pipe Support 3-47B458-564 – Core Spray

PER 555573, Unit 3 Reactor Scram  
 PER 556790, Design Error with U3 3A USST  
 Scaffold Request # 03-1453-3, RWCU HX Room  
 Scaffold Request # 10-239-3, RWCU HX Room  
 SR 556367, GOI Step Not Fully Signed Off and Dated  
 3-TO-2012-004, sections 3-002-0001 and 3-078-0001 for Unit 3 Alternate Reactor Water Level Control; 3-TO-2012-0003, Section 3-001-0008, for work on Main Steam Line Drain Inboard Isolation Valve, 1-FCV-001-055;  
 3-TO-2012-0003; Clearance 3-001-0009B, for maintenance on 3-FCV-1-56; Clearance 3-068-0023A, for maintenance of Recirculation Pump 3B; Clearance 3-071-0010, for maintenance on RCIC Barometric Condenser Condensate Pump Motor; Clearance 3-075-0009, for 3A Core Spray Motor Replacement; and Clearance 3-075-0013, for 3C Core Spray Motor Replacement.  
 3-POI-200.5  
 0-GOI-100-3A, Refueling Operations (In-Vessel Operations), 0-GOI-100-3B, Operations in the Spent Fuel Pool Only, and 0-GOI-100-3C, Fuel Movement Operations During Refueling.  
 Attachment 6, of 0-GOI-100-3C.

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

0-TI-360, Containment Leak Rate Programs, Rev. 33  
 0-TI-360, Containment Leak Rate Programs, Rev. 33  
 0-TI-362, Inservice Testing of Pumps and Valves, Rev. 30  
 0-TI-362, Inservice Testing of Pumps and Valves, Rev. 30  
 2-SI-4.2.E-1(B), Drywell Equipment Drain Sump Flow Integrator Calibration, Rev. 22  
 2-SI-4.4.A.1, Standby Liquid Control Pump Functional Test, Rev. 66  
 3-47E811-1, Flow Diagram Residual Heat Removal System, Rev. 65  
 3D EDG LAT RA Recorder Chart A Test 1 and 2 Data, dated 4/03/12  
 3-SR-3.6.1.1.1(OPT-A), Primary Containment Total Leak Rate – Option A, Rev. 11  
 3-SR-3.6.1.3.10(B), Primary Containment Local Leak Rate Test Main Steam Line B: Penetration X-7B, Rev. 07 performed on April 29, 2012  
 3-SR-3.8.1.9(3D OL), Diesel Generator 3D Emergency Load Acceptance Test with Unit 3 Operating, Rev. 14  
 3-TI-173, Primary Containment Inspection, Rev. 10 and Rev.11  
 3-TI-179, CILRT Data Acquisition System Setup, Rev. 08  
 ANSI/ANS-56.8-1994, Containment System Leakage Testing Requirements  
 Design Criteria BFN-50-7082, Standby Diesel Generator, Rev. 16  
 DWG 2-47E852-2, Flow Diagram Clean Radwaste & Decontamination Drainage, Rev. 33  
 FSAR Section 10.10, Emergency Equipment Cooling Water (EECW) System, BFN-24  
 FSAR Section 8.5, Standby AC Power Supply and Distribution, BFN-24  
 Main Control Room Logs  
 NEDP-14, Containment Leak Rate Programs, Rev. 09  
 NEDP-27, Past Operability Evaluations, Rev. 0  
 PER 533052, 3-FCV-1-27 failed as-found LLRT  
 PER 549232, As Found Integrator Indication Found Out Of Tolerance Low  
 PER 551019, Torus site glass readings were taken while isolated during CILRT  
 PER 554996, Evaluate potential HPCI preconditioning  
 PER 568095, 2-SI-4.4.A.1 SLC TEST, Schrader valve  
 PER 568705, Issue During SLC Pump Functional Test  
 PER 569867, High vibration on 2A SLC pump

PER 569895, High vibration on 2B SLC pump  
 PER 569965, 4 AUO's Not Present for Surveillance  
 PER 570625, BFN-2-PMP-063-0006A, 2A SLC PUMP (GE-11-2A) Flowrate high  
 PER 570710, U2 SLC Storage Tank Decreasing Level Trend  
 PER 571768, Unit 2 SLC Storage Tank decreasing level trend.  
 SR 531728, Failure to Check Large Load Start  
 SR 531819, Failure to Send AUOs Locally for Large Load Start  
 SR 569401, 2-DRV-063-0530 leaking by its seat. Needed excess force to seat valve  
 Technical Specifications and Bases 3.3.8.1, Loss of Power (LOP) Instrumentation, Amendment 215  
 Technical Specifications and Bases 3.7.2, Emergency Equipment Cooling Water (EECW) System and Ultimate Heat Sink (UHS), Amendment 215  
 Technical Specifications and Bases 3.8.1, AC Sources – Operating, Amendment 266  
 U2 Bases B 3.4.5 RCS Leakage Detection Instrumentation, Rev. 0  
 U2 Tech Spec 3.4.5, RCS Leakage Detection Instrumentation, Amendment 253  
 UFSAR, 4.10 Nuclear System Leakage Rate Limits, Amendment 22  
 WO 112511675, As Left – 3-SI-4.7.A.2.g-3/74g – PC LLRT – RHR Shutdown Cooling Suction  
 WO 112816329, Drywell Equipment Drain Sump Flow Integrator Calibration  
 WO 113145425, 2-SI-4.4.A.1, SLC Pump Functional Test  
 WO 113614430, Replace the Schrader valve on the bladder for the 2A SLC Pump  
 WO 113620697, 2-SI-4.4.A.1, SLC Pump Functional Test  
 WO 113625610, 2-DRV-063-0530 leaking by its seat, Needed excess force to seat valve

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

2012 Browns Ferry Emergency Planning Calendar mailer to members of the public in the 10-mile EPZ  
 Documentation of bi-weekly siren tests and maintenance for 4<sup>th</sup> quarter 2011 and 1<sup>st</sup> quarter 2012  
 Documentation of Quarterly siren maintenance for 4<sup>th</sup> quarter 2011 and 1<sup>st</sup> quarter 2012  
 EPDP-10, Facilitation of the Alert and Notification System and Notification Tests, Rev. 4  
 EPDP-14, Evaluation of Changes to Alert and Notification Systems (ANS), Rev. 0  
 EPDP-16, Designated Emergency Response Equipment (DERE), Rev. 0  
 EPDP-17, NPG Emergency Plan Effectiveness Review (10 CFR 50.54(q))  
 EPDP-8, Emergency Preparedness Quality Related Programs, Rev. 1  
 EPFS-9, Inspection, Service, and Maintenance of the Prompt Notification System (PNS) at Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants, Rev. 6 and 7  
 Federal Signal 508 Electro-Mechanical Siren Installation and Operating Instructions, Rev. 12/11  
 Siren Annual Maintenance records: 2011 and 1<sup>st</sup> quarter 2012  
 SR 572389; admin requirements not met in implementing new ANS system

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

2010, 2011, 2012 quarterly drill reports  
 2010, 2011, 2012 Unannounced pager test results  
 2012 Unannounced staffing drill report  
 239363 OSC Status Board Writer #1 failed to respond to Weekly Pager Test  
 243962 Operations Representative failed to respond to Weekly Pager Test  
 246558 Plant Assessment Team Leader failed to respond to Weekly Pager Test

246569 OSC Status Board Writer #1 failed to respond to Weekly Pager Test  
 248540 OSC I/C Supervisor failed to respond to Weekly Pager Test  
 258558 Radiation Protection Manager failed to respond to Weekly Pager Test  
 266020 OSC I/C Engineer failed to respond to Weekly Pager Test  
 294582 OSC Mechanical Engineer failed to respond to Weekly Pager Test  
 327650 Site Vice President failed to respond to Weekly Pager Test  
 328191 OSC Director failed to respond to Weekly Pager Test  
 362821 Confused communication on the need to send B5b blackout fire pump to BFN  
 408093 Assistant OSC Director failed to respond to Weekly Pager Test  
 423217 CECC Plant Assessment Team member preparation for actual emergencies  
 475726 2011 Graded Exercise Corrective Actions  
 541288 QA SSA1203 - EP qualifications not in Qualification Matrix  
 542221 SAMG Decision Maker training requirements do not exclude Shift Managers as Site  
 Emergency Director  
 569374 Simulator issues during the BFN Off Year Exercise  
 CECC EPIP-3, Operations Duty Specialist Procedure for Alert, Rev. 41  
 CECC EPIP-4, Operations Duty Specialist Procedure for Site Area Emergency, Rev. 42  
 Emergency Response Organization Teams listing dated 6/22/2012  
 EPDP-3, Emergency Plan Exercises and Preparedness Drills, Rev. 5  
 EPIP-6, Activation and Operation of the Technical Support Center (TSC), Rev. 34  
 EPIP-7, Activation and Operation of the Operations Support Center (OSC), Rev. 29  
 EPT500A, 2012 EP Staff Orientation Course Description  
 TRN 30, Radiological Emergency Preparedness Training, Rev. 19  
 Various EP staff and ERO member training records

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

10CFR50.54(q) Evaluation of TEENS augmentation hardware addition  
 10CFR50.54(q) Evaluation of TSC Renovation  
 362854; NOUE declared – Tornado  
 364318; Tornado event  
 364674; Extensive loss of ANS due to tornadoes  
 453700; PAR training requirement  
 456771; RP ERO staffing PER not closed correctly  
 571878; admin error on 50.54q eval of TEENS implementation  
 572826; EPDP-17 enhancement to add subject matter experts in 50.54q screening  
 95003-005, BFN NRC Column 4 Response Project and Administrative Controls – Appendix H,  
 Rev. 1: ERO Readiness Performance Area Report  
 BFN Quality Assurance – Emergency Preparedness Drill Assessment – QA-11-007 dated April  
 21, 2011  
 BFN Quality Assurance – Emergency Preparedness Equipment and Facility Readiness, QA-BF-  
 11-008 dated June 30, 2011  
 BFN Self-assessment BFN-EP-S-10-001, B5B Commitments  
 BFN Self-assessment BFN-EP-S-11-001, Effectiveness Reviews  
 Drill and exercise reports, 2010, 2011, and 2012  
 EPDP-1, Procedures, Maps, and Drawings, Rev. 3  
 EPDP-16, Designated Emergency Response Equipment (DERE), Rev. 0  
 EPDP-17, NPG Emergency Plan Effectiveness Review, Rev. 0  
 Event records of NOUE declared on 4/27/2011 – Tornado with Extended Loss of Off-site Power

NPG-SPP-18.3, Emergency Preparedness, Rev. 1  
 REP, Radiological Emergency Plan, (Appendix A - BFN), Rev. 97  
 REP, Radiological Emergency Plan, (Generic Part), Rev. 97  
 Self-assessment CRP-EP-S-11-03, Site Tornado Procedure, BP-128, dated September 28, 2011  
 Self-assessment CRP-EP-S-12-005; Training Program comparison  
 Self-assessment CRP-EP-S-12-006, REP drill  
 Self-assessment CRP-EP-S-12-020; EP Records  
 SPP-3.1, Corrective Action Program, Rev. 4  
 TVA Quality Assurance - Emergency Preparedness Audit Report SSA1003 dated May 20, 2010  
 TVA Quality Assurance - Emergency Preparedness Audit Report SSA1203 dated April 24, 2012

### **Section 1EP6: Drill Evaluation**

Browns Ferry, Off Year Exercise Report  
 CECC-EPIP-1, Emergency Classification Procedure, REV. 53  
 EPIP-1, Emergency Classification Procedure, REV. 47  
 NP-REP, Radiological Emergency Plan, (Generic Part), Rev. 97  
 NP-REP, Radiological Emergency Plan, Appendix A, Rev. 97  
 PER 567663, Accountability report inaccuracy during EP drill  
 PER 568729, Revise EPIP-7, App. B to Indicate OSC Minimum Staffing  
 PER 569310, CECC ERO member failed to respond to CECC activation  
 PER 569374, Simulator Issues during the BFN Off Year Exercise  
 PER 570670, During the Unannounced Staffing Drill, TEENS System Delay  
 PER 571025, During EP OYE Simulator Stack Rad Simulation did not operate as expected  
 PER 571053, During the EP Unannounced Staffing Drill issues were observed  
 PER 571382, During the 2012 EP Off Year Exercise Stack Monitor Simulation was an issue  
 PER 572271, Focus areas found in the June 13th BFN REP OYE  
 Performance Indicator Data from June 2012

### **Section 2RS1: Radiological Hazard Assessment and Exposure Control**

(Annual Inventory Of Non-Fuel SNM and Other Items (Trash) In Unit 1, 2 And 3 Spent Fuel Pools Performed 8/10-25/2011.)  
 0-TI-540, Storage of Material in the spent Fuel Storage Pool (SFSP) and Transfer Canal (U1/U2), Rev. 2  
 Browns Ferry Technical Specification 5.7 Administrative Controls-High Radiation Area  
 NPG-SPP-05.0, Radiological and Chemistry Control, Rev. 1  
 NPG-SPP-05.1, Radiological Controls, Rev. 2  
 NSTS Confirmation Form 2012 Annual Inventory Reconciliation [Browns Ferry 1 AmBe Source], Dated 1/18/2012  
 NSTS Confirmation Form 2012 Annual Inventory Reconciliation [Browns Ferry 3 Cs-137 Sources], Dated 1/18/2012  
 PER 334211 Track and trend radworker practices in drywell U2R16  
 PER 334244 Radworker practices in drywell U2R16  
 PER 439979 RP posted area incorrectly  
 PER 475108 U1R9 Drywell access room improperly posted  
 PER 512565 worker put tie wrap in mouth in RCA  
 PER 512567 building scaffold in unsurveyed area  
 RCDP-1, Conduct of Radiological Controls, Rev. 3  
 RCI-1.1, Radiation Operations Program Implementation, Revision 149

RCI-1.2, Radiation, Contamination and Airborne Surveys, Revision 16  
 RCI-17, Control of High Radiation Areas and Very High Radiation Areas, Revision 71  
 RCI-26, Radiation Protection Department Standards and Expectations, Revision 19  
 RCI-33, Diving Operations on the Refuel Floor, Rev. 9  
 RCI-34, Remote Monitoring, Revision 12  
 RCI-40.0, RP Actions for Operation's Unit 0 (Common) Procedural Hold Points, Revision 17  
 RCI-47, Diving Operations in the Radiologically Controlled Area, Rev. 1  
 RCI-9.1, Radiation Work Permits, Revision 70  
 RWP 1238-0001, Unit-3R15 Refueling Outage Drywell Outside Support  
 RWP 1238-0002, Unit-3R15 Refueling Outage Drywell Outside Support [High Rad]  
 RWP 1238-0003, Unit-3R15 Outage Drywell Miscellaneous System Support [Locked High Rad]  
 RWP 1238-0012, Unit-3R15 Outage Drywell Main Steam System Maintenance [High Rad]  
 RWP 1238-0033, Unit-3R15, Outage Drywell Feedwater System Maintenance [Locked High Rad]  
 RWP 1238-0683, Unit-3R15, Outage, Drywell Reactor Water Recirculation System [Continuous Coverage- Locked High Radiation Area]  
 RWP 1238-0693, Unit-3R15, Outage, Drywell Reactor Water Cleanup System Maintenance [Locked High Rad]  
 SR 532617 Worker got separated from escort  
 SR 532875 Inaccurate rad tag on a box  
 SR 532981 Small air activity excursion on RFF during Rx disassembly  
 SR 534873 Coordination issues obtaining RWCU sludge sample.  
 SR 534880 Deterioration of padding on Knee anchors U1 593  
 Survey M-010612-2, Unit 3 RXB 593' RWCU BW Transfer Pump Room, 01/06/2012  
 Survey M-020712-13, Unit 2 RXB 519' Under Torus, 02/07/2012  
 Survey M-021012-10, 0-CASK-079-0100/1 (MPC SN-0237), 02/10/2012  
 Survey M-102411-11, Unit 2 TB 586' 2A SJAE Room, 10/24/2011  
 Survey M-20120306-26, ISFSI Pad, 03/06/2012

### **Section 2RS6: Radioactive Gases and Liquid Effluent Treatment**

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

0-ODCM-001, Offsite Dose Calculation Manual, Rev. 21  
 NPG-SPP-05.14, Guide for Communicating Inadvertent Radiological Spills/Leaks to Outside Agencies, Rev. 0  
 NPG-SPP-05.15, Fleet Ground Water Protection Program, Rev.2  
 0-TI-15, Radioactive Gaseous Effluent Engineering Calculations and Measurements, Rev. 15  
 0-SI-4.8.A.1-1, Liquid Effluent Permit, Rev. 74  
 0-SI-4.8.B.1.a.2, Airborne Effluent Release Rate by Manual Sampling When a Gaseous Effluent Monitor is Inoperable, Rev. 31  
 0-SI-4.8.B.2-1, Airborne Effluent Analysis - Particulate and Charcoal Filter Analysis, Rev. 37  
 0-SI-4.8.B.2-5, Airborne Effluent Analysis - Monthly Tritium, Rev. 30  
 0-SI-4.8.B.2-8, Airborne Effluent Analysis - Stack Noble Gas, Rev. 12  
 0-SI-4.8.B.2-4, Airborne Effluent Analysis - Monthly Gamma Isotopic, Rev. 30  
 CI-714, Particulate and Charcoal Filter Sampling and Analysis, Rev. 30  
 CI-738, Sampling Effluent Monitors (CAMS) for Tritium and Gamma Isotopics, Rev. 31  
 0-SI-2.1-2, Airborne Effluent Radiation Monitor Source Checks, Rev. 45  
 1-SIMI-90B, Radiation Monitoring System Scaling and Setpoint Documents, Rev. 41  
 2010 Radiological Effluent Release Report



2011 Radiological Effluent Release Report  
 2002 Radiological Effluent Release Report – Abnormal Release Addendum

### Records and Data Reviewed

Browns Ferry UFSAR Chapter 9

0-SR-3.6.4.3.2(A)-SBGTS Iodine Removal Efficiency (Train-A), 8/23/2010

0-SR-3.6.4.3.2(A)-SBGTS Iodine Removal Efficiency (Train-A), 7/13/2011

Gaseous Release Permits: 120323.030.020.G, 120315.037.020.G, 120350.030.021.G,  
 20328.032.020.G, 120333.043.019.G, 120340.046.020.G, 120330.040.025.G

Surveillance Task Sheet: 0-SI-4.8.B.2-1- Airborne Effluent Analysis- Particulate & Charcoal  
 Filter Analysis, 5/1/2012

System Health Reports, Each Unit System 66 - Off-Gas, 2/1/2011-1/31/2012

System Health Report, System 77 -Radwaste, 10/1/2011-1/31/2012

System Health Report, Each Unit System 90- Radiation Monitoring, 10/1/2011-1/31/2012

Cross-Check Analysis Data: 1<sup>st</sup> Quarter 2010 through 2<sup>nd</sup> Quarter 2011

Chemistry Focused Self Assessment Report – BFN-CEM-F-11-001, Performed 6/6-17/2011

White paper documenting Ground Water Monitoring in 2010 and 2011 with results

### CAP Documents

PER 257903 2-RM-090-013D, RCW Effluent Offline Rad Monitor alarmed on Hi Rad Setpoint

PER 313929 1Q FY11 Radwaste water processing and effluents continues to be problem areas.

PER 324700 Unit 3 Station Sump tritium results from the sample obtained 1/18/2011

PER359503 Unmonitored release at the gas stack

PER 367604, Insufficient sample equipment for inop Effluent CAM monitors

PER 532416, Possible release path to Waters of the US

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

#### Procedures and Guidance Documents

CI-420, Collection of Radiological Environmental Monitoring Samples, Revision 03

EPFS-8, Servicing of Radiological Water Samplers, Revision 2

EPFS-12, Repair and Preventative Maintenance Procedure for Radiological

EPFS-03, Servicing of Meteorological Equipment at Environmental Data Stations, Rev 15

EPFS-07, Radio and Meteorological Tower Inspection, Rev 4

EPFS-06, Calibration of Environmental Data Station Data Logger and Sonic Channels, Rev 16

Environmental Monitoring Air Sampling System, Rev 01

EMSTD-01, Environmental Radiological Monitoring Program, R25

### Records and Data Reviewed

Annual Radiological Environmental Operating Report 2010 & 2011

Field Collection Sheets for June 4, 2012 Environmental Run

EPFS-6 Data sheet 1 for Cal dates 3/21/12; 10/04/11; 04/13/11; 10/14/10; 08/24/10

EPFS-6 Data sheet 6 for dates 03/21/12; 10/31/11; 10/04/11; 04/12/11; 10/14/10

EPFS-6 Data sheet 5 for dates 03/22/12; 04/12/11; 10/04/11; 10/20/10

EPFS-6 Data sheet 4 for dates 03/21/12; 10/04/11; 04/13/11; 10/14/10

EPFS-6 Data sheet 3 for dates 03/21/12; 10/04/11; 04/13/11; 10/14/10

EPFS-6 Data sheet 2 for dates 03/21/12; 10/04/11; 04/13/11; 10/14/10

Calibration Data Sheets for REMF Air Sampler Gas meter 2010 & 2011

EPFS 1 Attachment 2 Trouble Report: 10BFN538, 10BFN536, 10BFN560, 10BFN561, 10BFN557, 10BFN549, 10BFN506  
 QA Record L17111221800, TVA Quality Assurance- Nuclear Power Group- Fleet Comparative Report SSA1107, 12/20/11

#### CAP Documents

PER 259776- The BFN REMP air filter and charcoal cartridge samples invalid  
 PER 366333- Loss of power to REMP air samplers  
 PER 411549- REMP TLDs  
 PER 450297- REMP sample not analyzed and not recorded in PER  
 PER 515446- REMP sample

#### **Section 2RS8: Radioactive Material Processing and Transportation**

##### Procedures, Manuals, and Guides

Energy Solutions Procedure, FO-OP-022, "Ecodex Precoat/Powdex/Solka-Floc/Diatomaceous Earth/Zeolite Dewatering Procedure for Energy Solutions 14-215 or Smaller Liners", Rev. 23  
 Radioactive Material Shipment Manual (RMSM), Volume I, Rev. 40  
 Radioactive Material Shipment Manual (RMSM), Volume II, Rev. 42  
 Radioactive Material Shipment Manual (RMSM), Volume III, Rev. 39  
 RWI-001, "Administration of the Radioactive Material and Radwaste Packaging and Transportation Program", Rev 9  
 RWTP-102, "Use of Casks", Rev. 2  
 RWI-111, "Storage of Radioactive Waste and Materials", Rev. 18  
 RWI-112, "Container Markings", Rev. 2  
 0-OI-77G, "Duratek Procedure FO-OP-32, Set Up and Operating Procedure for the RDS-1000 Unit at TVA Browns Ferry", Rev. 2  
 0-PCP-001, "Process Control Program Manual (PCP)", Rev. 4  
 NPG-SPP-3.1, "Corrective Action Program", Rev. 2 and Rev. 3

##### Shipping Records and Radwaste Data

Certificate of Compliance No. 9168 for the Model No. 8-120B, 5/25/12  
 Certificate of Compliance No. 9204 for the Model No. 10-160B, 5/25/12  
 Gamma Isotopic Analysis Results – ID # 20120227-29 [For survey 022712-29, trash dumpster], 2/27/12  
 Gamma Isotopic Analysis Results – ID # 20100607-23 [NCDM Coupon 101], 6/7/10  
 Gamma Isotopic Analysis Results – ID # 20100607-25 [NCDM Coupon 103], 6/7/10  
 Gamma Isotopic Analysis Results – ID # 20100607-27RC [NCDM Coupon 047], 6/7/10  
 Gamma Isotopic Analysis Results – ID # 20100607-26 [NCDM Coupon 192], 6/7/10  
 Letter to File, "Browns Ferry Nuclear Plant – Personnel Qualified to Ship Radioactive Material/Waste", 3/19/12  
 List of Radioactive Material Storage Areas [Spreadsheet]  
 List of Red System 077 Issues  
 List of Outstanding Work Orders for System 077 [Radwaste]  
 Liquid Radwaste System (System 077) Health Report (2/1/12 – 5/31/12), 6/19/12  
 Liquid Radwaste System (System 077) Health Report (10/1/2011 - 1/31/2012), 5/17/12  
 Project Plan, BFN Radwaste Legacy Project, Project ID: 100533, Rev. 1, 2/1/12  
 Qualification Matrix Report for selected individuals to verify Subpart H training  
 Radioactive Material Shipping logs for the period 7/10/10 to 5/17/12

Radiological Survey M-20120517-23, Pre-Shipment Survey on HIC# CL40524-9  
 Radiological Survey M-20120620-17, Down Post, HIC transfer complete.  
 Radiological Survey M-20120620-19, Pre-Shipment on cask # 14-170-35  
 Radiological Survey M-022412-4, Other – Trash Dumpster  
 Radiological Survey M-022712-29, Job Coverage [Trash Dumpster]  
 Radiological Survey M-20120312-12, Trash Dumpster from PA  
 RWP12040086, Legacy Radwaste Project (LHRA), Rev. 0  
 Shipment 100618, Corrosion coupons in a DOT 7A container, Type A  
 Shipment 120401, Liquid tanker, Low Specific Activity (LSA-I)  
 Shipment 120455, Control Rod Drives (2 boxes), Type A  
 Shipment 110804, Empty 8-120A cask, Excepted package-empty  
 Shipment 110318, DAW (2 sealand containers), Low Specific Activity (LSA-II)  
 Shipment 101111, DAW (1 sealand container), Low Specific Activity (LSA-II)  
 Shipment 110902, Surveillance Capsule, Type A  
 Shipment 100326, Control Rod Drives (2 boxes), Type A  
 Shipment 100327, Control Rod Drives (2 boxes), Type A  
 Shipment 100328, Control Rod Drives (2 boxes), Type A  
 Shipment 120616, Dewatered Resin, Low Specific Activity (LSA-II)  
 10 CFR Part 61 Analyses, DAW 2012; CWPS 2012; RWCU 2010 and 2012 Preliminary;  
 Thermex 2010 and 2012 Preliminary,

#### CAP Documents

PER 513962, Non-RCA Trash dumpster alarms truck monitor  
 PER 520927, Non-RCA Trash dumpster alarms truck monitor  
 PER 409367, Equipment Sump over flowed contaminating RW 546'  
 PER 425240, Radwaste El. 546' posted CA due to flooding from floor drains  
 PER 433904, RW 546' C-zone due to Equipment Sump overflow  
 PER 429803, Trend of flooding RW 546' elevation  
 PER 451830, Entire 546' elevation of the Rad waste building flooded  
 PER 456136, RW elevation 546' was flooded again spreading more contamination  
 PER 533414, 10CFR61 samples do not include a RWCU Sample  
 PER 441666, Intruder brak in at Low Level Radwaste yard  
 PER 254001, ATIS Radwaste Shipping Task tracking problem  
 PER 343736, Radioactive Material stored for years without disposition determination  
 PER 431466, Received notification that torque values were incorrect upon receipt of ISP capsule  
 PER 236118, Two boxes of Used Control Rod Drives Shipped to GEH Improperly  
 PER 453834, Adverse Trend of flooding RW 546 elevation  
 Apparent Cause Evaluation Report, PER 453834, 10/28/11

#### PERs written by licensee during inspection activities:

SR 568025, O-OI-77E needs to be revised to correct references to procedures that are no longer in existence.  
 SR 570902, PER 236118 needs to be revisited. Upon review, the corrective actions were inadequate.  
 SR 571151, PER 431466 needs to be revisited. Upon review, the corrective actions were inadequate.

**Section 40A1: Performance Indicator Verification**

3-47E812-1, Flow Diagram for HPCI, Rev. 64  
 3-OI-73, High Pressure Coolant Injection System, Rev. 52  
 571936; improve DEP PI advance scheduling  
 572831; PAR development in licensed operator training PI opportunities  
 BFN-50-7073, Design Criteria Document for the HPCI system, Rev. 22  
 CECC EPIP-3, Operations Duty Specialist Procedure for Alert, Rev. 41  
 Consolidated Date Entry Sheets for Units 1, 2 and 3 for the Safety System Functional Failures (SSFF) PI  
 Documentation of ANS tests for 4<sup>th</sup> quarter 2011 – 1<sup>st</sup> quarter 2012  
 Documentation of DEP opportunities for 4<sup>th</sup> quarter 2011 – 1<sup>st</sup> quarter 2012  
 EPDP-11, Emergency Preparedness Performance Indicators, Rev. 3  
 EPIP-2, Notification of Unusual Event, Rev. 31  
 EPIP-3, Alert, Rev. 34  
 EPIP-4, Site Area Emergency, Rev. 33  
 LER 259/2011-006-00, Loss of Safety Function (HPCI) Due to Primary Containment Isolation.  
 Licensed Operator Training Scenarios 04, 17, 06, 18, 30, and 05 from 4<sup>th</sup> quarter 2011  
 Maintenance Rule Function Failure Report from April 1, 2011 to March 31, 2012  
 NPG-SPP-02.2, Performance Indicator Program, Rev. 3  
 NPG-SPP-03.4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting  
 10 CFR 50.65, Rev. 01  
 PER 439338 RP tech posted an area incorrectly  
 PER 533834 Contractor receives uptake during hydrolaze activities  
 PER 534086 Laborer contaminated while working in an area near where CRD header was being hydrolased.  
 RCI-39, Radiation Protection Cornerstones, Rev. 9  
 SR 532755, Dosimetry alarms due to being run through x-ray machine

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

0-47E820-1, Flow Diagram Control Rod Drive Hydraulic System, Rev. 32  
 0-OI-2B, Condensate Storage and Transfer System, Rev. 76  
 1-POI-200.5, Operations with Potential for Draining the Reactor Vessel/Cavity, Rev. 04  
 2-POI-200.5, Operations with Potential for Draining the Reactor Vessel/Cavity, Rev. 14  
 3-47E804-1, Flow Diagram Condensate, Rev. 45  
 3-47E818-1, Flow Diagram Condensate Storage and Supply System, Rev. 27  
 3-47E820-2, Flow Diagram Control Rod Drive Hydraulic System, Rev. 19  
 3-47E855-1, Flow Diagram Fuel Pool Cooling System, Rev. 24  
 3-GOI-100-3A, Refueling Operations (RX Vessel Disassembly and Floodup), Rev. 53  
 3-OI-78, Fuel Pool Cooling and Cleanup System, Rev. 60  
 3-OI-85, Control Rod Drive System, Rev. 75  
 3-POI-200.5, Operations with Potential for Draining the Reactor Vessel/Cavity, Rev. 11  
 3-POI-78, Reactor Water Letdown During Refueling Outages Using Submersible Pump/Filter, Rev. 06  
 Engineering trend report data from January 1, 2011 to December 1, 2011  
 Integrated Trend Report, Q1FY12, October 1 - December 31, 2012  
 Integrated Trend Report, Q2FY12, January 1 - March 31, 2011  
 PE-P4461A, Recirculation System Suction Plug Installation/Removal Procedure for Browns Ferry Nuclear Station under Project PE 00-829/1299 & 09-1614, Rev. 4

PE-P4462A, Jet Pump Plug Procedure for Browns Ferry Nuclear Station under Project PE 00-829, Rev. 0  
 PE-P4850, Operating and Maintenance Instructions for the Main Steam Line Plugs and Installation/Removal Tools for Browns Ferry Station – Project PE 998, Rev. 2  
 PER 471366, CAP gaps to excellence plan  
 PER 491985, Human Performance gaps to excellence plan  
 PER 512589, Cross-functional issue on outage-related worker practices  
 PER 539854, Engineering has documented several inappropriate action closures  
 PER 563559, QA identified trend on BFN Fire Operations Training  
 RPT-CAP011, Gognos PER Word Search report from Jan 1, 2012 to June 29, 2012

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

0-TI-230V, Vibration Program, Rev. 10  
 0-TI-346, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting – 10CFR50.65, Rev. 38  
 1-SR-3.3.8.2.1(A), RPS Circuit Protector Calibration/Functional Test For 1A1 and 1A2, Rev. 6  
 3-AOI-100-1, Reactor Scram, Rev. 58  
 Browns Ferry – Emergency Diesel Generator System Vulnerability to Functional Failure Assessment, dated May 7, 2009  
 Design Criteria BFN-50-7082, Standby Diesel Generator, Rev. 16  
 Drawing 1-45E641-3, Instr & Controls Power Sys Schematic Diagram SH-3, Rev. 5  
 Drawing, 0104D3695-1, Isolated Phase Bus Return Air Duct, dated 1/20/12  
 Electro-Motive Vibration Guidelines Industrial Power Units, letter dated October 29, 1982  
 EMD Power Systems Owners Group Meeting, Diesel Generator Vibration Acceptable Criteria, dated June 26-28, 1991  
 FSAR Section 11, Power Conversion Systems, BFN-24  
 FSAR Section 8.4, Normal Auxiliary Power System, BFN-24  
 FSAR Section 8.5, Standby AC Power Supply and Distribution, BFN-24  
 Main Control Room Logs  
 NPG-SPP-06.2, Preventive Maintenance, Rev.0  
 NPG-SPP-06.2, Preventive Maintenance, Rev.04  
 NPG-SPP-09.18, Integrated Equipment Reliability Program, Rev. 02  
 NPG-SPP-09.18.1, System Vulnerability Review Process (MCIP Reviews), Rev. 4  
 NPG-SPP-09.18.2, Equipment Reliability Classification, Rev. 0  
 NPG-SPP-09.18.2, Equipment Reliability Classification, Rev. 01  
 NPG-SPP-2.3, Operating Experience Program, Rev. 3  
 OE25284 – Emergency Diesel Generator Governor Drive Oil Supply Line Sheared, North Anna 1 and 2  
 Operations Standing Order 174, Rev. 1, To establish Operations Department expectation when as-found data is outside of acceptable regulatory or programmatic requirements  
 PER 131365, Out of Tolerance Time Delay Relay  
 PER 151812, RPS Circuit Protector Failed Acceptance Criteria  
 PER 178286, Acceptance Criteria Failed  
 PER 248513, Failed Acceptance Criteria Step 7.2 (28)  
 PER 362395, Oil Leak Resulting in Emergency Shutdown of C DG  
 PER 391479, Classification of System 55 Power Supplies  
 PER 413140, 1A1 RPS Circuit Protector Undervoltage Trips  
 PER 438808, Unknown Object Found in U3 Phase Bus Duct

PER 440359, U3 Scrammed on September 28, 2011 at 0414  
PER 442914, Evaluation of Surveillance Data from Past Performances  
PER 486780, 3C1 Relay Results Below Acceptance Criteria  
PER 496592, Fire in Annunciator Panel 3-XA-55-5A  
SPP-3.9, Operating Experience Program, Revs. 4 and 5  
SPP-6.2, Preventive Maintenance, Rev.09  
SPP-9.18.2, Equipment Reliability Classification, Rev. 00  
SR 496007, U-3 Annunciator Panel 9-5A Fire and AOI entry  
Technical Specification and Bases 3.3.8.2, Reactor Protection System (RPS) Electric Power  
Monitoring, Amendment 263 and Rev. 43, respectively  
Technical Specifications and Bases 3.8, Electrical Power System, Amendment 266  
Technical Specifications and Bases Section 3.8, Electrical Power Systems, Amendment 280  
and Rev. 52 respectively  
TVA-NQA-PLN89-A, Nuclear Quality Assurance Plan (NQAP), Rev. 23, 24, 25 and 26

## LIST OF ACRONYMS

ADAMS	-	Agencywide Document Access and Management System
ADS	-	Automatic Depressurization System
ALARA		As Low As Reasonably Achievable
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
CRD	-	control rod drive
CS	-	core spray
DAC		Derived Air Concentration
DCN	-	design change notice
ED		Electronic Dosimeter
EDG	-	emergency diesel generator
EECW	-	emergency equipment cooling water
FE	-	functional evaluation
FPR	-	Fire Protection Report
FSAR	-	Final Safety Analysis Report
HP		Health Physics
HRA		High Radiation Area
IMC	-	Inspection Manual Chapter
JOG		Joint Owners Group
LER	-	licensee event report
LHRA		Locked High Radiation Area
NCV	-	non-cited violation
NRC	-	U.S. Nuclear Regulatory Commission
NSTS		National Source Tracking System
OA		Other Activity
ODCM	-	Off-Site Dose Calculation Manual
PER	-	problem evaluation report
PCIV	-	primary containment isolation valve
PI	-	performance indicator
RCE	-	Root Cause Evaluation
RCW	-	Raw Cooling Water
RG	-	Regulatory Guide
RHR	-	residual heat removal
RHRSW	-	residual heat removal service water
RS		Radiation Safety
RTP	-	rated thermal power
RPS	-	reactor protection system
RWP	-	radiation work permit
SDP	-	significance determination process
SBGT	-	standby gas treatment
SLC	-	standby liquid control
SNM	-	special nuclear material

SRV	-	safety relief valve
SSC	-	structure, system, or component
TI	-	Temporary Instruction
TIP	-	transverse in-core probe
TLD		Thermoluminescent Dosimeter
TRM	-	Technical Requirements Manual
TS	-	Technical Specification(s)
U1		Unit 1
U2		Unit 2
U3		Unit 3
UFSAR	-	Updated Final Safety Analysis Report
URI	-	unresolved item
VHRA		Very High Radiation Area
WO	-	work order