



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

May 10, 2013

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

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000390/2013002

Dear Mr. Shea:

On March 31, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Nuclear Plant, Unit 1. The enclosed inspection report documents the inspection results which were discussed on April 9, 2013, with Mr. T. Cleary and other members of the Watts Bar staff.

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

One self-revealing finding of very low safety significance (Green) was identified. Additionally, licensee identified violations which were determined to be of very low safety significance are identified in this report. All these findings were determined to involve violations of NRC requirements. The NRC is treating these violations as non-cited violations (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

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

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II; and the NRC Resident Inspector at the Watts Bar Nuclear Plant.

J. Shea

2

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 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/**

Scott M. Shaeffer, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Docket No.: 50-390  
License No.: NPF-90

Enclosure: NRC Inspection Report 05000390/2013002  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

J. Shea

2

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 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/

Scott M. Shaeffer, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Docket No.: 50-390  
License No.: NPF-90

Enclosure: NRC Inspection Report 05000390/2013002  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

X PUBLICLY AVAILABLE

☐ NON-PUBLICLY AVAILABLE

☐ SENSITIVE

X NON-SENSITIVE

ADAMS: ☐ Yes

ACCESSION NUMBER: \_\_\_\_\_

X SUNSI REVIEW COMPLETE ☐ FORM 665 ATTACHED

OFFICE	RII:DRS	RII:DRS	RII:DRS	RII:DRS			
SIGNATURE	JDH /RA/	Via email	Via telecom	SMS /RA/			
NAME	JHamman	KMiller	RMonk	SShaeffer			
DATE	05/10/2013	05/09/2013	05/02/2013	05/09/2013			
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY  
2013002.DOCX

DOCUMENT NAME: G:\DRPI\RPB6\WATTS BAR\REPORTS\2013\002\WATTS BAR

J. Shea

3

cc w/encl:  
T.P. Cleary  
Site Vice President  
Watts Bar Nuclear Plant  
Tennessee Valley Authority  
Electronic Mail Distribution

Ann Harris  
341 Swing Loop  
Rockwood, TN 37854

David H. Gronek  
Plant Manager  
Watts Bar Nuclear Plant  
Tennessee Valley Authority  
Electronic Mail Distribution

Donna K. Guinn  
Manager, Site Licensing  
Watts Bar Nuclear Plant  
Tennessee Valley Authority  
Electronic Mail Distribution

E. D. Schrull  
Manager, Corporate Licensing  
Tennessee Valley Authority  
Electronic Mail Distribution

Edward J. Vigluicci  
Associate General Counsel, Nuclear  
Tennessee Valley Authority  
Electronic Mail Distribution

Gordon P. Arent  
Senior Manager, Licensing WBN Unit 2  
Watts Bar Nuclear Plant  
Tennessee Valley Authority  
Electronic Mail Distribution

County Mayor  
P.O. Box 156  
Decatur, TN 37322

County Executive  
375 Church Street  
Suite 215  
Dayton, TN 37321

Tennessee Department of Environment &  
Conservation  
Division of Radiological Health  
401 Church Street  
Nashville, TN 37243

J. Shea

4

Letter to Joseph Shea from Scott Shaeffer dated May 10, 2013

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000390/2013002

Distribution w/encl:

C. Evans, RII

L. Douglas, RII

OE Mail

RIDSNRRDIRS

PUBLIC

RidsNrrPMWattsBar1 Resource

RidsNrrPMWattsBar2 Resource

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 50-390

License No.: NPF-90

Report No.: 05000390/2013002

Licensee: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 1

Location: Spring City, TN 37381

Dates: January 1 through March 31, 2013

Inspectors: R. Monk, Senior Resident Inspector  
K. Miller, Resident Inspector

Approved by: Scott M. Shaeffer, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000390/2013-002; 01/01/2013 – 03/31/2013; Watts Bar, Unit 1; Adverse Weather Protection, and Identification and Resolution of Problems.

The report covered a three-month period of inspection by resident inspectors and announced inspections by regional inspectors. One Green finding was identified which involved a non-cited violation (NCV) of NRC requirements. The significance of most findings is identified by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP); the cross-cutting aspect was 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.

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

#### Cornerstone: Mitigating Systems

Green: A self-revealing (Green) NCV of 10 CFR Part 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, was identified for failure to properly follow plant procedures to perform a surveillance test for calibration of pressurizer pressure channel II. Specifically, the instrument maintenance surveillance test procedure 1-SI-68-6, 18 Month Channel Calibration Pressurizer Pressure Channel II, Loop 1-LPP-68-334 (P-456), Revision 10, was not adequately followed by maintenance personnel during the calibration test. The licensee's failure to correctly implement procedure 1-SI-68-6, 18 Month Channel Calibration Pressurizer Pressure Channel II, Loop 1-LPP-68-334 (P-456), to configure the test equipment in the correct configuration was a performance deficiency. The finding was more than minor because it was associated with the Initiating Events Cornerstone attribute of Human Performance and adversely affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions during shutdown or power operations. Specifically, the failure to adequately implement SI 1-SI-68-6, 18 Month Channel Calibration Pressurizer Pressure Channel II, Loop 1-LPP-68-334 (P-456), resulted in a reactor trip. The inspectors screened this finding in accordance with IMC 0609, Significance Determination Process, Attachment 4, Phase 1 – Initial Screening and Characterization of Findings, and determined the finding was of very low safety significance (Green) since it did not result in the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. The finding directly involved the cross-cutting area of Human Performance, work practices component under the aspect related to proceeding in the face of uncertainty. (H.4(a))

Enclosure

B. Licensee-Identified Violations

- Unit 2 Materials License, SNM-2014, allows storage of 193 fuel assemblies for Unit 2.

During receipt of Unit 2 fuel, Westinghouse identified a manufacturing flaw with fuel assembly M36. Conversations with fuel vendor determined that they would manufacture a replacement fuel assembly and that at a later time Watts Bar Nuclear Plant (WBN) would be able to return the unusable fuel assembly. The licensee received the final shipment of fuel which included the replacement assembly prior to returning the unusable assembly. From September 28, 2011, until July 18, 2012, the licensee was in possession of 194 fuel assemblies, one more than allowed by its license.

- Technical Specification (TS) 3.4.12, Cold Overpressure Mitigation System (COMS), requires that COMS must be operable with a maximum of one centrifugal charging pump (CCP) and no safety injection (SI) pumps capable of injecting into the reactor coolant system (RCS) when in Modes 4, 5, and Mode 6 (when the reactor vessel head is on).

On September 21, 2009, WBN entered Mode 4 at 0420 Eastern Daylight Time (EDT) as part of the Cycle 9 refueling outage (RFO). When Mode 4 was entered, two SI pumps and more than one CCP were capable of injecting into the RCS. As a result, limiting condition of operation (LCO) 3.4.12 was not met and the applicable required actions were not taken within their associated completion times. Therefore, WBN was in a condition prohibited by the TS.

A review of previous operating data revealed this condition also existed on April 4, 2011, when WBN entered Mode 4 at 0454 EDT as a part of the Cycle 10 RFO.

- 10 CFR 50 Appendix B, Criterion III, Design Control, states in part that design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design. Contrary to this requirement, the licensee did not assure configuration control was maintained on the inputs from two of the nuclear instrumentation channels to the rod control system.

On January 15, 2013, during performance of procedure IMI-92.017, Calibration of NIS Power Range High Flux Auctioneer, in accordance with work order (WO) 112727523, instrument technicians found that inputs from nuclear instrumentation channels N41 and N42 were not present as expected. Investigation by the licensee determined that the associated wiring was lifted during the recent refueling outage as part of Design Change Notice 52853, Stage 8, in a WO, but that the WO contained no steps to re-install the wiring. No post maintenance was performed.



## **REPORT DETAILS**

### **Summary of Plant Status**

Unit 1 operated at or near 100 percent rated thermal power during this reporting period.

#### **1. REACTOR SAFETY**

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

#### **1R01 Adverse Weather Protection**

##### **Readiness for Impending Adverse Weather Conditions**

##### **a. Inspection Scope**

The inspectors reviewed the licensee's preparation for and response to actual high winds and severe weather on January 30, 2013. Additionally, the inspectors walked down the safety-related portions of the switchyard. This activity constituted one inspection sample.

##### **b. Findings**

No findings were identified.

#### **1R04 Equipment Alignment**

##### **Partial System Walkdowns**

##### **a. Inspection Scope**

The inspectors conducted three equipment alignment partial walkdowns, listed below, to evaluate the operability of selected redundant trains or backup systems with the other train or system inoperable or out of service. This also includes that redundant trains are returned to service properly. The inspectors reviewed the functional system descriptions, Updated Final Safety Analysis Report (UFSAR), system operating procedures, and TS 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. Documents reviewed are listed in the attachment.

- 1A containment spray (CS) pump while 1B CS pump out of service (OOS) for maintenance
- 1A motor-driven auxiliary feedwater (MDAFW) pump while 1B MDAFW pump OOS for maintenance
- 1A residual heat removal (RHR) pump while 1B RHR pump OOS for routine maintenance

Enclosure

b. Findings

No findings were identified.

1R05 Fire Protection

Fire Protection Tours

a. Inspection Scope

The inspectors conducted tours of the eight areas important to reactor safety, listed below, to verify the licensee's implementation of fire protection requirements as described in the Fire Protection Program, Nuclear Power Group Standard Programs and Processes (NPG-SPP)-18.4.6, Control of Fire Protection Impairments, NPG-SPP-18.4.7, Control of Transient Combustibles, NPG-SPP-18.4.8, Control of Ignition Sources (Hot Work). The inspectors evaluated, as appropriate, conditions related to: (1) licensee control of transient combustibles and ignition sources; (2) the material condition, operational status, and operational lineup of fire protection systems, equipment, and features; and (3) the fire barriers used to prevent fire damage or fire propagation. This activity constituted eight inspection samples.

- Control room emergency ventilation system
- Vital DC Boardroom I, II, III, IV (counts as 4)
- A 6.9 kv shutdown board room (SDBR)
- B 6.9 kv SDBR
- MDAFW pumps/component cooling system (CCS) pumps

b. Findings

No findings were identified.

1R06 Flood Protection Measures

Cables in Underground Manholes

a. Inspection Scope

Inspectors directly observed two underground bunker/manholes subject to flooding that contained cables whose failure could disable risk-significant equipment. Specific attributes evaluated were: (1) the cables were not submerged in water; (2) the cables and/or splices appeared intact and the material condition of cable support structures was acceptable; and (3) dewatering devices (sump pump) operation and level alarm circuits were set appropriately to ensure that the cables would not be submerged or were in an environment for which they were qualified. Below are the bunker/manholes that were inspected.

- Manhole 20
- Manhole 19

Enclosure

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification

a. Inspection Scope

Routine Operator Regualification Review: On February 13, 2013, the inspectors observed the simulator evaluations for Operations Crew 4 per 3-OT-SRT-E1-2, Rev. 0, Loss of Coolant Accident/Transfer to CNTMT Sump. The plant conditions led to an Alert level classification. Performance indicator credit was taken.

The inspectors specifically evaluated the following attributes related to the operating crews' 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 and emergency operating instructions
- Timely and appropriate Emergency Action Level declarations per emergency plan implementing procedures
- Control board operation and manipulation, including high-risk operator actions
- Command and Control provided by the unit supervisor and shift manager

The inspectors also attended the critique to assess the effectiveness of the licensee evaluators, and to verify that licensee-identified issues were comparable to issues identified by the inspector.

Observation of Operator Performance: 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 procedures OPDP-1, Conduct of Operations; NPG-SPP-10.0, Plant Operations; and GO-4, Normal Power Operation.

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

Enclosure

- Supervision of activities, including risk and reactivity management
- Pre-job briefs

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the two performance-based problems listed below. A review was performed to assess the effectiveness of maintenance efforts that apply to scoped structures, systems, or components (SSCs) and to verify that the licensee was following the requirements of TI-119, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting 10 CFR 50.65, and NPG-SPP-03.4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting 10 CFR 50.65. Reviews focused, as appropriate, on: (1) appropriate work practices; (2) identification and resolution of common cause failures; (3) scoping in accordance with 10 CFR 50.65; (4) characterization of reliability issues; (5) charging unavailability time; (6) trending key parameters; (7) 10 CFR 50.65 (a)(1) or (a)(2) classification and reclassification; and (8) the appropriateness of performance criteria for SSCs classified as (a)(2) or goals and corrective actions for SSCs classified as (a)(1).

- Review of a(1) performance improvement plan for SDBR train A heating, ventilation, and air conditioning system
- Review of basis to reclassify the condensate storage tank makeup function from a(2) to a(1)

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors evaluated, as appropriate, for the four work activities listed below: (1) the effectiveness of the risk assessments performed before maintenance activities were conducted; (2) the management of risk; (3) that, upon identification of an unforeseen situation, necessary steps were taken to plan and control the resulting emergent work activities; and (4) that maintenance risk assessments and emergent work problems were adequately identified and resolved. The inspectors verified that the licensee was complying with the requirements of 10 CFR 50.65 (a)(4); NPG-SPP-07.0, Work Control and Outage Management; NPG-SPP-07.1, On Line Work Management; and TI-124, Equipment to Plant Risk Matrix. This inspection satisfied five inspection samples for Maintenance Risk Assessment and Emergent Work Control.

Enclosure

- Emergent risk assessment of work week 703 activities with actual high winds and severe weather
- Risk assessment for work week 707 with C-S CCS pump, G-B essential raw cooling water (ERCW) pump, and 1B-B 480v board room chillers OOS
- Risk assessment for work week 708 with H-B ERCW pump, 2B-B traveling water screen, and 1B residual heat removal (RHR) pump OOS for maintenance
- Risk assessment for work week 711 with D-A ERCW pump and 1B-B emergency diesel generator OOS for maintenance.

b. Findings

No findings were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed five operability evaluations affecting risk-significant mitigating systems, listed below, to assess, as appropriate: (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether the compensatory measures, if involved, were in place, would work as intended, and were appropriately controlled; (4) where continued operability was considered unjustified, the impact on TS Limiting Conditions for Operation (LCOs) and the risk significance in accordance with the significant determination process (SDP). The inspectors verified that the operability evaluations were performed in accordance with NPG-SPP-03.1, Corrective Action Program.

- Prompt determination of operability (PDO) for problem evaluation report (PER) 671039, N42 noise
- PDO for PER 666516, Design adequacy of watertight hatches of EI 708 feet of turbine building, which provides access to the control building
- Functional evaluation (FE) for PER 659525, Design adequacy of conduit internal flood seals in the IPS ERCW strainer rooms
- Past Operability Evaluation (POE) for PER 667589, Inadequate flood barrier walls used around turbine building EI 708' hatches to control building when hatches were opened
- POE for PER 682861, 2nd inadvertent lifting of #2 S/G PORV

b. Findings

No findings were identified.

## 1R18 Plant Modifications

### a. Inspection Scope

The inspectors reviewed two temporary plant modification against the requirements of NPG-SPP-09.3, Plant Modifications and Engineering Change Control, and NPG-SPP-09.4, 10 CFR 50.59 Evaluation of Changes, Tests, and Experiments, and verified that the modification did not affect system operability or availability as described by the TS or the UFSAR. In addition, the inspectors determined whether: (1) the installation of the permanent modification was in accordance with the work package; (2) adequate configuration control was in place; (3) procedures and drawings were updated; and (4) post-installation tests verified operability of the affected systems.

- Temporary alteration control form (TACF) 1-12-0003-030, Revision 0, Temporary self-powered motor runtime monitor for turbine-driven auxiliary feedwater (TDAFW) pump dc-powered exhaust fan
- TACF 1-13-0001-067, Revision 0, Lower compartment cooler temperature control valves and associated pressure regulators

### b. Findings

## 1R19 Post-Maintenance Testing

### a. Inspection Scope

The inspectors reviewed four post-maintenance test procedures and/or test activities, (listed below) as appropriate, for selected risk-significant mitigating systems to assess whether: (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation had current calibrations, range, and accuracy consistent with the application; (5) tests were performed as written with applicable prerequisites satisfied; (6) jumpers installed or leads lifted were properly controlled; (7) test equipment was removed following testing; and (8) equipment was returned to the status required to perform its safety function. The inspectors verified that these activities were performed in accordance with NPG-SPP-06.9, Testing Programs; NPG-SPP-06.3, Pre-/Post-Maintenance Testing; and NPG-SPP-07.1, On Line Work Management.

- WO 113892828, RHR pump 1B-B room cooler motor WBN-1-MTR-030-0176-B, clean, inspect motor, check T-drain and megger test IAW PMUG 1548V
- WO 113354103, Replacement and testing of alarm relays per PM 600107458 for WBN-1-GEN-082-0001A-A, Diesel Generator 1A-A
- WO 113001032, Replacement and testing of pneumatic time delay relays per PM 610082000 for WBN-1-02-082-0001A-A, Diesel Generator 1A-A
- WO 114125420, 0-SI-82-17-A, 184 day fast start and load test DG 1A-A

b. Findings

No findings were identified.

1R22 Surveillance Testinga. Inspection Scope

The inspectors witnessed six surveillance tests and/or reviewed test data of selected risk-significant SSCs, listed below, to assess, as appropriate, whether the SSCs met the requirements of the TS; the UFSAR; NPG-SPP-06.9, Testing Programs; NPG-SPP-06.9.2, Surveillance Test Program; and NPG-SPP-09.1, ASME Section XI. The inspectors also determined whether the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions.

In-Service Test:

- WO 113238743, 0-SI-82.15, 24-hour load run, DG 2A-A
- WO 114100526, 1-SI-67-902B, Essential raw cooling water pump F-B and pump H-B performance test
- WO 114126909, 1-SI-74-901B, Residual heat removal pump 1B-B quarterly performance test
- WO 114126919, 1-SI-74-902B, Quarterly valve full stroke exercising RHR system (train B)

Containment Isolation Valve

- WO 114614429A, 1-SI-63-701, Containment isolation valve local leak rate test, 1-MVOP-063-0084-B

Other Surveillances

- WO 113967024, 1-SI-68-28, Primary radiochemistry requirements

b. Findings

No findings were identified.

## Cornerstone: Emergency Preparedness

1EP6 Drill Evaluationa. Inspection Scope

Inspectors evaluated the conduct of routine licensee emergency drill on March 14, 2013, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the Technical Support Center to verify that event classification

Enclosure

and notifications were done in accordance with procedure EPIP-1, Emergency Plan Classification Matrix, Revision 37. The inspectors also attended the licensee critique of the drill to compare any inspector observed weakness with those identified by the licensee in order to verify whether the licensee was properly identifying deficiencies. The inspectors completed one sample.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

The inspectors sampled licensee submittals for the four PIs listed below. To verify the accuracy of the PI data reported during the periods listed, PI definitions and guidance contained in NEI 99-02, Regulatory Assessment Indicator Guideline, Revision 6, were used to verify the basis in reporting for each data element.

- Unplanned scrams per 7000 critical hours
- Unplanned scrams with complications
- Unplanned power changes per 7000 critical hours (transients)
- Reactor coolant system (RCS) activity

b. Findings

No findings were identified.

4OA2 Identification & Resolution of Problems

.1 Review of Items Entered into the Corrective Action Program (CAP)

a. Inspection Scope

As required by Inspection Procedure 71152, Identification and Resolution of Problems, and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished by reviewing daily PER summary reports and attending daily PER review meetings

.2 Annual Sample: Review of Problem Identification and Resolution for PERs 668117 and 668103

a. Inspection Scope

The inspectors reviewed the plan and implementation of corrective actions configuration control during design changes, which were documented in PERs 668117 and 668103.

Enclosure



b. Findings and Observations

Inspectors reviewed PERs 668117 and 668103 for problem identification and resolution of the issues related to configuration control of nuclear instrumentation channels N41 and N42 (see Section 4OA7). Each of the PERs was closed to WO 114312516. This WO was never worked. PER 668103 had no corrective actions and PER 668117 had a corrective action plan which indicated that the contract modifications planners were not rigorous, had a heavy workload, and were coached on the use of human performance tools. This corrective action plan was written and approved by the PER coordinator, a contractor. No evidence was found that the licensee had any involvement in this plan. Inspectors brought this to the attention of the licensee that the WO specified as a corrective action was not worked and that there appeared to be no licensee involvement in the corrective actions. The licensee responded by writing PER 695891, which is intended to cover both the technical issue of configuration control and the apparent lapse in the corrective action program.

4OA3 Event Follow-up

.1 (Closed) Licensee Event Report (LER) 05000390/2012-002-00: Unanalyzed Condition Affecting Probable Maximum Flood (PMF) Level

On June 29, 2012, TVA approved an updated calculation titled "PMF Determination for Tennessee Valley Watershed" that increased the WBN probable maximum flood (PMF) level to Elevation 739.2 ft. mean sea level (MSL). The current Updated Final Safety Analysis Report (UFSAR) PMF elevation is 734.9 ft. MSL. All flood-sensitive, safety-related systems, structures, and components have been reviewed. The only equipment affected by the revised PMF level is ERCW and high pressure fire protection equipment required for flood mode operation located on Elevation 722 ft. of the intake pumping station (IPS) and the thermal barrier booster pump (TBBP) motors. The increase in calculated PMF elevation resulted from new rim leakage paths (i.e., leakage that occurs when water contained in a reservoir finds an alternate path around the dam) identified during aerial surveys for the proposed TVA Clinch River Site.

No actual flooding has occurred. However, because of the unanalyzed condition, the potential existed for WBN to exceed its design basis PMF and adversely affect plant safety. Contingency measures have been put into place to protect the TBBPs and equipment located on Elevation 722 ft. of the IPS. Permanent plant modifications will be made to protect affected equipment during a PMF event. This LER is closed. See Inspection Report 05000390/2012009 for associated Regulatory issues.

.2 (Closed) LER 05000390/2012-002-01: Unanalyzed Condition Affecting Probable Maximum Flood (PMF) Level

On June 29, 2012, TVA approved an updated calculation titled "PMF Determination for Tennessee Valley Watershed" that increased the WBN PMF level to Elevation 739.2 ft. MSL. The current UFSAR PMF elevation is 734.9 ft. MSL. WBN reviewed flood-sensitive, safety-related systems, structures, and components. ERCW and HPFP equipment required for flood mode operation located on Elevation 722 ft. of the IPS and

Enclosure

the TBBP motors are affected by the revised PMF level. The increase in calculated PMF elevation resulted from new rim leakage paths (i.e., leakage that occurs when water contained in a reservoir finds an alternate path around the dam) identified during aerial surveys for the proposed TVA Clinch River Site. No actual flooding has occurred. However, because of the unanalyzed condition, the potential existed for WBN to exceed its design basis PMF and adversely affect plant safety.

#### Other Systems or Secondary Functions Affected

On November 8, 2012, WBN identified that several components that were previously identified as having low available physical margin during a design basis PMF event were actually partially submerged during a PMF event. This condition was identified in September 2012 by a contractor performing Fukushima Near-Term Task Force walkdowns, but was not recognized by WBN until November 2012. The components identified include the chilled water circulating pumps for the main control room (MCR) and SDBR chillers and ancillary equipment required for MCR and SDBR air conditioning system functionality. A portion of the MCR and SDBR chiller pump motors would be submerged during the design basis PMF event. The MCR chiller is required as a part of the Control Room Emergency Air Temperature Control System (CREATCS), which is a TS-required system. This LER is closed. See Inspection Report 05000390/2012009 for associated Regulatory issues.

#### .3 (Closed) LER 05000/2012-003-00: Entry into Mode 4 Without Meeting LCO 3.4.12, Cold Overpressure Mitigation System (COMS)

TS 3.4.12, Cold Overpressure Mitigation System (COMS), controls RCS pressure at low temperatures so the integrity of the reactor coolant pressure boundary is not compromised by violating the pressure and temperature limits. Limiting Condition for Operation (LCO) for TS 3.4.12 requires that COMS must be operable with a maximum of one centrifugal charging pump (CCP) and no safety injection (SI) pumps capable of injecting into the RCS when in Modes 4, 5, and Mode 6 (when the reactor vessel head is on).

On September 21, 2009, WBN entered Mode 4 at 0420 Eastern Daylight Time (EDT) as part of the Cycle 9 refueling outage (RFO). When Mode 4 was entered, two SI pumps and more than one CCP were capable of injecting into the RCS. As a result, LCO 3.4.12 was not met and the applicable required actions were not taken within their associated completion times. Therefore, WBN was in a condition prohibited by the TS, which is reportable under 10 CFR 50.73(a)(2)(i)(B).

A review of previous operating data revealed this condition also existed on April 4, 2011, when WBN entered Mode 4 at 0454 EDT as a part of the Cycle 10 RFO. This LER is closed. See Section 4OA7 of this report.

.4 (Closed) LER 05000/2012-004-00: Automatic Reactor Trip Due to Low-Low Steam Generator Level

a. Inspection Scope

On August 28, 2012, personnel were performing surveillance instruction 1-SI-68-6, 18 Month Channel Calibration Pressurizer Pressure Channel II, Loop 1-LPP-68-334. The incorrect configuration of test equipment used during performance of 1-SI-68-6 induced a fault into the channel. As a result of the incorrect configuration, the channel fuse and upstream circuit breaker cleared. Loss of the upstream circuit removed power from the #2 main feedwater regulating valve [EHS code SJ] circuitry, causing the valve to fail closed which resulted in the loss of feed to steam generator (SG) #2. Low-low level in SG #2 resulted in an automatic reactor trip and actuation of the auxiliary feedwater system. The unit was stabilized in Mode 3, and an event investigation was initiated. All safety systems functioned as designed. This LER is closed.

b. Findings

Introduction: A self-revealing (Green) NCV of 10 CFR Part 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, was identified for failure to properly follow plant procedures to perform a surveillance test for calibration of pressurizer pressure channel II. Specifically, the instrument maintenance surveillance test procedure, 1-SI-68-6, 18 Month Channel Calibration Pressurizer Pressure Channel II, Loop 1-LPP-68-334 (P-456), Revision 10, was not adequately followed by maintenance personnel during the calibration test.

Description: On August 28, 2012, instrument maintenance personnel were performing surveillance instruction 1-SI-68-6, 18 Month Channel Calibration Pressurizer Pressure Channel II, Loop 1-LPP-68-334 (P-456), Revision 10. During set-up of the test equipment, the maintenance personnel stopped work activities because they were unsure of the correct configuration of the jumper cables on the test equipment. The maintenance foreman was called to the work location to provide clarification on the correct test equipment configuration. The foreman instructed the maintenance personnel to connect the test equipment in an inappropriate configuration. Had the foreman either understood the test equipment configuration step or stopped and sought additional guidance, the test equipment would have been connected in the correct configuration. Due to proceeding in the face of uncertainty, by the foreman, the jumper cable configuration used by the maintenance personnel was incorrect, causing the channel fuse and upstream circuit breaker to clear. Trip of the upstream circuit breaker removed power from the instrument rack which included #2 main feedwater regulating valve circuitry, causing the valve to fail closed. This resulted in the loss of feedwater to SG #2 and subsequently, a low-low level for SG #2. This low-low level for steam generator # 2 resulted in an automatic reactor trip and actuation of the auxiliary feedwater system. The unit was stabilized in Mode 3 and all safety systems functioned as designed.

Enclosure

Analysis: The licensee's failure to correctly implement procedure 1-SI-68-6, 18 Month Channel Calibration Pressurizer Pressure Channel II, Loop 1-LPP-68-334 (P-456), to configure the test equipment in the correct configuration was a performance deficiency. The finding was more than minor because it was associated with the Initiating Events Cornerstone attribute of Human Performance and adversely affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions during shutdown or power operations. Specifically, the failure to adequately implement SI 1-SI-68-6, 18 Month Channel Calibration Pressurizer Pressure Channel II, Loop 1-LPP-68-334 (P-456), resulted in a reactor trip. The inspectors screened this finding in accordance with IMC 0609, Significance Determination Process, Attachment 4, Phase 1 – Initial Screening and Characterization of Findings, and determined the finding was of very low safety significance (Green) since it did not result in the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. The finding directly involved the cross-cutting area of Human Performance, work practices component under the aspect related to proceeding in the face of uncertainty. (H.4(a))

Enforcement: Title 10 of CFR, Part 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, requires, in part, that "activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions." Contrary to the above, the licensee failed to follow procedural instructions, resulting in a reactor trip due to an incorrect test equipment configuration. Specifically, during implementation of SI 1-SI-68-6, when faced with uncertainty, the maintenance foreman provided incorrect information to the work crew on how to configure the test equipment during channel calibration of pressurizer pressure channel II. The maintenance personnel incorrectly configured the test equipment which resulted in a reactor trip. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program as PER 601154, this violation is being treated as an NCV, consistent with the Enforcement Policy and is identified as NCV 05000390/2013002-01, Failure to Correctly Implement Procedure for Pressurizer Pressure Channel Calibration.

#### 4OA5 Other Activities

##### .1 Temporary Instruction 2515/187 – Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns

###### a. Inspection Scope

Inspectors verified that licensee's walkdown packages, related to walkdowns in the intake pumping station and the auxiliary building flood mode spool pieces, contained the elements as specified in NEI 12-07, Walkdown Guidance document:

The week of July 23, 2012, the inspectors accompanied the licensee on their walkdown of those activities related to accomplishing the plant's flood mode strategy and verified that the licensee confirmed the following flood protection features:

Enclosure

- Visual inspection of the flood protection feature was performed if the flood protection feature was relevant. External visual inspection for indications of degradation that would prevent its credited function from being performed was performed.
- Reasonable simulation, if applicable to the site
- Critical SSC dimensions were measured
- Available physical margin, where applicable, was determined.
- Flood protection features which included spool piece simulated installations were observed to verify licensee capability to meet installation time requirements.

The inspectors independently performed their walkdown and verified that the following flood protection features were in place:

- Installed HESCO barriers were reviewed for material condition
- Review of installation of HESCO barriers including demonstrations to fill gaps
- Flood protection features in the intake pumping station were reviewed, including seals, sump pumps, check valves and equipment failure histories.
- Available physical margin, where applicable, was determined.

The inspectors verified that noncompliances with current licensing requirements, and issues identified in accordance with the 10 CFR 50.54(f) letter, Item 2.g of Enclosure 4, were entered into the licensee's corrective action program. In addition, issues identified in response to Item 2.g that could challenge risk significant equipment and the licensee's ability to mitigate the consequences will be subject to additional NRC evaluation.

b. Findings

No findings were identified

4OA6 Meetings, including Exit

On April 9, 2013, the resident inspectors presented the quarterly inspection results to Mr. Timothy Cleary, Site Vice President, and other members of the licensee staff. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and are violations of NRC requirements which met the criteria of the NRC Enforcement Policy for being dispositioned as an NCV.

- Unit 2 Materials License, SNM-2014, allows storage of 193 fuel assemblies for Unit 2. Contrary to this license, the licensee received and stored 194 assemblies.

During receipt of Unit 2 fuel, Westinghouse identified a manufacturing flaw with fuel assembly M36. Conversations with fuel vendor determined that they would manufacture a replacement fuel assembly and that at a later time WBN would be able to return the un-usable fuel assembly. The licensee received the final shipment

Enclosure

of fuel which included the replacement assembly prior to returning the unusable assembly. From September 28, 2011 until July 18, 2012, the licensee was in possession of 194 fuel assemblies, one more than allowed by its license. This low safety significant adverse condition was captured in the licensee's corrective action program as PER 682419

- TS 3.4.12, Cold Overpressure Mitigation System (COMS), requires that COMS must be operable with a maximum of one CCP and no SI pumps capable of injecting into the RCS when in Modes 4, 5, and Mode 6 (when the reactor vessel head is on).

On September 21, 2009, WBN entered Mode 4 at 0420 EDT as part of the Cycle 9 RFO. When Mode 4 was entered, two SI pumps and more than one CCP were capable of injecting into the RCS. As a result, LCO 3.4.12 was not met and the applicable required actions were not taken within their associated completion times. Therefore, WBN was in a condition prohibited by the TS.

A review of previous operating data revealed this condition also existed on April 4, 2011, when WBN entered Mode 4 at 0454 EDT as a part of the Cycle 10 RFO. This low safety significant adverse condition was captured in the licensee's corrective action program as PER 593388.

- 10 CFR 50 Appendix B, Criterion III, Design Control, states in part that design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design. Contrary to this requirement, the licensee did not assure configuration control was maintained on the inputs from two of the nuclear instrumentation channels to the rod control system.

On January 15, 2013, during performance of procedure IMI-92.017, Calibration of NIS Power Range High Flux Auctioneer, in accordance with WO 112727523, instrument technicians found that inputs from nuclear instrumentation channels N41 and N42 were not present as expected. Investigation by the licensee determined that the associated wiring was lifted during the recent refueling outage as part of Design Change Notice (DCN) 52853, Stage 8, in a WO, but that the WO contained no steps to re-install the wiring. No post maintenance was performed. This low safety significant adverse condition was captured in the licensee's corrective action program as PER 695891.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

R. Bankes, (Interim) Chemistry/Environmental Manager  
T. Carter, (interim) Site Engineering Director  
T. Cleary, Site Vice President  
T. Detchemende, Emergency Preparedness Manager  
R. Dittmer, Operations Superintendent  
W. Francis, (Interim) Maintenance Manager  
D. Gronek, Plant Manager  
D. Guinn, Licensing Manager  
W. Hooks, Radiation Protection Manager  
D. Hughes, Training Supervisor  
B. Hunt, Operations Support Superintendent  
D. Jacques, Security Manager  
W. Prevatt, Operations Manager  
A. Scales, Work Control Manager

### **ITEMS OPENED, CLOSED, AND DISCUSSED**

#### **Opened**

None.

#### **Opened and Closed**

05000390/2013002-01	NCV	Failure to Correctly Implement Procedure for Pressurizer Pressure Channel Calibration (Section 4OA3.4)
---------------------	-----	--

#### **Closed**

05000390/2012004-01	URI	Lack of ability to execute Flood Mode Configuration Within the Time Frame Required by the Technical Requirements Manual, Section 3.7.2, Flood Protection Plan (See Inspection Report 05000390/2012009)
050000390/2012003-01	URI	Failure to Demonstrate Corrective Actions for Check Valve 0-CKV-040-0604 (See Inspection Report 05000390/2012009)
050000390/2012003-02	URI	Failure to Demonstrate Corrective Actions for IPS Sump Pumps 3A and 3B (See Inspection Report 05000390/2012009)

Attachment

05000390/2012-002-00	LER	Unanalyzed Condition Affecting Probable Maximum Flood (PMF) Level (Section 4OA3.1)
05000390/2012-002-01	LER	Unanalyzed Condition Affecting Probable Maximum Flood (PMF) Level (Section 4OA3.2)
05000390/2012-003-00	LER	Entry into Mode 4 without Meeting LCO 3.4.12, Cold Overpressure Mitigation System (COMS) (Section 4OA3.3)
05000390/2012-004-00	LER	Automatic Reactor Trip Due to Low-Low Steam Generator Level (Section 4OA3.4)
2515/187	TI	Inspection of Near-Term Task Force Recommendation 2.3 Flooding Walkdowns (Section 4OA5.1)

### LIST OF DOCUMENTS REVIEWED

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

SOI-72.01, Containment Spray System Power Checklist 72.01-1P  
 SOI-72.01, Containment Spray System Valve Checklist 72.01-1V  
 SOI-3.02, Auxiliary Feedwater System Power Checklist 3.02-1P  
 SOI-3.02, Auxiliary Feedwater System Valve Checklist 3.02-1V  
 SOI-74-01, Residual Heat Removal System Power Checklist 74.01-1P  
 SOI-74-01, Residual Heat Removal System Power Checklist 74.01-2P  
 SOI-74-01, Residual Heat Removal System Power Checklist 74.01-3P  
 SOI-74-01, Residual Heat Removal System Valve Checklist 74.01-1V  
 SOI-74-01, Residual Heat Removal System Valve Checklist 74.01-2V  
 SOI-74-01, Residual Heat Removal System Valve Checklist 74.01-3V



## **LIST OF ACRONYMS**

CAP	Corrective Action Program
CCP	centrifugal charging pump
CCS	component cooling system
CCW	condenser circulating water
CFR	<i>Code of Federal Regulations</i>
COMS	cold overpressure mitigation system
CS	containment spray
CREATCS	control room emergency air temperature control system
DCN	Design Change Notice
EDT	Eastern Daylight Time
ERCW	essential raw cooling water
FE	functional evaluation
FSAR	Final Safety Analysis Report
IMC	Inspection Manual Chapter
IP	inspection procedure
IPS	intake pumping station
LCO	limiting condition of operation
LER	licensee event report
MCR	main control room
MDAFW	motor-driven auxiliary feedwater
MSL	mean sea level
NCV	non-cited violation
NEI	Nuclear Energy Institute
NPG-SPP	nuclear power group standard programs and processes
NRC	Nuclear Regulatory Commission
OOS	out of service
PER	problem evaluation report
PDO	prompt determination of operability
PI	performance indicator
POE	past operability evaluation
PMF	probably maximum flood
PMT	post maintenance test
RCS	reactor coolant system
RFO	refueling outage
RHR	residual heat removal
RTV	room temperature vulcanizing
SDBR	shutdown board room
SDP	Significance Determination Process
SG	steam generator
SI	safety injection
SR	service request
SSCs	structures, systems, or components
TACF	temporary alteration control form
TBBP	thermal barrier booster pump
TDAFW	turbine-driven auxiliary feedwater
TS	technical specifications

TVA	Tennessee Valley Authority
UFSAR	Updated Final Safety Analysis Report
URI	unresolved item
WBN	Watts Bar Nuclear Plant
WO	work order