



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

April 7, 2016

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

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000390/2016001, 05000391/2016001

Dear Mr. Shea:

On March 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Nuclear Plant, Unit 1 and Unit 2. On March 31, 2016, the NRC inspectors discussed the results of this inspection with Mr. Pry and other members of the Watts Bar staff. Inspectors documented the results of this inspection in the enclosed inspection report. As described in Watts Bar Nuclear Plant, Unit 2 - Reactor Oversight Process Implementation and Partial Cornerstone Transition, applicable inspections for all cornerstones as required by the baseline inspection program for a dual unit site, as described in IMC 2515 "Light-Water Reactor Inspection Program - Operations Phase", are being implemented and documented as part of Unit 1 and 2 NRC Integrated Inspection Reports. Inspection activities associated with Unit 2 construction are being documented in separate Unit 2 Construction - NRC Integrated Inspection Reports.

The enclosed inspection report discusses one finding for which the NRC has not yet reached a preliminary significance determination. As described in Section 4OA2.4 of the enclosed report, a finding was identified for Tennessee Valley Authority's (TVA) failure to maintain procedure 1-SI-63-10.1-A, "ECCS Discharge Pipes Venting – Train A Inside Containment," Revisions 11-16. The procedure failed to include provisions to accurately quantify the amount of gas vented. This resulted in potential adverse impacts on system safety function due to accumulated gas voids in the ECCS piping. This condition did not present an immediate safety concern because the licensee has verified current operability. The NRC will inform you in a separate correspondence when the preliminary significance has been determined. We intend to complete and issue our final safety significance determination within 90 days from the date of this letter. The NRC's significance determination process (SDP) is designed to encourage an open dialogue between your staff and the NRC; however, the dialogue should not affect the timeliness of our final determination. Because the NRC has not made a final determination in this matter, no notice of violation is being issued for this inspection finding at this time.

Additionally, NRC inspectors documented six findings of very low safety significance (Green) in this report. Six of these findings involved violations of NRC requirements. Additionally, NRC inspectors documented one Severity Level IV violation with no associated finding. Further, inspectors documented licensee-identified violations which were determined to be of very low

safety significance in this report. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violation or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 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.

Additionally, on March 23, 2016, the NRC issued a letter titled Chilled Work Environment For Raising And Addressing Safety Concerns At The Watts Bar Nuclear Plant (ML16083A479). The NRC has concluded that a Chilled Work Environment exists in the Operations Department because of a perception that operators are not free to raise safety concerns using all available avenues without fear of retaliation. We have not identified any serious safety violations or instances involving significant plant safety issues, but the information gathered has led to concerns about the impact the work environment is having on plant operations and raises questions about your commitment to emphasize safety over competing goals to ensure protection of people and the environment. This letter will be included as part of the 2016 mid-cycle assessment of plant performance following the end of the second quarter inspection period.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS).

J. Shea

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ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

***/RA/***

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

Docket Nos.: 50-390, 391  
License Nos.: NPF-90, NPF-96

Enclosure: NRC Inspection Report 05000390/2016001, 05000391/2016001  
w/Attachment: Supplemental Information

cc: Distribution via ListServ

J. Shea

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DATE	3/31/2016	4/05/216	4/05/2016	4/01/2016	3/31/2016	3/31/2016
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J. Shea

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Letter to Joseph Shea from Alan Blamey dated April 7, 2016

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000390/2016001, 05000391/2016001

Distribution w/encl:

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RidsNrrPMWattsBar1 Resource

RidsNrrPMWattsBar2 Resource

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No.: 50-390, 50-391

License No.: NPF-90, NPF-96

Report No.: 05000390, 0500391/2016001

Licensee: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Units 1 and 2

Location: Spring City, TN 37381

Dates: January 1 through March 31, 2016

Inspectors: J. Nadel, Senior Resident Inspector  
J. Hamman, Resident Inspector  
C. Kontz, Senior Project Engineer  
J. Austin, Senior Resident Inspector  
D. Lanyi, Operations Engineer  
B. Bishop, Project Engineer  
J. Eargle, Senior Reactor Inspector  
M. Greenleaf, Reactor Inspector  
D. Jones, Senior Reactor Inspector  
D. Kern, Senior Reactor Inspector  
R. Reyes, Resident Inspector  
S. Shah, Operations Engineer  
J. Montgomery, Senior Reactor Inspector

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

Enclosure

## SUMMARY

IR 05000390/2016-001, 05000391/2016-001; January 1, 2016 – March 31, 2016; Watts Bar, Units 1 and 2; Maintenance Effectiveness, Operability Evaluations, Problem Identification and Resolution, Event Follow-up.

The report covered a three-month period of inspection by the resident inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Revision 5.

The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," (SDP) dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015.

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

#### Cornerstone: Mitigating Systems

- Green. A self-revealing non-cited violation (NCV) of 10 *Code of Federal Regulations* (CFR) 50, Appendix B, Criterion V, Procedures was identified for the licensee's failure to use a procedure appropriate to the circumstances for work associated with the A-A auxiliary control air system (ACAS) compressor. Specifically, the licensee used a section of procedure 0-SOI-32.02, Auxiliary Air System, Revision 2, that placed the air compressor in "OFF" when it was intended to place it in "A-Auto". The licensee restored the compressor to "A-Auto" and entered this issue into their corrective action program as condition report (CR) 1131261.

The performance deficiency was more than minor because it affected the equipment performance attribute of the mitigating system cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the ACAS train A was nonfunctional for approximately 19.5 hours on January 29, 2016 and as a supported system, the auxiliary feedwater system was inoperable during this time. The inspectors determined that this finding was of very low safety significance (Green) because the finding did not represent an actual loss of function of a single train for greater than its TS allowed outage time. The finding has a cross cutting aspect in the Work Management component of the Human Performance area because the licensee failed to implement a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. Specifically, the planning and execution of work on the A-A ACAS compressor on January 29, 2016 lacked sufficient rigor to ensure the activity was performed as intended. [H.5] (Section 1R12)

- Green. The NRC identified an NCV of 10 CFR 50, Appendix B, Criterion V, Procedures, for the licensee's failure to follow TVA procedure OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking, Revision 21.

Specifically, the licensee failed to base an immediate determination of operability (IDO) for the auxiliary control air system on information sufficient to conclude that a reasonable expectation of operability/functionality existed. The licensee subsequently implemented compensatory measures and entered this issue into their corrective action program as CR 1129322.

The performance deficiency was more than minor because it affected the equipment performance attribute of the mitigating system cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, reasonable assurance of operability/functionality did not exist for the A train of auxiliary control air from January 13, 2016, until January 14, 2016, and it therefore should have been declared inoperable/nonfunctional. The inspectors determined that this finding was of very low safety significance (Green) because the finding did not represent an actual loss of function of a single train for greater than its TS allowed outage time. This finding had a cross-cutting aspect in the area of Human Performance, conservative bias, because the licensee failed to make the conservative decisions. Specifically, the licensee reinstalled a degraded valve in the auxiliary control air system without fully understanding the failure mechanism or its impact on system operability/functionality. [H.14] (Section 1R15.1)

- TBD. The inspectors identified an apparent violation of TS 5.7.1.1.a, Procedures, for the licensee's failure to maintain procedure 1-SI-63-10.1-A, "ECCS Discharge Pipes Venting – Train A Inside Containment," Revisions 11-16, in accordance with the requirements of Regulatory Guide 1.33. Specifically, the procedure did not have provisions for quantifying accumulated gases during venting which allowed emergency core cooling system (ECCS) piping to be vented without being evaluated for potential adverse impacts on system operability. The licensee implemented manual ultrasonic testing (UT) of gas accumulation and entered this issue into their corrective action program as CR 1136359.

The performance deficiency was more than minor because, if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, if left uncorrected, the potential existed for an unacceptable void affecting ECCS operability to develop prior to the next scheduled surveillance. The inspectors determined the finding could not be screened to GREEN and may require a detailed risk evaluation following a determination of whether the finding represents a loss of system and/or function. Because the safety characterization of this finding is not yet finalized, it is being documented with a significance of To Be Determined (TBD). The inspectors determined that the finding had a cross-cutting aspect of Change Management in the area of Human Performance because the licensee failed to use a systematic process to implement changes to the ECCS venting procedure to ensure that Generic Letter 2008-01 commitments would continue to be met. [H.3] (Section 4OA2.4)

- Green. The NRC identified an NCV of TS 5.7.1.1.a, Procedures, for the licensee's inadequate implementation of procedure NPG-SPP-01.2, Administration of Site Technical Procedures, Revision 8. Specifically, the licensee determined applicable



acceptance criteria steps in technical procedures were not applicable (N/A) in lieu of performing a procedure change. This resulted in challenging the operability of safety-related plant equipment. The licensee entered this issue into their corrective action program as CR 1125256.

The performance deficiency was more than minor because, if left uncorrected, it could lead to a more significant safety concern with the use of N/A and implementation of site technical procedures. Specifically, if further adjustments outside of the acceptance criteria or additional acceptance criteria were not met, it could have resulted in the turbine-driven auxiliary feedwater pump becoming inoperable. The inspectors determined this finding to be of very low safety significance (Green) because it was a deficiency affecting the design or qualification of equipment and operability was maintained. The finding had a cross-cutting aspect of Procedure Adherence, as described in the Human Performance cross-cutting area because the licensee failed to comply with NPG-SPP-01.2. [H.8] (Section 4OA2.2)

- Green. The NRC identified an NCV of TS 5.7.1.1.a, Procedures, for the licensee's failure to place the residual heat removal (RHR) system into ECCS-Standby Mode prior to the reactor coolant system (RCS) temperature exceeding 212 °F as required by procedure 1-GO-1, Unit Startup from Cold Shutdown to Hot Standby, Revision 4. The licensee entered this issue into their corrective action program as CR 1127691.

The performance deficiency was determined to be more than minor because, if left uncorrected, a failure to align a safety system under the proper plant conditions could lead to that system being inoperable or degraded. The inspectors determined that this finding was of very low safety significance (Green) because the system temperatures never rose high enough to allow the RHR pump suction header to form steam voids. The performance deficiency had a cross-cutting aspect of Avoid Complacency in the area of Human Performance because licensee personnel were complacent and failed to question the long held idea that the particular step just needed to be started prior to exceeding an RCS temperature of 212 °F. [H.12] (Section 4OA3.3)

- Green. The NRC identified an NCV of TS 5.7.1.1.a, Procedures, for the licensee's failure to use any approved procedures to place RHR Letdown in service. The licensee entered this issue into their corrective action program as CR 1127691.

The performance deficiency was determined to be more than minor because if left uncorrected a failure to use procedures to place systems or portions of systems in service could result in equipment being operated incorrectly and that system could then become inoperable or degraded. The inspectors determined that this finding was of very low safety significance (Green) because the way that the system was placed in service did not cause any safety-related components to become inoperable nor did it represent an actual loss of function of one or more non-TS trains of equipment designated as high safety-significant in accordance with the licensee's maintenance rule program for greater than 24 hours. The performance deficiency had a cross-cutting aspect of safety conscious work environment (SCWE) policy in the area of Safety Conscious Work Environment because the licensee organization

failed to effectively implement a policy that supports individuals' rights and responsibilities to raise safety concerns, and does not tolerate harassment, intimidation, retaliation, or discrimination for doing so [S.1] (Section 40A3.3)

- Green. The NRC identified an NCV of TS 5.7.1.1.a, Procedures, for the licensee's failure to implement OPDP-8, Operability Determinations and LCO tracking. Specifically, the licensee failed to track the applicability of action statement 'B' of TS LCO 3.5.3, ECCS- Shutdown, during planned testing. The licensee entered this issue into their corrective action program as CR 1134949.

The licensee's failure to track applicable TS LCOs, as required by Section 3.5.1 of OPDP-8 was a performance deficiency. The performance deficiency was more than minor because, if left uncorrected, it would have had the potential to lead to a more significant safety concern in that, the failure to track an applicable TS action statement could lead to plant operations outside of TS analyzed conditions. The inspectors determined that this finding was of very low safety significance (Green) because the finding did not represent an actual loss of function of a single train for greater than its TS allowed outage time nor did it represent an actual loss of function of one or more non-TS equipment for greater than 24 hours. The performance deficiency had a cross-cutting aspect of Challenge the Unknown in the area of Human Performance because licensee personnel did not appropriately stop, question, and evaluate the risks before proceeding when the 1A-A CCP oil cooler low flow alarm came in during flow testing. [H.11] (Section 40A3.3)

- SL-IV. The NRC identified a NCV of 10 CFR 50, Appendix B, Criterion XVII, Quality Assurance Records, for the licensee's failure to maintain sufficient records to furnish evidence of activities affecting quality. The licensee entered this issue into their corrective action program as CR 1127691.

The inspectors determined that the licensee's failure to document plant operations in the operating logs in accordance with OPDP-1 was a violation of 10 CFR 50, Appendix B, Criterion XVII, Quality Assurance Records. This violation constitutes a traditional enforcement violation because it impacts the NRC's ability to carry out its regulatory function. The failure to maintain accurate logs was more than minor because it would have likely caused the NRC to undertake further inquiry and was consistent with Enforcement Policy section 6.9.d.1 for a SL-IV violation. Cross-cutting aspects are not assigned to traditional enforcement violations. (Section 40A3.3)

## B. Licensee-Identified Violations

Violations of very low safety or security significance or Severity Level IV that were identified by the licensee have been reviewed by the NRC. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and corrective action tracking numbers are listed in Section 40A7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 started the reporting period at 100 percent rated thermal power and remained there until March 22, 2016, when the reactor tripped due to a circuit card failure in the main turbine electro-hydraulic control circuit. After post trip repairs, Unit 1 became critical on March 25, and ascended to approximately 90 percent rated thermal power on March 27. Unit 1 then experienced a feedwater heater isolation, requiring a downpower to approximately 80 percent. Unit 1 returned to 100 percent rated thermal power on March 28, 2016, and remained there through the end of the reporting period.

Unit 2 started the reporting period in Mode 5 and entered Mode 4 on March 19, 2016. Unit 2 entered Mode 3 on March 30, 2016, and remained in Mode 3 through the end of the reporting period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

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

##### Readiness for Impending Adverse Weather Conditions

##### a. Inspection Scope

The inspectors reviewed licensee preparation for, and response to, actual freezing conditions on the week of January 11, 2016. The inspectors reviewed licensee procedure 0-PI-OPS-1-FP, Freeze Protection, including associated checklist 1, Freeze Protection. Inspectors walked down selected components associated with the high-pressure fire pumps and essential raw cooling water (ERCW) pumps. The inspectors also walked down compensatory freeze protection measures for the refueling water storage tank and the main feedwater flow sensing lines. The inspectors evaluated implementation of plant freeze protection, including the material condition of insulation, heat trace elements, and temporary heated enclosures. Corrective actions for items identified in relevant conditions reports (CRs) and work orders (WOs) were assessed for effectiveness and timeliness. Documents reviewed are listed in the Attachment. This activity constituted one Impending Adverse Weather inspection sample, as defined in Inspection Procedure (IP) 71111.01.

##### b. Findings

No findings were identified.

## 1R04 Equipment Alignment (71111.04)

### .1 Partial System Walkdowns

#### a. Inspection Scope

The inspectors conducted the 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 (OOS). This also included that redundant trains were returned to service properly. The inspectors reviewed the functional system descriptions, the Updated Final Safety Analysis Report (UFSAR), system operating procedures, and Technical Specifications (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. This activity constituted seven inspection samples, as defined in IP 71111.04.

- 2A train residual heat removal (RHR) while 2B train is OOS for maintenance
- 2B train RHR while 2A train is OOS for maintenance
- 2A train of motor-driven auxiliary feedwater system
- 2B train of motor-driven auxiliary feedwater system
- Unit 2 turbine-driven auxiliary feedwater system
- 2A train of safety injection system
- 2B train of safety injection system

#### b. Findings

No findings were identified.

### .2 Complete Walkdown

The inspectors performed a complete system walkdown of the Unit 2 chemical and volume control system (CVCS) and support systems to verify proper equipment alignment, to identify any discrepancies that could impact the function of the system and increase risk, and to verify that the licensee properly identified and resolved equipment alignment problems that could cause events or impact the functional capability of the system.

The inspectors reviewed the UFSAR, system procedures, system drawings, and system design documents to determine the correct lineup and then examined system components and their configuration to identify any discrepancies between the existing system equipment lineup and the correct lineup. During the walkdown, the inspectors reviewed the following:

- Valves were correctly positioned and did not exhibit leakage that would impact the functions of any given valve

- Electrical power was available as required
- Major system components were correctly labeled, lubricated, cooled, ventilated, etc.
- Hangers and supports were correctly installed and functional
- Essential support systems were operational
- Ancillary equipment or debris did not interfere with system performance
- Valves were locked as required by the locked valve program
- Major system components were correctly labeled
- Visible cabling appeared to be in good material condition

In addition, the inspectors reviewed outstanding maintenance work requests and design issues on the system to determine whether any condition described in those work requests could adversely impact current system operability. Documents reviewed are listed in the Attachment. This activity constituted one inspection sample, as defined in IP 71111.04.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

Fire Protection Tours

a. Inspection Scope

The inspectors conducted tours of the 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; and 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. Documents reviewed are listed in the Attachment. This activity constituted eight inspection samples, as defined in IP 71111.05.

- Unit 2 upper containment
- Unit 2 lower containment
- Emergency raw cooling water system strainer room train A
- High pressure fire pump room train A
- 1A-A emergency diesel generator (EDG) Room
- 1B-B EDG Room
- 2A-A EDG Room
- 2B-B EDG Room

b. Findings

No findings were identified.

.2 Annual Drill Observations

a. Inspection Scope

On March 8, 2016, the inspectors observed a fire drill in the boric acid evaporator package B room. The drill was observed to evaluate the readiness of the site fire brigade to fight fires. The inspectors verified that the licensee staff identified deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were: 1) specified number of individuals responding; 2) proper wearing of turnout gear; 3) self-contained breathing apparatus available and properly worn and used; 4) control room personnel followed procedures for initiation and verification of response; 5) fire brigade leader exhibited command and had a copy of the pre-fire plan; 6) fire brigade leader maintained control starting at the dress-out area; 7) fire brigade response was timely and followed the appropriate access route; 8) command/control set up near the location and communications were established; 9) proper use and layout of fire hoses; 10) fire area entered in a controlled manner; 11) sufficient firefighting equipment brought to the scene; 12) search for victims and propagation of the fire into other plant areas; 13) utilization of pre-planned strategies; 14) adherence to the pre-planned drill scenario and drill objectives acceptance criteria were met; and 15) firefighting equipment returned to a condition of readiness to respond to an actual fire. Documents reviewed are listed in the Attachment. This activity constituted one fire protection annual drill inspection sample, as defined in IP 71111.05.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

.1 Internal Flooding

The inspectors reviewed related flood analysis documents and walked down the area listed below containing risk-significant structures, systems, and components susceptible to flooding. The inspectors verified that plant design features and plant procedures for flood mitigation were consistent with UFSAR design requirements and the internal flooding analysis assumptions. The inspectors assessed the condition of flood mitigation features such as drains, barriers, curbs, and door seals. In addition, the inspectors verified the licensee was identifying and properly addressing internal flooding issues in the corrective action program (CAP). Documents reviewed are listed in the Attachment. This inspection constituted one inspection sample, as defined in IP 71111.06.

- Intake pumping station, strainer room A and B

b. Findings

No findings were identified.

.2 Cables in Underground Manholes

a. Inspection Scope

Inspectors directly observed, as listed below, the underground bunkers/manholes subject to flooding that contained cables whose failure could disable risk-significant equipment. Specific attributes evaluated were: the cables were not submerged in water; the cables and/or splices appeared intact and the material condition of cable support structures was acceptable; and 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. Where dewatering devices were not installed, the inspectors ensured that drainage was provided and was functioning properly. Documents reviewed are listed in the Attachment. This inspection constituted one Underground Manhole Internal Flooding inspection sample, as defined in IP 71111.06.

- Manhole 20

b. Findings

No findings were identified

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

The inspectors reviewed performance of the 1B-B containment spray heat exchanger to verify proper test controls and method, as applicable. The inspectors reviewed design basis documents, calculations, test procedures, and results to evaluate the licensee's program for maintaining heat sinks in accordance with the licensing basis, as applicable. The inspectors reviewed the impact on design basis function of the heat exchanger from a past operability evaluation performed in CR 1115519.

The inspectors performed walkdowns of the heat exchanger to verify material conditions were acceptable and physical arrangement matched procedures and drawings. Inspectors reviewed licensee compliance to commitments made based on their response to the NRC Generic Letter 89-13 for service water system problems that could affect heat exchanger performance. Documents reviewed are listed in the Attachment. This activity constituted one Heat Sink Performance Inspection sample, as defined in IP 71111.07.

b. Findings

No findings were identified.

## 1R11 Licensed Operator Requalification and Performance (71111.11)

### .1 Licensed Operator Requalification Review

#### a. Inspection Scope

On March 1, 2016, the inspectors observed the simulator evaluation for Operations Crew 2 per 3-OT-SRE-0003, Loss of Coolant Accident, Revision (Rev.) 18

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. Documents reviewed are listed in the Attachment. This activity constituted one Observation of Requalification Activity inspection sample, as defined in IP 71111.11.

#### b. Findings

No findings were identified.

### .2 Observation of Operator Performance

#### 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 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. This activity constituted one Observation of Operator Performance inspection sample, as defined in IP 71111.11.



- 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

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed the 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) 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. Documents reviewed are listed in the Attachment. This activity constituted two Maintenance Effectiveness inspection sample, as defined in IP 71111.12.

- CR 1131261, A-A auxiliary air compressor handswitch in off position instead of automatic (unplanned LCO entry)
- CR 1114410, 1-RM-90-400, shield building stack flow radiation monitor failed

b. Findings

Introduction. A self-revealing Green NCV of 10 CFR 50, Appendix B, Criterion V, Procedures was identified for the licensee's failure to use a procedure appropriate to the circumstances for work associated with the A-A auxiliary control air system (ACAS) compressor. Specifically, the licensee used a section of 0-SOI-32.02, Auxiliary Air System, Rev. 2, that placed the air compressor in "OFF" when it was intended to place it in "A-Auto".

Discussion. The ACAS at Watts Bar is a safety-related, dual train, common plant system that provides air to various components in multiple systems that are required for mitigation of design basis events. The ACAS compressors are normally aligned in standby and will auto start on low pressure in the non-safety control air system. The ACAS is not included in the plant TS; however, it is a required support system and nonfunctionality of the ACAS requires entry into multiple TS Limiting Conditions for Operations (LCOs) associated with supported systems. The most limiting supported system TS LCO for a single train of ACAS nonfunctional is 72 hour TS LCO 3.7.5.B for auxiliary feedwater (AFW) due to the associated impact of a loss of safety grade air to AFW system discharge level control and pressure control valves.

To mitigate a long term concern associated with a previously identified failure of 0-FSV-67-1221, the A-A compressor emergency raw cooling water inlet valve, the A-A compressor was running unloaded continuously as an operability compensatory measure. This was later modified to leave the compressor in "A-Auto" and perform a weekly four hour unloaded run instead. On nightshift on January 29, 2016, the operators performed procedure 0-SOI-32.02, Auxiliary Air System, Rev. 2 with the intent to place the A-A ACAS compressor in "A-Auto".

On January 29, 2016, at approximately 11:00 pm, operators responded to a plant computer based alarm and upon investigation discovered the A-A ACAS compressor was not in the expected "A-Auto" position. A review of the plant computer showed that the compressor had been in the "OFF" position since 4:21 am on January 29, 2016. It was determined that the licensee's pre-job brief discussed the need to perform Section 7.1 of 0-SOI-32.02, which is the shutdown section, when the correct section that needed to be performed was Section 8, which is the "infrequent operations" section. Additionally, relevant operating experience was not discussed and the team involved made incorrect assumptions about why they were taking the briefed actions. As a result, the incorrect procedure section was performed and the compressor was placed in "OFF" on January 29, 2016, at 4:21 am. This resulted in the nonfunctionality of the A-A train of the ACAS until the compressor was restored to the "A-Auto" position on January 29, 2016, at 11:55 pm.

Analysis. The failure to use a procedure appropriate to the circumstances for work associated with the A-A ACAS compressor as required by 10 CFR Part 50, Appendix B, Criterion V, on January 29, 2016, is a performance deficiency. The performance deficiency was more than minor because it affected the equipment performance attribute of the mitigating system cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the ACAS train A was nonfunctional for approximately 19.5 hours on January 29, 2016. As a supported system, the auxiliary feedwater system was inoperable during this time and TS LCO 3.7.5.B applied. The inspectors performed an initial screening of the finding in accordance with NRC Manual Chapter IMC 0609, Appendix A, "The Significance Determination Process for (SDP) for Findings At-Power". Using IMC 0609 Appendix A, Exhibit 2 – Mitigating Systems Screening Questions, the inspectors determined that this finding was of very low safety significance (Green) because the finding did not represent an actual loss of function of a single train for greater than its TS allowed outage time. The finding had a cross cutting aspect in the

Work Management component of the Human Performance area because the licensee failed to implement a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. Specifically, the planning and execution of work on the A-A ACAS compressor on January 29, 2016, lacked sufficient rigor to ensure the activity was performed as intended. [H.5].

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings”, states, 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, procedures, or drawings.” This requirement is implemented, in part, by TVA procedure 0-SOI-32.02, Auxiliary Air System, Rev. 2. Contrary to the above, on January 29, 2016, 0-SOI-32.02 was not accomplished in accordance with section 8.0 as the licensee intended. The licensee subsequently restored the compressor to “A-Auto”. This violation is being treated as an NCV consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee’s CAP as CR 1131261. NCV 05000390/2016001-01, Failure to Use a Procedure Appropriate to the Circumstances for the Auxiliary Control Air System Train A.

#### 1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

##### a. Inspection Scope

The inspectors evaluated, as appropriate, for the 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. Documents reviewed are listed in the Attachment. This activity constituted four Maintenance Risk Assessment inspection samples, as defined in IP 71111.13.

- Risk assessment for work week 0124 with the 1A-A containment spray pump OOS
- Risk assessment for work week 0201 with Unit 2 power operated relief valves removed and 2A RHR pump maintenance
- Risk Assessment for work week 0307 with emergent failure of 1A-A motor-driven auxiliary feedwater pump pressure control valve.
- Risk assessment for work week 0314 with unanticipated entry into TS LCO 3.0.3 due to inoperability of A train auxiliary control air

##### b. Findings

No findings were identified.

1R15 Operability Evaluations (71111.15)a. Inspection Scope

The inspectors reviewed the 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 LCO and the risk significance in accordance with the SDP. The inspectors verified that the operability evaluations were performed in accordance with NPG-SPP-03.1, Corrective Action Program. Additional documents reviewed are listed in the Attachment. This activity constituted 12 Operability Evaluation inspection samples, as defined in IP 71111.15.

- Immediate Determination of Operability (IDO) for CR 1125343, DG 1A Starting air inlet pressure switch, 1-PS-82-160 cracked housing
- Prompt Determination of Operability (PDO) for CR 1131306, Turbine driven auxiliary feedwater (TDAFW) pump trip and throttle valve (TTV) leak by
- PDO for CR 1118632, TDAFW pump as left calibration of governor controls not within procedure requirements
- PDO for CR 1125623, Following replacement of 1A-A safety injection pump mechanical seal, required post maintenance measurements were not recorded
- PDO for CR 1125040, Auxiliary control air valve 0-FSV-67-1221 found failed open
- IDO for CR 1132576, 1B containment spray pump room cooler 1-PMCL-30-178 leak
- IDO for CR 1140303, 2B-B Component cooling system pump seal leakage
- Past operability evaluation (POE) for CR 1135737, Containment recirculation Fan A-A handswitch shows unstable contact development
- POE for CR 1111791, Failure of shaft bearing for the 1B-B charging pump room cooler
- POE for CR 1115519, Containment spray heat exchanger 1B ERCW throttle valve mispositioned
- IDO for CR 1134015, RHR check valve 1-CKV-74-544 leakby
- CR 1133958, Control room deficiency where the pressurizer relief tank high pressure alarm comes in when 1-HS-62-140A is taken to the start position during refueling water storage tank make up using the blender.

b. Findings.1 Inadequate Immediate Determination of Operability for the Auxiliary Control Air System Train A

Introduction. The NRC identified a Green NCV of 10 CFR 50, Appendix B, Criterion V, Procedures, for the licensee's failure to follow procedure OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking, Revision 21. Specifically, the licensee failed to base an immediate determination of operability (IDO)

for the auxiliary control air system on information sufficient to conclude that a reasonable expectation of operability/functionality existed.

Description. The auxiliary control air system (ACAS) at Watts Bar is a safety related, dual train, common plant system that provides air to various components in multiple systems that are required for mitigation of design basis events. The ACAS compressors are normally aligned in standby and will auto start on low pressure in the non-safety control air system. The ACAS is not included in the plant technical specifications (TS), however it is a required support system and nonfunctionality of the ACAS requires entry into multiple TS Limiting Conditions for Operations (LCOs) associated with supported systems. The most limiting supported system TS LCO for a single train of ACAS nonfunctional is 72 hour TS LCO 3.7.5.B for Auxiliary Feedwater (AFW) due to the associated impact of a loss of safety grade air to AFW system discharge level control and pressure control valves.

On January 13, 2016, WO 117459604 was authorized to remove 0-FSV-67-1221, the auxiliary control air system compressor A-A emergency raw cooling water (ERCW) inlet valve, from the system for internal inspection and bench testing to determine the cause of a previously identified failure. The normally closed valve provides ERCW cooling water to the A-A auxiliary control air system compressor, and it had been found failed open on December 25, 2015. Since then, the licensee thought the valve was not fully closed due to debris blocking the seat. The results of the bench testing and internal inspection identified that the disc was separated from the stem and was essentially "floating" in the valve. The licensee wrote CR 1125040 and performed an IDO based on the new information. An engineering evaluation determined that the valve would still provide full cooling flow with the disc separated from the stem. The IDO concluded the valve was operable/functional and did not request a prompt determination of operability (PDO) to further evaluate the conclusions.

The inspectors identified the IDO did not provide reasonable assurance that the valve would remain open, given the documented failure mode, through all design bases events including seismic events. It also did not address the required mission time of the auxiliary control air system, which is 100 days. The inspectors challenged the licensee as to whether the requirements of OPDP-8, Section 3.3.6, which required that the IDO be based on information that is "sufficient to conclude that there is a reasonable expectation that the SCC is operable" by considering the impacts of a number of items, including: "technical specification specified safety functions and events protected against, compensatory measures, equipment failure modes, and mission time" was being satisfied. The licensee documented a revision to the initial IDO that included additional information from a confidence surveillance test after the first IDO was completed. The licensee reinstalled the failed valve into the system and performed a surveillance test of the compressor to show that it was operable/functional. The surveillance test acceptance criteria was met. The other aspects of OPDP-8 section 3.3.6.F were not addressed in the revised IDO.

During further inspection of the failure mechanism of the valve, the inspectors discovered that the orientation of the valve and the size of the flanged piping extensions did not allow for a determination of what internal failure mechanism may have caused

the failure of the valve to close as described in their engineering evaluation. The licensee agreed that the nature of the internal valve failure could not be determined without a destructive analysis of the valve internals from the vendor. As a result, a PDO was requested and it concluded that the A train auxiliary control air system was operable/functional, but a compensatory measure was needed to open a manual bypass line valve. This configuration was already in place with the valve removed from the system, but the bypass valve was closed during the earlier confidence surveillance test, resulting in potential inoperability/nonfunctionality of the A train auxiliary control air system. The PDO created an additional compensatory measure to run the compressor continuously unloaded to address a long term concern associated with condensation creating internal piston cylinder rust. The licensee initiated CR 1129322 to document the inadequacies associated with the IDOs.

Analysis. The licensee's failure to document an IDO for the auxiliary control air system compressor A-A based on information "sufficient to conclude that there is a reasonable expectation that the SCC is operable", as required by OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking, Revision 21, was a performance deficiency. The performance deficiency was more than minor because it affected the equipment performance attribute of the mitigating system cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, reasonable assurance of operability/functionality did not exist for the A train of auxiliary control air from January 13, 2016, until January 14, 2016 and it therefore should have been declared inoperable/nonfunctional. The inspectors performed an initial screening of the finding in accordance with NRC Manual Chapter IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power". Using IMC 0609 Appendix A, Exhibit 2 – Mitigating Systems Screening Questions, the inspectors determined that this finding was of very low safety significance (Green) because the finding did not represent an actual loss of function of a single train for greater than its TS allowed outage time. This finding had a cross-cutting aspect in the area of human performance, conservative bias, because the licensee failed make the conservative decisions. Specifically, the licensee reinstalled a degraded valve in the auxiliary control air system without fulling understanding the failure mechanism or its impact on system operability/functionality. [H.14].

Enforcement. 10 CFR Part 50, Criterion V, "Instructions, Procedures, and Drawings", states, 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, procedures, or drawings." This requirement is implemented, in part, by TVA procedure OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking, Rev. 21. OPDP-8, Section 3.3.6.F, requires that the IDO be based on information that is sufficient to conclude that a reasonable expectation of operability exists. Contrary to the above, between January 13, 2016, and January 14, 2016, the IDO for CR 1125040 was not accomplished in accordance with requirements of OPDP-8 section 3.3.6.F. Specifically, the IDO was not based on information "sufficient to conclude that there is a reasonable expectation that the SCC is operable" for the A train auxiliary control air system. The licensee subsequently completed a PDO and implemented compensatory measures.

This violation is being treated as an NCV consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's CAP as CR 1129322. NCV 05000390/2016001-02, Inadequate Immediate Determination of Operability for the Auxiliary Control Air System Train A.

.2 (Opened) Unresolved Item 05000390/2016001-08, Charging Pump 1B-B Room Cooler Fan Bearing Failure

Introduction. Inspectors identified an unresolved item (URI) associated with the failure of the 1B-B charging pump room cooler. This item is unresolved pending review of an equipment apparent cause evaluation that was performed after deficiencies were identified by inspectors in the past operability evaluation.

Description. On September 27, 2015, the licensee installed a new bearings on the 1B-B CCP room cooler fan shaft as part of planned maintenance (PM) under WO 115790759. The WO noted the room cooler had a broken lubrication line close to the point where it is attached to the outboard fan shaft bearing, but the new bearing on the fan shaft, including the outboard shaft bearing, were installed without an immediate repair of the lubrication line. The bearing replacements for WO 115790759 were accomplished in accordance with maintenance procedure 0-MI-0.16, Maintenance Guidelines for Belt Driven Equipment, Rev. 7. Appendix D, Bearing Installation, Step 14 requires, "All remote lubrication lines, remote vibration attachments, etc. shall be verified as attached prior to return to service." The work order noted at this step that the lubrication line to the outboard fan shaft bearing was broken in half and will need to be replaced prior to return to service and the step was left blank. The licensee did not initiate a CR for this degraded condition. Due to the broken lubrication line, the outboard fan shaft bearing was the only fan shaft bearing that was not greased during installation.

October 15, 2015, the licensee completed the PMT for the room cooler and noted it to be satisfactory. The broken lubrication line documented in the PM WO was identified and CR 1093983 was initiated to document the condition. This CR stated that the broken lubrication line did not affect the functionality of the fan and could be repaired at the next scheduled PM. This assessment was not questioned during the review of the CR for operability. The fan was returned to service and declared operable.

On December 4, 2015, the room cooler failed in service. The licensee declared the 1B-B charging pump inoperable and entered the applicable TS LCO. Investigation revealed that the outboard fan shaft bearing had failed. At this point, the inappropriate treatment of the degraded lubrication line under 0-MI-0.16 and the associated PMT was identified. This issue was documented in the licensee's CAP in CR 1111791.

The licensee performed a past operability evaluation (POE) for CR 1111791 which concluded the fan was operable until several hours before the time of the failure. The POE was based largely on statements from the bearing vendor indicating that the new bearing was pre-lubricated at the factory and should have performed under load for a long period of time without needing to be pre-greased at installation. The POE was hampered by the fact that the licensee did not retain the damaged bearing for failure analysis. The inspectors reviewed the POE and determined that it failed to adequately

document sufficient information to either discount the broken lubrication line as a cause of the bearing failure or to identify another cause. In response, the licensee opened an investigation of the cause of the bearing failure under an equipment apparent cause evaluation.

Because more information is necessary to evaluate the cause of the 1B-B CCP room cooler fan shaft bearing failure, future inspection is required to determine if a more than minor performance deficiency or violation exists associated with this issue. Specifically, the inspectors need to review the equipment apparent cause evaluation, which was not completed by the end of the inspection period. This is identified as URI 05000390/2016001-08, Charging Pump 1B-B Room Cooler Fan Bearing Failure.

#### 1R18 Plant Modifications (71111.18)

##### a. Inspection Scope

The inspectors reviewed the permanent plant modifications listed below 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. Documents reviewed are listed in the Attachment. This activity constituted two Plant Modifications inspection samples, as defined in IP 71111.18.

- Temporary modification WBN-1-2015-0047, route Unit 1 main turbine EHC leak to the EHC tank
- Temporary modification WBN-0-2016-067-001, Temporary modification of pipe encapsulation/clamp around ERCW discharge G-B check valve, WBN-0-CKV-067-0503G-B, to eliminate gasket leak, Rev. 0

##### b. Findings

No findings were identified.

#### 1R19 Post-Maintenance Testing (71111.19)

##### a. Inspection Scope

The inspectors reviewed the 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. Documents reviewed are listed in the Attachment. This activity constituted six Post Maintenance Testing inspection samples, as defined in IP 71111.19.

- WO 116720683, post maintenance test (PMT) following interlock bypass switch installation for B-A ERCW pump
- WO 117543137, 1-SI-72-906-A, containment spray flow control valve 1-FCV-72-39 valve position indication verification and full stroke exercising following routine planned maintenance
- WO 116730870, PMT for containment spray pump 1A-A relay replacement under DCN 64044-A
- WO 116973384, 0-SI-82-17-A, Emergency diesel generator (EDG) 1A-A 184 day fast start and load test following EDG governor card replacement
- WO 116951920, 1A-A containment spray pump room cooler motor post maintenance test following planned maintenance
- WO 117227223, 2A-A containment spray pump room cooler post maintenance test following routine planned maintenance

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors witnessed the 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. Documents reviewed are listed in the Attachment. This activity constituted six Surveillance Testing inspection samples; two in-service; and four routine, as defined in IP 71111.22.

In-Service Test:

- WO 117048926, 0-SI-70-902-S, Component cooling system (CCS) pump C-S quarterly performance test
- WO 116966214, 1-SI-62-901-A, 1A-A centrifugal charging pump (CCP) quarterly performance test

Routine Surveillances

- WO 117061860, 0-SI-82-12-A, Monthly diesel generator start and load test DG 2A-A
- WO 117006513, 1-SI-63-10.1-A, ECCS discharge pipes venting - train A inside containment
- WO 116966129, 1-SI-63-10.1-A, ECCS discharge pipes venting - train A inside containment
- WO 117593789, 1-SI-63.10.1-A, ECCS discharge pipes venting - train A inside containment

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope

The inspectors observed an emergency planning (EP) radiological emergency plan training drill that contributed to the licensee's drill/exercise performance and emergency response organization performance indicator measures on March 3, 2016.

This drill was intended to identify any licensee weaknesses and deficiencies in classification, notification, dose assessment, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulator and the technical support center to verify that event classification and notifications were done in accordance with Emergency Plan Implementing Procedure (EPIP)-1, Emergency Classification Procedure, and licensee conformance with other applicable EPIPs. The inspectors also observed licensee actions in the corporate emergency operations facility to verify actions were completed in accordance with applicable emergency procedures. The inspectors attended the post-drill critique to compare any inspector-observed weaknesses with those identified by the licensee in order to verify whether the licensee was properly identifying EP-related issues and entering them into the CAP, as appropriate. This activity constituted one EP drill evaluation inspection sample.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES (OA)

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

4OA1 Performance Indicator (PI) Verification (71151)a. Inspection Scope

The inspectors sampled licensee submittals for the four PIs listed below. To verify the accuracy of the PI data reported from January 1, 2015 through December 31, 2015, PI definitions and guidance contained in NEI 99-02, Regulatory Assessment Indicator Guideline, Rev. 6, were used to verify the basis in reporting for each data element. This activity constituted four performance indicator samples, as defined in IP 71151.

- Unplanned scrams
- Scrams with loss of normal heat removal
- RCS activity
- Unplanned power changes per 7000 critical hours

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152).1 Review of Items Entered into the Corrective Action Program (CAP)a. Inspection Scope

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

b. Findings

No findings were identified.

.2 Annual Sample: Review of CR 1118632, Turbine Driven Auxiliary Feedwater Pump Governor Calibration WO Delivered for operations Review 60 Days Latea. Inspection Scope

The inspectors conducted a detailed review of the following CRs:

- CR 1118632, The completed work order that calibrated the Turbine Driven Auxiliary Feed water pump (TDAFW) governor controls, was not presented to Operations for review until 60 days later and had calibration data outside the acceptance criteria.

The inspectors evaluated the following attributes of the licensee's actions:

- complete and accurate identification of the problem in a timely manner
- evaluation and disposition of operability and reportability issues
- consideration of extent of condition, generic implications, common cause, and previous occurrences
- classification and prioritization of the problem
- identification of root and contributing causes of the problem
- identification of any additional condition reports
- completion of corrective actions in a timely manner

b. Findings

Introduction: The NRC identified a Green NCV of TS 5.7.1.1.a, Procedures, for the licensee's inadequate implementation of procedure NPG-SPP-01.2, Administration of Site Technical Procedures, Rev. 8. Specifically, the licensee determined applicable acceptance criteria steps in technical procedures were not applicable (N/A) in lieu of performing a procedure change. This resulted in challenging the operability of safety-related plant equipment.

Description: On December 21, 2015, the licensee was reviewing the completed WO 117263617, IMI-46.001, Calibration of the Turbine Driven Auxiliary Feedwater Pump 1-A-S Governor Controls, Rev.15, and identified that calibration data was outside the acceptance criteria range for the "Null voltage" and "0%" speed setting as prescribed in IMI-46.001. IMI-46.001 Section 6.10, which defines the acceptance criteria for the calibration, was marked "N/A" during performance of the procedure. The purpose of IMI-46.001 is to provide detailed steps for the calibration of TDAFW pump governor controls and associated instrumentation.

NPG-SPP-01.2, Administration of Site Technical Procedures, Rev. 8, is the procedure used by the licensee to establish the minimum requirements for use, preparation, revision, review, approval, cancellation and administrative hold of site and common technical procedures. Section 3.2.10, Use of Not Applicable (N/A), provides criteria when N/A is acceptable, but notes "it is NOT to be used on applicable acceptance criteria or to bypass steps that are inadequately or improperly written or to be used in lieu of a procedure change". Inspectors noted that IMI-46.001 did have a note in section 6.10 that allowed "adjustment steps that are not required" to be marked N/A by the responsible engineer. The inspectors concluded that this note was inadequate because, like in this case, it can create a conflict on the use of N/A between the lower tier instrument maintenance instruction, IMI-46.001, and the higher tier fleet procedure, NPG-SPP-01.2.

Operations created CR 1118632 and performed an immediate determination of Operability (IDO) and determined the TDAFW pump was operable based on the successful completion of the TDAFW pump full flow test, 1-SI-3-923-S, on October 20, 2015. The inspectors reviewed the IDO and questioned the licensee if any other design functions of the TDAFW pump were adversely affected by the miscalibration, which may

not be identified by the full flow test. The licensee concluded, and documented in the IDO, that the speed indication was accurately calibrated on the range of speed the pump is operated at and that the lower end out of calibration would not affect operability, though it is outside the acceptance criteria.

Analysis: The licensee's failure to adequately implement procedure, NPG-SPP-01.2 Revision 8, Administration of Site Technical Procedure, Section 3.2.10, was a performance deficiency. The performance deficiency was more than minor because, if left uncorrected, it could lead to a more significant safety concern with the use of N/A and implementation of site technical procedures. Specifically, if further adjustments outside of the acceptance criteria or additional acceptance criteria were not met, it could have resulted in the TDAFW pump becoming inoperable. Using IMC 609, Significance Determination Process, Appendix A, Exhibit 2-Mitigating Systems Screening Questions, the inspectors determined this finding to be of very low safety significance (Green) because it was a deficiency affecting the design or qualification of equipment and operability was maintained. The finding had a cross-cutting aspect of Procedure Adherence, as described in the Human Performance cross-cutting area because the licensee failed to comply with NPG-SPP-01.2. [H.8]

Enforcement: Enforcement. TS 5.7.1.1.a, "Procedures," requires, in part, that written procedures be established, implemented, and maintained covering activities related to procedures recommended in Regulatory Guide 1.33, Rev. 2, Appendix A, 1978. Regulatory Guide 1.33, Section 1(h), "Administrative Procedures," required procedures addressing procedure use. These requirements are implemented, in part, by TVA procedure NPG-SPP-01.2, Administration of Site Technical Procedures. NPG-SPP-01.2, Section 3.2.10, Use of Not Applicable (N/A), provides criteria when N/A is acceptable, but notes "it is NOT to be used on applicable acceptance criteria or to bypass steps that are inadequately or improperly written or to be used in lieu of a procedure change". Contrary to this requirement, on October 20, 2015, the licensee used N/A for acceptance criteria steps in technical procedure IMI-46.001. This violation is being treated as an NCV, consistent with Section 2.3.2. of the Enforcement Policy. The violation was entered into the licensee's CAP as CR 1125256. NCV 05000390/2016001-03, Failure to Adequately Implement the Administration of Site Technical Procedures for TDAFW Pump Governor Calibration.

### .3 Annual Sample: Review of Multiple Pump Mechanical Seal Issues

#### a. Inspection Scope

The inspectors conducted a detailed review of the following CRs:

- CR 1125623, required measurements not taken on 1A Safety Injection Pump Seal replacement.
- CR 1142428, QA level 3 seal material used in safety related pumps and CR/Offsite Dose evaluation for ECCS leakage outside containment, to include maximum seal leakage.
- CR 1043242 Trend of RHR pump seal leakage.

- CR 1140303 2B Component Cooling System pump developed significant seal leakage on the pump inboard seal, appropriate PMT following replacement.
- CR 1125147 "A" Mechanical seal replacement.
- CR 1126967 Conclusions in Operability Determinations adverse trend.

The inspectors evaluated the following attributes of the licensee's actions:

- complete and accurate identification of the problem in a timely manner
- evaluation and disposition of operability and reportability issues
- consideration of extent of condition, generic implications, common cause, and previous occurrences
- classification and prioritization of the problem
- identification of root and contributing causes of the problem
- identification of any additional condition reports
- completion of corrective actions in a timely manner

b. Findings

(Opened) Unresolved Item 05000390/2016001-09, Appropriateness of Corrective Actions Associated with Safety Related Pump Mechanical Seal Issues and the Effect on Plant Response

Introduction: The inspectors identified an URI associated with the timely and effective corrective action associated with an adverse trend in safety related pump performance, including mechanical seal degradation and failure. This item is unresolved pending review and evaluation of the licensee's response to the CRs generated to determine if a performance deficiency exists.

Description: During Unit 1, 2015 fall outage, the 1A Safety Injection (SI) pump mechanical seal was replaced. The mechanical seal had degraded to a point at which the leakage was greater than the Technical Specification limit for ECCS leakage outside of containment. The inspectors identified several issues during a review of the Prompt Determination of Operability for CR 1125623 and WO 116050574 to replace the seal. Specifically, inspectors found that non-QA1 parts were being used for seal replacement, the seal was the original equipment manufacturer part from startup, the failure mechanism was not clearly understood, and an extent of condition review was not performed. The inspectors reviewed other safety related pump mechanical seal performance and corrective action program entries. The inspectors are awaiting the completion of the licensee's evaluation to determine the licensee's compliance with applicable procedures and TS relative to pump operability and ECCS leakage limits outside containment.

Additional inspection activities are needed to determine the extent of condition and compliance with the procedures and TS. Pending the results of this additional inspection, an URI will be opened and designated as URI 05000390/2016001-09, Appropriateness of Corrective Actions Associated with Safety Related Pump Mechanical Seal Issues and the Effect on Plant Response.

#### .4 Annual Sample: Emergency Core Cooling System Venting Inside Containment

##### a. Inspection Scope

The inspectors conducted a detailed review of the following CRs:

- CR 1124906 – Excessive gas vented during performance of 1-SI-63-10.1-A
- CR 1125372 – Unable to perform 1-SI-3-10.1-A
- CR 1127959 – The performance of 1-SI-63-10.1A on 12/9/15 did not meet SR 3.5.2.3
- CR 1114752 – 1-SI-63-10.1-A procedure/test rig requires revision/modification
- CR 1135820 – CR to drive creation of a PDO for U1 ECCS venting
- CR 1136359 – ECCS venting roll up of issues

The inspectors evaluated the following attributes of the licensee's actions:

- complete and accurate identification of the problem in a timely manner
- evaluation and disposition of operability and reportability issues
- consideration of extent of condition, generic implications, common cause, and previous occurrences
- classification and prioritization of the problem
- identification of root and contributing causes of the problem
- identification of any additional condition reports
- completion of corrective actions in a timely manner

##### b. Findings

Introduction. The inspectors identified an apparent violation of TS 5.7.1.1.a, Procedures for the licensee's failure to maintain procedure 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Revisions 11-16, in accordance with the requirements of Regulatory Guide 1.33. Specifically, the procedure did not have provisions for quantifying accumulated gases during venting which allowed ECCS piping to be vented without being evaluated for potential adverse impacts on system operability.

Description. NRC Generic Letter 2008-01, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems states, in part, that surveillance requirements should reasonably ensure that gas has not affected operability and will not likely accumulate in sufficient quantity to jeopardize operability before the next surveillance. The licensee performs surveillance procedure 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, to meet TS Surveillance Requirement (SR) 3.5.2.3 which verifies that ECCS piping is full of water by venting system piping high points. The procedure, prior to revision 11, also included methods to quantify the amount of gas vented from the piping. The inspectors reviewed past performances of the surveillance and noted that 1-SI-63-10.1A had been revised eight times since July 2015. These revisions included several one-time only revisions and were in response to problems with gas quantification test methods, ultimately resulting in Revision 16, which removed gas quantification steps. The acceptance

criteria for 1-SI-63-10.1A, revisions 11-16 was to observe a solid stream of water issuing from the vent line for each section of piping that is vented. There were no provisions in the procedure for quantifying any gas that was released. Therefore, operability impacts associated with any gas went unanalyzed.

Interviews with operations personnel who conduct the surveillance instruction (SI), observation of the venting by inspectors, and review of the SI venting data, showed that reliable gas quantification data had not been recorded since July 2015. Since no reliable analysis was available to support the licensee's process of measuring ECCS piping gas, the inspectors concluded that the procedure revisions which removed gas quantification requirements were inadequate. Additionally, instances where the procedure did require gas quantification, but the results were not evaluated as reliable due to problems with the quantification or testing methods, also represent inadequate procedural revisions. Furthermore, inspectors noted that revision 14, performed on December 9, 2015, removed all acceptance criteria from the procedure, including the requirement to verify that all gas has been vented from the system by the observation of a solid stream of water. Inspectors concluded that this procedure change did not meet the TS SR 3.5.2.3. The licensee addressed the December 9, 2015 surveillance as a missed surveillance.

In response to the inspectors concerns the licensee performed a prompt determination of operability (PDO) on February 2, 2016. The PDO concluded that current gas accumulation rates in the ECCS would require weekly performances of 1-SI-63-10.1A in order to ensure operability of ECCS until corrective actions to build scaffolding to allow for manual ultrasonic testing (UT) of gas accumulation could be completed. The licensee entered these issues into their corrective action program as CR 1136359.

Analysis. The inspectors determined that the licensee's failure to maintain 1-SI-63-10.1-A, as required by technical specifications, was a performance deficiency (PD). The PD was more than minor because if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern. Specifically, if left uncorrected the potential existed for an unacceptable void affecting ECCS operability to develop prior to the next scheduled surveillance.

The inspectors characterized the finding using IMC 0609, Appendix A, Significance Determination Process, Exhibit 2, Mitigating Systems, dated June 19, 2012. The inspectors determined the finding could not be screened to GREEN and may require a detailed risk evaluation following a determination of whether the finding represents a loss of system and/or function. The finding does not present an immediate safety concern because the licensee has verified current operability. Because the safety characterization of this finding is not yet finalized, it is being documented with a significance of To Be Determined (TBD). The inspectors determined that the finding had a cross-cutting aspect of change management in the area of Human Performance because the licensee failed to use a systematic process to implement changes to the ECCS venting procedure to ensure that GL 2008-01 commitments would continue to be met. [H.3]



Enforcement. TS Section 5.7.1.1.a states, in part, that “written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978.” NRC Regulatory Guide 1.33, Appendix A, Section 8.b states, “Specific procedures for surveillance tests, inspections, and calibration should be written (implementing procedures are required for each surveillance test, inspection, or calibration listed in the technical specification)”. Contrary to the above, from July 2015, until February 2016 the licensee failed to maintain a procedure required by Regulatory Guide 1.33, Appendix A, Sections 8b. Specifically, surveillance procedure 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Revisions 11-16, failed to include provisions to accurately quantify the amount of gas vented. This resulted in potential adverse impacts on system safety function due to accumulated gas voids in the ECCS piping. The licensee implemented manual ultrasonic testing (UT) of gas accumulation and entered this issue into the corrective action program as CR 1136359. This violation is being treated as an AV consistent with the NRC’s Enforcement Policy, AV 05000390/2016001-10, Failure to Maintain an Adequate Surveillance Procedure for Emergency Core Cooling System Venting.

#### 4OA3 Event Follow-up (71153)

##### .1 Unit 2 Notification of Unusual Event Due to a Plant Fire

###### a. Inspection Scope

On March 9, 2016, Unit 2 was in Mode 5 when a fire occurred in the 2B hotwell pump at 3:27 a.m. The fire was not extinguished within 15 minutes, and the site declared a Notification of Unusual Event (NOUE) at 3:42 a.m. The on-site fire brigade responded, and the fire was out at 3:58 a.m. The site completed overhaul of the fire and exited the NOUE at 5:08 a.m. Unit 1 was operating at 100 percent power and was not affected by the event.

The inspectors reviewed Unit 2 operations logs and EPIP-2, Notification of Unusual Event, to verify proper licensee staff performance. The inspectors also reviewed the initial licensee notification to verify it met the requirements specified in NUREG-1022, Event Reporting Guidelines, Rev. 2. Additional documents reviewed are listed in the Attachment.

###### b. Findings

No findings were identified.

##### .2 Unit 1 Automatic Reactor trip due to a Main Turbine Control Circuit Failure

###### a. Inspection Scope

The inspectors responded to a Unit 1 automatic reactor trip that occurred on March 22, 2016, due to a rapid closure of the main turbine governor valves. The governor valves closed rapidly due to a failure of the main turbine governor valve position limiter card.

The governor valve closure represented a full turbine load rejection, and resulted in tripping the over-temperature delta-temperature protective feature.

The inspectors discussed the preliminary cause of the trip with the licensee and reviewed unit parameters and system response to verify that equipment responded to the reactor trip as designed. The inspectors also reviewed parts of the licensee's post-trip review. The inspectors reviewed the initial licensee event notification to verify that it met regulatory requirements.

b. Findings

No findings were identified.

.3 Multiple Issues Identified Associated with Operating Crew Performance during Unit 1 Heatup in Mode 4 on November 11, 2015

a. Inspection Scope

On November 11, 2015, Watts Bar Unit 1 was in start-up after a maintenance outage. While in Mode 4 plant heat-up, with the plant in an abnormal line-up due to normal chemical volume control system letdown being isolated for repairs, the nonconservative decision was made to secure residual heat removal (RHR) cooling and heatup the RCS. Within one hour after removal of the RHR system from service, operators took compensatory actions to re-establish control of pressurizer level after it had risen from 43 percent to 79 percent. The operators re-established control by aligning the RHR system for letdown flow. Inspectors reviewed the event including plant logs, computer data, recorders, and interviewed licensee personnel to obtain an understanding of plant status, equipment/personnel performance, and plant management decisions associated with the event. Additionally, as part of the inspection of this event, inspectors made efforts to note any issues associated with components of safety culture as described in IMC 0310, "Components within the Cross-cutting Areas."

b. Findings

.1 Failure to Place the RHR System in ECCS-Standby Mode Prior to Exceeding an RCS Temperature of 212 °F.

Introduction. The NRC identified an NCV of TS 5.7.1.1.a, Procedures, for the licensee's failure to place the residual heat removal (RHR) into ECCS-Standby Mode prior to the reactor coolant system (RCS) temperature exceeding 212 °F as required by procedure 1-GO-1, Unit Startup from Cold Shutdown to Hot Standby, Rev. 4.

Description. On November 11, 2015, the licensee entered Mode 4 following a maintenance outage. Procedure 1-GO-1, Unit Startup from Cold Shutdown to Hot Standby, Revision 4, provides direction on how to heat-up and pressurize the plant. Section 5.4, step [8.3] states "Before the RCS (Reactor Coolant System) exceeds 212 °F ... Place RHR (Residual Heat Removal) system in ECCS-Standby mode per 1-SOI-

74.01, Residual Heat Removal System, Revision 2.” This is done in order to meet the requirements of TS 3.5.2, ECCS –Operating, and 3.5.3, ECCS- Shutdown while guaranteeing that the water temperature at the suction of the RHR pumps remains below 235 °F. This would ensure that the water in the suction of the RHR pump would be cold enough to keep it from flashing if the pump were called upon to operate in an emergency.

The RHR system was isolated when RCS temperature was approximately 216 °F and fully placed in an ECCS-Standby mode with the RCS temperature at approximately 230 °F.

Inspectors noted the following TVA procedural requirements:

Procedure OPDP-1 Section 3.8.1.G states:

“Procedure compliance is mandatory. If a procedure is required but not available or the procedure is incorrect or inadequate to safely conduct the evolution. then the evolution in progress is stopped until the procedure is revised or written and approved.”

Analysis. The inspectors determined that the licensee’s failure to complete placing the RHR system into an ECCS- Standby lineup in accordance with 1-GO-1 was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected a failure to align a safety system under the proper plant conditions could lead to that system being inoperable or degraded. The inspectors evaluated the significance of this finding using IMC 0609 Appendix A, dated June 19, 2012, The Significance Determination Process (SDP) for Findings at Power, Exhibit 2, Mitigating Systems Screening Questions. The inspectors determined that this finding was of very low safety significance (Green) because the system temperatures never rose high enough to allow the RHR pump suction header to potentially form steam voids. The performance deficiency had a cross-cutting aspect of Avoid Complacency in the area of Human Performance because licensee personnel were complacent and failed to question the long held idea that the particular step just needed to be started prior to exceeding an RCS temperature of 212 °F. [H.12]

Enforcement. TS 5.7.1.1.a, “Procedures,” required, in part, that written procedures be established, implemented, and maintained for activities recommended in Regulatory Guide 1.33, Rev. 2, Appendix A. Procedures 1-GO-1 and OPDP-1, Conduct of Operations, are required by this Appendix. Procedure OPDP-1 Section 3.8.1.G requires, in part, that procedure compliance is mandatory. On November 11, 2015, the licensee entered Mode 4 following a maintenance outage. Procedure 1-GO-1, Unit Startup from Cold Shutdown to Hot Standby, Rev. 4, provided direction on how to heat-up and pressurize the plant. Section 5.4, step [8.3] stated “Before the RCS (Reactor Coolant System) exceeds 212 °F ... Place RHR (Residual Heat Removal) system in ECCS-Standby mode per 1-SOI-74.01, Residual Heat Removal System, Revision 2.” Contrary to this requirement, the RHR system was not placed into ECCS-Standby until after the RCS temperature exceeded 212 °F. Because this finding is of very low safety significance (Green) and was entered into the CAP as CR 1127691, this issue is being treated as an NCV consistent with Section 2.3.2.a of the Enforcement Policy. NCV

05000390/2016001-04: Failure to Place the RHR System in ECCS-Standby Mode Prior to Exceeding an RCS Temperature of 212 °F.

.2 Failure to Use Approved Procedures to Place RHR Letdown In Service

Introduction. The NRC identified an NCV of TS 5.7.1.1.a, Procedures, for the licensee's failure to use any approved procedures to place RHR Letdown in service.

Description. On November 10, 2015, the licensee removed normal letdown from service for maintenance. The next day, the licensee chose to enter Mode 4 and then isolated the RHR system in preparation for a continued RCS heat-up, with the reactor shutdown, even though normal letdown had not yet been restored. The operating crew discussed their concerns with performing a heat up without normal letdown because there was no specific procedural direction and none of the operators had ever performed this operation before. But, because the operating crew did not identify any specific prohibition against performing a heat-up under these plant conditions, the crew began the heat-up. The licensee stated that they believed excess letdown would be adequate to maintain pressurizer level during the heat-up. Therefore, no formal contingency plans were developed to deal with an unexpected level rise in the pressurizer. As the heat-up progressed, the operating crew noted that pressurizer level was rising faster than anticipated. They minimized charging flow and attempted to arrest the heat-up by dumping steam to the condenser. However, since steam pressure was low (approximately 5 psig), dumping steam was ineffective to stop the heat-up. Then, the operating crew decided that they needed to let down more RCS volume and determined that this could be done using RHR Letdown. At the time, the RHR hot leg suction isolation valves had been closed to allow placing the RHR system in an ECCS-Standby mode. In order to place RHR Letdown in service, the crew decided to open the RHR hot leg suction valves without procedural direction.

If the crew had used a procedure, it was determined by the inspector that they would have used 1-SOI-74.01, Residual Heat Removal System, Rev. 2. First the RHR system would have been placed in service in accordance with Section 5.8, Placing RHR in Service. This would have entailed opening the RHR hot leg suction valves and then starting one of the RHR pumps. Then, they would have placed letdown in service in accordance with Section 8.3, Establishing RHR Letdown. By not using the procedure, the crew failed to fully place RHR in service in that they did not start any RHR pumps prior to placing letdown in service.

Inspectors noted the following TVA procedural requirements:

Procedure OPDP-1 Section 3.8.1.G states:

“Procedure compliance is mandatory. If a procedure is required but not available or the procedure is incorrect or inadequate to safely conduct the evolution then the evolution in progress is stopped until the procedure is revised or written and approved.”

Procedure NPG-SPP-01.2 Section 3.2.1 Procedure Use and Adherence - General Requirements states:

“Procedure adherence means understanding a procedure’s purpose, scope, and intent and following its directions. The user performs all actions as written in the sequence specified by the procedure. However, if the procedure cannot be used as written, then the activity is stopped and the issue is resolved before the user continues.”

Through interviews, the inspectors identified that although operators had reservations about performing a plant heat-up without normal letdown in service, the evolution was performed, in part, because the operators could not identify a prohibition to performing the evolution. In addition, there were indications that licensed operators may have received undue influence and direction from TVA staff outside the control room. During the events on November 11, 2015 the operating crew moved forward with the heat-up despite having concerns, in part, because there was a fear of reprisal. The licensee’s root cause evaluation of this event identified the fear of reprisal as a contributing cause.

Analysis. The inspectors determined that the licensee’s failure to use any approved operating procedures to place RHR Letdown in service as required by OPDP-1, Conduct of Operations, and NPG-SPP-01.2, Administration of Site Technical Procedures, was a performance deficiency. The performance deficiency was determined to be more than minor because if left uncorrected a failure to use procedures to place systems or portions of systems in service could result in equipment being operated incorrectly and that system could then become inoperable or degraded. The inspectors evaluated the significance of this finding using IMC 0609 Appendix A, dated June 19, 2012, The Significance Determination Process (SDP) for Findings at Power, Exhibit 2, Mitigating Systems Screening Questions. The inspectors determined that this finding was of very low safety significance (Green) because the way that the system was placed in service did not cause any safety related components to become inoperable nor did it represent an actual loss of function of one or more non-TS trains of equipment designated as high safety-significant in accordance with the licensee’s maintenance rule program for greater than 24 hours. The performance deficiency had a cross-cutting aspect of SCWE policy in the area of Safety Conscious Work Environment because the licensee organization failed to effectively implement a policy that supports individuals’ rights and responsibilities to raise safety concerns, and does not tolerate harassment, intimidation, retaliation, or discrimination for doing so. [S.1]

Enforcement. TS 5.7.1.1.a, “Procedures,” required, in part, that written procedures be established, implemented, and maintained covering activities related to procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, 1978. Regulatory Guide 1.33, Section 1(h), “Administrative Procedures,” required procedures addressing procedure use. These requirements are implemented, in part, by TVA procedures OPDP-1, Conduct of Operations, and NPG-SPP-01.2, Administration of Site Technical Procedures.

Procedure OPDP-1 Section 3.8.1.G states:

“Procedure compliance is mandatory. If a procedure is required but not available or the procedure is incorrect or inadequate to safely conduct the evolution then the evolution in progress is stopped until the procedure is revised or written and approved.”

Procedure NPG-SPP-01.2 Section 3.2.1 Procedure Use and Adherence - General Requirements states:

“Procedure adherence means understanding a procedure’s purpose, scope, and intent and following its directions. The user performs all actions as written in the sequence specified by the procedure. However, if the procedure cannot be used as written, then the activity is stopped and the issue is resolved before the user continues.”

Contrary to the above, the licensee failed to use and adhere to procedure 1-SOI-74.01, Residual Heat Removal System, Revision 2 during a transient on November 11, 2015. Because this finding is of very low safety significance (Green) and was entered into the CAP as CR 1127691, this issue is being treated as an NCV consistent with Section 2.3.2.a of the Enforcement Policy, NCV 05000390/2016001-05, Failure to Use Approved Procedures to Place RHR Letdown In Service

### .3 Failure to Track Applicable Technical Specification Action Statement for Charging Pump Inoperability

Introduction. The NRC identified a Green NCV of Technical Specification (TS) 5.7.1.1.a, Procedures, for the licensee’s failure to implement OPDP-8, Operability Determinations and LCO tracking. Specifically, the licensee failed to track the applicability of action statement ‘B’ of TS LCO 3.5.3, ECCS- Shutdown, during planned testing.

Description. On November 11, 2015, the operating crew began a routine test of the component cooling system (CCS) pumps per 1-SI-70-915-B, Component Cooling System Pump 1B-B Preservice Pump Test, Rev. 1, at 1:30 p.m. This test adjusted the CCS flows to ensure that they could meet accident analysis requirements. When the test was started, the 1B-B charging pump was out of service. During the test, some CCS flow was diverted from the 1A-A charging pump oil cooler. It was noted in WO 116771811 that the crew identified that the 1A-A charging pump CCS flow was approaching its low flow alarm setpoint. At that point, the WO only states that they suspended the test and restored the system to normal.

A review of the computer generated logs identified that Alarm 241-D, “CCP 1A-A GEAR & OIL CLR FLOW LO” was actuated from approximately 1445 to 1453 and again from 1455 to 1456. This indicated that flow was below 25 gpm through the coolers for these periods of time. The Annunciator Response Instruction for 241-D contained a note that a charging pump can survive 10 to 12 minutes without any CCS flow to the oil cooler. Additionally, the vendor technical manual stated that the pump and gear lube oil coolers

should have at least 28 gpm of combined cooling flow through them. Therefore, the charging pump should have been declared inoperable during the periods of low cooling flow. There are no records of the operating crew declaring the pump inoperable or even acknowledging that the low flow alarm had actuated. There was no record of the potential for this alarm to occur and there was no record of any compensatory actions that the crew would take if this alarm were to come in. In fact, the only written record was the WO note described earlier that stated the CCS flow in the 1A-A charging pump was “approaching” its low flow alarm setpoint.

Inspectors noted that licensee procedure OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking, Rev. 21, Section 3.5.1 requires narrative log entries for tracking entry and exit from applicable TS LCOs.

Analysis. The licensee’s failure to track applicable TS LCOs, as required by section 3.5.1 of OPDP-8 was a performance deficiency. The performance deficiency was more than minor because, if left uncorrected, it would have had the potential to lead to a more significant safety concern in that, the failure to track an applicable Technical Specification action statement could lead to plant operations outside of TS analyzed conditions. The inspectors evaluated the significance of this finding using IMC 0609 Appendix A, dated June 19, 2012, The Significance Determination Process (SDP) for Findings at Power, Exhibit 2, Mitigating Systems Screening Questions. The inspectors determined that this finding was of very low safety significance (Green) because the finding did not represent an actual loss of function of a single train for greater than its TS allowed outage time nor did it not represent an actual loss of function of one or more non-Technical Specification equipment for greater than 24 hours. The performance deficiency had a cross-cutting aspect of Challenge the Unknown in the area of Human Performance because licensee personnel did not appropriately stop, question, and evaluate the risks before proceeding when the 1A-A CCP oil cooler low flow alarm came in during flow testing. [H.11]

Enforcement. TS 5.7.1.1.a, “Procedures,” required, in part, that written procedures be established, implemented, and maintained covering activities related to procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, 1978. Regulatory Guide 1.33, Section 1(h), “Administrative Procedures,” required procedures addressing log entries, which was partially implemented by OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking, Revision 21. OPDP-8, section 3.5.1, required, in part, narrative log entries of entry and exit from TS LCOs. Contrary to the above, the licensee failed to identify and make narrative log entries for the entry and exit from TS LCO 3.5.3, ECCS- Shutdown condition “B” on two occasions on November 11, 2015. Because this finding is of very low safety significance (Green) and was entered into the CAP as CR 1134949, this issue is being treated as an NCV consistent with Section 2.3.2.a of the Enforcement Policy, NCV 05000390/2016001-06, Failure to Track Applicable Technical Specification Action Statement for Charging Pump Inoperability.

#### .4 Failure to Maintain Operating Logs

Introduction. The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion XVII, Quality Assurance Records, for the licensee's failure to maintain sufficient records to furnish evidence of activities affecting quality.

Description. On November 10, 2015, the licensee removed normal letdown from service for maintenance. The next day, the licensee chose to enter Mode 4 and then isolated the RHR system in preparation for a continued RCS heat-up, with the reactor shutdown, even though normal letdown had not yet been restored. As the heat-up progressed, the operating crew noted that pressurizer level was rising faster than anticipated. They minimized charging flow and attempted to arrest the heat-up by dumping steam to the condensers. However, since steam pressure was low (approximately 5 psig), dumping steam was ineffective at stopping the heat-up and the increase in pressurizer level. To arrest the rising level and restore pressurizer level, the operating crew decided to reduce RCS inventory using RHR Letdown. At the time the RHR hot leg suction isolation valves had been closed to allow placing the RHR system in an ECCS-Standby mode. In order to place RHR Letdown in service, the crew decided to open the RHR hot leg suction valves. RCS inventory was drained through the RHR letdown line to restore pressurizer level.

The inspector reviewed the operating logs for November 11, 2015, and determined the events described above were not documented in the operating logs. OPDP-1 Conduct of Operations, Section 3.6, Log keeping, in part, requires:

- All members of the shift shall ensure entries are made for their respective areas of responsibility.
- Log entries document all major equipment manipulations and plant configuration changes. They should provide enough detail that events can be reconstructed at a later date.
- Capture information in the narrative log including critical thinking in sufficient detail to accurately categorize system and component operability and availability in accordance with OPDP-8.
- To aid in event reconstruction, as much significant information as possible is logged during emergencies and abnormal or unexpected events. A rough narrative log may be kept provided that entries are made in the narrative log as soon as possible.
- Shift management reviews the logs to ensure that the logs are accurate and appropriate
- The following shall be recorded upon occurrence (as soon as time allows):
  - Status changes to safety-related and other major plant equipment
  - Any reportable or potentially reportable event, including near-misses
  - Start/stop of process streams identifying origination point, end point, and volume changes.
- Pertinent evolutions related to specific watch stations such as adding hydrogen to the main generator.



The inspector conducted interviews with operators and reviewed plant operating data to obtain details about the plant operations. The inspector determined that the information omitted from operating logs was required by 10 CFR 50, Appendix B, Criterion XVII, Quality Assurance Records, which required, in part, that sufficient records shall be maintained to furnish evidence of activities affecting quality. The records shall include at least the operating logs and procedures.

Analysis. The inspectors determined that the licensee's failure to document plant operations in the operating logs in accordance with OPDP-1 was a violation of 10 CFR 50, Appendix B, Criterion XVII, Quality Assurance Records. This violation constitutes a traditional enforcement violation because it impacts the NRC's ability to carry out its regulatory function. The failure to maintain accurate logs was more than minor because it caused the NRC to undertake further inquiry and was consistent with Enforcement Policy section 6.9.d.1 for a SLIV violation. Cross-cutting aspects are not assigned to traditional enforcement violations.

Enforcement. 10 CFR 50, Appendix B, Criterion XVII, Quality Assurance Records, requires in part that sufficient records shall be maintained to furnish evidence of activities affecting quality. The records shall include at least the following: Operating logs and procedures. OPDP-1 Conduct of Operations, Section 3.6, Log keeping, in part, implements this requirement, and requires:

B. All members of the shift shall ensure entries are made for their respective areas of responsibility.

C. Log entries document all major equipment manipulations and plant configuration changes. They should provide enough detail that events can be reconstructed at a later date.

F. Capture information in the narrative log including critical thinking in sufficient detail to accurately categorize system and component operability and availability in accordance with OPDP-8.

G. To aid in event reconstruction, as much significant information as possible is logged during emergencies and abnormal or unexpected events. A rough narrative log may be kept provided that entries are made in the narrative log as soon as possible.

I. Shift management reviews the logs to ensure that the logs are accurate and appropriate

J. The following shall be recorded upon occurrence (as soon as time allows):

- 3. Status changes to safety-related and other major plant equipment
- 5. Any reportable or potentially reportable event, including near-misses
- 16. Start/stop of process streams identifying origination point, end point, and volume changes.
- 17. Pertinent evolutions related to specific watch stations such as adding hydrogen to the main generator.

Contrary to the above, on November 11, 2015, the licensee failed to maintain sufficient records to furnish evidence of activities affecting quality. Specifically, following the events on November 11, 2015, where the Operations crew initiated RHR letdown to cope with an uncontrolled increase in pressurizer water level, the licensed operators failed to implement the requirements of OPDP-1, 3.6 to enter the required information detailing the events and their actions in the operating logs. This issue has been entered into the licensee's CAP as CR 1127691 and is being treated as an NCV consistent with Section 2.3.2.a of the Enforcement Policy, NCV 0500390/2016001-07, Failure to Maintain Operating Logs.

.05 (Closed) Licensee Event Report (LER) 05000390/2014-004-02: Appendix R Unanalyzed Condition Affecting the Turbine Driven Auxiliary Feedwater Pump and Pressurizer Spray Valves

(Closed) Licensee Event Report (LER) 05000390/2015-002-01: Unanalyzed Condition Related to Spurious Opening of a Pressurizer Power Operated Relief Valve During a Postulated Appendix R Fire

a. Inspection Scope

On August 14, 2015 and August 20, 2015, the licensee submitted revised LERs documenting the discovery of a condition of non-compliances with the site's fire protection program (FPP). These conditions could prevent operators from achieving and maintaining safe shutdown (SSD) of the plant, in the case of a postulated fire.

The inspectors performed a detailed review of the information related to these LERs. Inspectors reviewed documents, and discussed the events with plant personnel to gain an understanding of the events. The inspectors assessed the licensee's compensatory measures and corrective actions to determine if they were adequate.

b. Findings

Two licensee-identified violations associated with these LERs are documented in Section 4OA7 of this report.

LER 05000390/2014-004-02, Appendix R Unanalyzed Condition Affecting the Turbine Driven Auxiliary Feedwater Pump and Pressurizer Spray Valves, and LER 05000390/2015-002-01, Unanalyzed Condition Related to Spurious Opening of a Pressurizer Power Operated Relief Valve During a Postulated Appendix R Fire are closed.

.06 (Closed) Licensee Event Report (LER) 05000390/2015-004-01: Unanalyzed Condition Due to a Volume Control Tank Isolation Time Analysis Error During a Postulated Appendix R Fire

a. Inspection Scope

On August 14, 2015, the licensee submitted a revised LER documenting the discovery of a condition of non-compliance with the site's fire protection program (FPP). This condition could prevent operators from achieving and maintaining safe shutdown (SSD) of the plant, in the case of a postulated fire.

The inspectors performed a detailed review of the information related to the LER. Inspectors reviewed documents, and discussed the event with plant personnel to gain an understanding of the event. The inspectors assessed the licensee's compensatory measures and corrective actions to determine if they were adequate.

b. Findings

No findings were identified.

LER 05000390/2015-004-01, Unanalyzed Condition Due to a Volume Control Tank Isolation Time Analysis Error During a Postulated Appendix R Fire is closed.

4OA5 Other Activities

.1 (Closed) Unresolved Item 05000390/2015004-02, AFWST Permanent Plant Modification

a. Inspection Scope

An unresolved item (URI), previously documented in the NRC Integrated Inspection Report (IIR) 05000390/2015004 (ADAMS Accession Number ML16043A214), was opened regarding the licensee's 10 CFR 50.59 evaluation for the installation of the auxiliary feedwater storage tank (AFWST). Additional inspection was required to determine if the plant modification which installed the tank would have required NRC permission in the form of a license amendment prior to the change. Specifically, inspectors needed to review the 10 CFR 50.59 evaluation that was performed to determine if it was adequate.

The inspectors reviewed the results of the licensee's 10CFR50.59 evaluation related to the impact of the modification on the design bases functions of the condensate and auxiliary feedwater systems. Based on the additional review, the inspectors did not identify any new performance deficiencies and obtained reasonable assurance that the risk associated with the AFWST piping connections to the condensate system and the addition of new check valves did not meet the "more than a minimal increase" threshold established in 10 CFR 50.59 and the guidance endorsed in Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments." Inspectors noted that the 10 CFR 50.59 screening deficiencies for the AFWST, which are mentioned in IIR 05000390, 391/2015004, were determined to constitute a minor violation of 10 CFR 50.59 (d)(1). As such, the licensee has entered the issue into their corrective action program as CR 1089218.

b. Findings

No findings were identified.

.2 (Closed) Unresolved Item 05000390/2015004-04, Shield Building Operability Requirements

a. Inspection Scope

A URI, previously documented in the NRC IIR 05000390/2015004 (ADAMS Accession Number ML16043A214), was opened regarding the licensee's application of a note in TS LCO 3.6.15.B. Additional inspection was required to determine if the requirements of 3.6.15.B applied during a specific testing alignment or if the associated TS note constitutes a nonconservative TS.

Inspectors consulted with subject matter experts in the NRC Office of Nuclear Reactor Regulation to determine the allowable legal interpretation of the note in TS 3.6.15.B. It was determined that the wording of the note does not apply a time limit to the allowance for ventilating operations and required annulus entries. Through a licensing bases review, the inspectors determined that the original intent of the note was for it to be applied during short duration events. Furthermore, inspectors had a safety concern associated with allowing the shield building pressure requirements to be bypassed for an indefinite period of time. For these reasons, the inspectors concluded that the TS 3.6.15.B note constituted a nonconservative TS in accordance with NRC administrative letter 98-10. As such, this issue represents a degraded/nonconforming condition and the licensee has entered it in the CAP as CR 1104913.

b. Findings

No findings were identified.

40A6 Meetings, including Exit

On March 31, 2016, the resident inspectors presented the quarterly inspection results to members of the licensee staff. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

40A7 Licensee Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy for being dispositioned as a Non-Cited Violation.

- Watts Bar Operating License Condition 2.F requires that the licensee shall implement and maintain in effect all provisions of the approved fire protection program, as described in the Fire Protection Report for Watts Bar Unit 1, as approved in Supplements 18 and 19 of the SER (NUREG-0847). Fire Protection Report, Part V, Section 2.1, Safe Shutdown Procedures states, in part, the fire safe

shutdown procedures contained in AOI-30.2 were developed based on calculations WBN-OSG4-031, "Equipment Required for Safe Shutdown per 10 CFR 50 Appendix R," and WBN-OSG4-165, "Manual Actions Required for Safe Shutdown Following a Fire." Calculation WBN-OSG4-165 is contained within drawing 1-45A897-1, "Manual Actions Required for Safe Shutdown Following a Fire to 10 CFR 50 Appendix R."

Contrary to the above, since initial plant licensing, the licensee failed to perform an adequate calculation to support fire safe shutdown procedure AOI-30.2. Specifically, for certain fire scenarios, the licensee failed to identify all equipment required to ensure availability of the TDAFW pump; and, for certain fire scenarios, the licensee established a non-conservative time requirement to mitigate spurious opening of a pressurizer PORV to prevent an undesired safety injection.

This violation is of very low safety significance (Green). This issue was determined to be of very low safety significance based on the results of the IMC 0609, Appendix F, "Fire Protection Significance Determination Process," Phase II Quantitative Screening Approach. A bounding risk assessment performed by a regional SRA reviewed the licensee and inspector risk evaluations and confirmed the  $\Delta$  CDF risk increase due to this condition was less than 1E-6, and therefore Green. This violation was documented in the licensee's corrective action program as CRs 946764 and 999926.

- Technical Specification 5.7.1, Procedures, requires, in part, that written procedures shall be established, implemented, and maintained covering activities described in Regulatory Guide (RG) 1.33, Revision 2, Appendix A, February 1978; Appendix A, Section 6.v, requires procedures for Combating Emergencies and other Significant Events such as Plant Fires.

Contrary to the above, the licensee provided operators inadequate procedural instructions to support fire safe shutdown. Specifically, since 2012, for certain fire scenarios, fire SSD procedures did not contain necessary steps to secure all reactor coolant pumps to prevent inadvertent RCS depressurization due to spurious opening of a pressurizer spray valve. Additionally, since initial plant licensing, for certain fire scenarios, fire SSD procedures did not contain necessary steps to isolate the normal charging line to prevent inadvertent RCS depressurization due to spurious opening of an auxiliary pressurizer spray valve.

This violation is of very low safety significance (Green). This issue was determined to be of very low safety significance based on the results of the IMC 0609, Appendix F, "Fire Protection Significance Determination Process," Phase II Quantitative Screening Approach. A bounding risk assessment performed by a regional SRA reviewed the licensee and inspector risk evaluations and confirmed the  $\Delta$  CDF risk increase due to this condition was less than 1E-6, and therefore Green. This violation was documented in the licensee's corrective action program as CRs 954895 and 954957.

## **SUPPLEMENTARY INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

G. Arent, General Manager, WBN Site Licensing  
L. Belvin, Quality Assurance Manager  
M. Bottorff, Operations Superintendent  
M. Casner, Director, Engineering  
S. Connors, Plant Manager  
T. Detchemendey, Emergency Preparedness Manager  
E. Ellis, Senior Manager, Nuclear Site Security  
W. Hooks, Radiation Protection Manager  
J. James, Director, Maintenance  
T. Morgan, Site Licensing  
J. O'Dell, Site Licensing Supervisor  
J. Polickoski, Site Licensing  
G. Pry, Director, Plant Support  
P. Stephens, Senior Manager, Chemistry  
R. Stroud, Site Licensing  
M. Taggart, Director, Operations  
K. Walsh, Site Vice President

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

#### **Opened and Closed**

05000390/2016001-01	NCV	Failure to Use a Procedure Appropriate to the Circumstances for the Auxiliary Control Air System Train A (Section 1R12)
05000390/2016001-02	NCV	Inadequate Immediate Determination of Operability for the Auxiliary Control Air System Train A (Section 1R15)
05000390/2016001-03	NCV	Failure to Adequately Implement the Administration of Site Technical Procedures for TDAFW Pump Governor Calibration (Section 4OA2.2)
05000390/2016001-04	NCV	Failure to Place the RHR System in ECCS- Standby Mode Prior to Exceeding an RCS Temperature of 212 °F (Section 4OA3.3)
05000390/2016001-05	NCV	Failure to Use Approved Procedures to Place RHR Letdown In Service (Section 4OA3.3)

05000390/2016001-06	NCV	Failure to Track Applicable Technical Specification Action Statement for Charging Pump Inoperability (Section 4OA3.3)
05000390/2016001-07	NCV	Failure to Maintain Operating Logs (Section 4OA3.3)
<u>Opened</u>		
05000390/2016001-08	URI	Charging Pump 1B-B Room Cooler Fan Bearing Failure (Section 1R15)
05000390/2016001-09	URI	Appropriateness of Corrective Actions Associated with Safety Related Pump Mechanical Seal Issues and the Effect on Plant Response (Section 4OA2.3)
05000390/2016001-10	AV	Failure to Maintain an Adequate Surveillance Procedure for Emergency Core Cooling System Venting (Section 4OA2.4)
<u>Closed</u>		
05000390/2015004-02	URI	AFWST Permanent Plant Modification (Section 4OA5.1)
05000390/2015004-04	URI	Shield Building Operability Requirements (Section 4OA5.2)
05000390/2014-004-02	LER	Appendix R Unanalyzed Condition Affecting the Turbine Driven Auxiliary Feedwater Pump and Pressurizer Spray Valves (Section 4OA3.5)
05000390/2015-002-01	LER	Unanalyzed Condition Related to Spurious Opening of a Pressurizer Power Operated Relief Valve During a Postulated Appendix R Fire (4OA3.5)
05000390/2015-004-01	LER	Unanalyzed Condition Due to a Volume Control Tank Isolation Time Analysis Error During a Postulated Appendix R Fire

## LIST OF DOCUMENTS REVIEWED

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

0-PI-OPS-1-FP, Freeze Protection, Rev. 0009

WOs 116508475, 116817728, 116635537, 116733476, 117223872, 117203674, 116554636,  
117485032

CR 1121743

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

#### Procedures

2-SOI-74.01, Residual Heat Removal System, Rev. 0003

2-SOI-74.01, Attachments ATT-1P, ATT-2P, ATT-1V, ATT-2V, ATT-3V, ATT-3P

2-PI-OPS-1-PE, Protected Equipment, Rev. 0000

0-PI-OPS-17.1, 18 month Locked Breaker Verification, Rev. 0024

Condition Reports (CRs) 1130555, 1130558, 1130355, 1127228

NPG-SPP-07.3.4, Protected Equipment, Rev. 0003

TI-276, Temporary Equipment Control, Rev. 0012

NPG-SPP-09.17, Temporary Equipment Control, Rev. 0006

MMTP-102, Erection of Scaffolds/Temporary Work Platforms and Ladders, Rev. 0011

2-SOI-62.01, Att 1V, CVSC-Charging and Letdown Valve Checklist 2-62.01-1V, Rev. 3

2-SOI-62.02, Att 1P, Boron Concentration Control Power Checklist 2-SOI-62.02-1P, Rev. 0

2-SOI-62.02, Att 1V, Boron Concentration Control Power Checklist 2-SOI-62.02-1V, Rev. 0

2-SOI-62.04, Att 1V, CVCS Purification System Valve Checklist 2-SOI-62.04-1V, Rev. 0

0-SOI-62.05, Att 1P, Boric Acid Batching, Transfer, and Storage Power Checklist 0-62.05-1P,  
Rev. 7

0-SOI-62.05, Att 1V, Boric Acid Batching, Transfer, and Storage Power Checklist 0-62.05-1V,  
Rev. 11

2-SOI-63.01, Safety Injection System, Rev. 0001, Att IV

2-SOI-3.02, Auxiliary Feedwater System

#### Drawings

2-47W810-01

2-47W809-1; 2-47W809-2

2-47W811-1

2-47803-2

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

WBN Prefire Plan DGB-0-742-01, Rev. 3

WBN Prefire Plan RXN-2-702-01, Rev. 3

WBN Prefire Plan RXN-2-713-01, Rev. 1

WBN Prefire Plan RXN-2-757-01, Rev. 2

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

WO 117610980

CRs 1149859, 1145389, 1145464, 1147703

WBN-DCD-40-29, Flood Protection Provisions Watts Bar Nuclear Plant Unit 1/Unit 2, Rev. 14

Calculation WBNOSG4099, Moderate Energy Line Break Flooding Study, Rev. 16



0-AOI-7.1, Maximum Probable Flood, Rev. 0

**Section 1R07: Heat Sink Performance**

0-TI-79.000 Program for Implementing NRC Generic Letter 89-13 Rev 0000  
 Past Operability Evaluation Documentation for CR 1115519  
 PMTI-62151, Modify Unit 1 ERCW Valve Positions in Preparation for Dual Unit ERCW Flow Balance, Rev. 0001  
 2-PTI-067-02-A, ERCW System Flow Balance, Train A, Rev. 0003  
 2-PTI-067-02-B, ERCW System Flow Balance, Train B, Rev. 0001

**Section 1R11: Licensed Operator Regualification Program**

Simulator Exercise Guide # 3-OT-SRE0003, Loss of Coolant Accident, Rev. 18

**Section 1R12: Maintenance Effectiveness**

Maintenance Rule CDE Record 1416;, dated January 29, 2016  
 Maintenance Rule CDE Record 1417, dated January 13, 2016  
 Maintenance Rule SSC/Function Record 032-B  
 Maintenance Rule Function 032-B, U0B, Aux Air B Total Unavailability (TI-119, Att.) [PC-53]  
 Maintenance Rule Function 032-B, U0, Aux Air Unreliability – Functional Failure Rate (TI-119, Att. 8)  
 Maintenance Rule CDE Record 1414, 001-E, SG Atmospheric Relief Valves (ADV)s  
 Maintenance Rule CDE Record 1415, 001-I, S/G Atm Relief Vlv control during Flood Mode  
 0-TI-119, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting –  
 10CFR50.65, Rev. 4  
 CR 1131261  
 Operations Logs for 1/30/2016  
 1-PI-OPS-1-PE, Protected Equipment, Rev. 18  
 NPG-SPP-07.3.4, Protected Equipment, Rev. 3  
 NPG-SPP-03.4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting  
 – 10CFR50.65, Rev. 3

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

Maintenance Rule CDE Record 1406, Shield Building Exhaust, dated January 14, 2016  
 Maintenance Rule CDE Record 1414, 001-E, SG Atmospheric Relief Valves (ADV)s, dated  
 January 21, 2016  
 Maintenance Rule CDE Record 1415, 001-I, S/G Atm Relief Vlv Control during Flood Mode,  
 dated January 21, 2016  
 0-TI-119, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting –  
 10CFR50.65, Rev. 4  
 CR 1114410  
 Operations Logs for 01/21/2016  
 1-PI-OPS-1-PE, Protected Equipment, Rev. 18  
 NPG-SPP-07.3.4, Protected Equipment, Rev. 3  
 NPG-SPP-03.4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting  
 – 10CFR50.65, Rev. 3  
 WBN Defense in Depth Assessments dated 01/31/16, 1400; 02/01/16, 0100; 02/01/16, 120;  
 02/02/16, 0030; 02/02/16, 1600; 02/03/16, 0100; 02/03/16, 1200; 02/04/16, 1200; 02/05//16,  
 0030

Operator Logs, 02/02/16, 1500 – 02/6/16, 0920  
 NPG-SPP-07.2.11-2, Shutdown Risk Management, Rev. 0008  
 Operators Risk Evaluation for Watts Bar Unit 1, dated 03/07/16 through 03/11/16

**Section 1R15: Operability Determinations and Functionality Assessments**

Incident CR 1131261 PI form dated 1/29/2016  
 DataWare History, dated 1/28/2016  
 Unit 1 Logs, dated 1/19/2016 and 1/14/2016  
 WO 117459604  
 Vendor Manual WBN-VTD-1075-0620  
 Drawing 1132110-5, Rev. B  
 Drawing 1132110-3, Rev. H  
 Applicability Determination for CR 1125040 PDO, Rev. 0  
 Prompt Determination of Operability (PDO) Documentation for CR 1125040  
 WO 117262582  
 0-MI-0.16, Maintenance Guidelines for Belt Driven Equipment, Rev. 0007 and 0008  
 0-IMI-110, Installation Procedure for Compression Tube Fittings, Rev. 0000, Appendix C  
 TI-27 Part III, Cleaning and Cleanliness of Fluid Systems and Components, Rev. 0053,  
 Appendix L  
 Log Entries Report dated 09/28/15-12/04/15  
 DataWare History 27-Sep-2015 to 05-Dec-2015  
 NPG-SPP-31.2, Records Management, Rev. 0005  
 WO 115790759  
 Pre-job briefing checklists  
 CRs 1128114, 1128086, 1111791, 1093983  
 Past Operability Evaluation Documentation for PER 1111791  
 WO Minor Maint 117404861 dated 12/06/15  
 TVA Level 2 Evaluation for CR 1111791  
 Prompt Investigation Form WBN CR 1111791  
 PDO Documentation for PER 979323, Rev. 01  
 PDO for PER 885414  
 Unit 1 Log Entries dated 1/30/16 and 1/31/16  
 PDO for PER 1118632  
 PDO for PER 1125623  
 CRs 1119089, 1125040  
 OPDP-8, Operability Determination Process and Limiting Conditions for Operation Tracking,  
 Rev. 0021  
 CR 1134015  
 Drawing 1-47W810-1, Rev. 20  
 CR 1133958  
 WO 117001304  
 CRs 1125343, 1135049, 1132576  
 System Description Document, Standby Diesel Generator System, SDD-N3-82-4002, Rev. 23  
 Drawings 0-47W611-82-3, Rev. 0; 0-4760-82-4, Rev. 0  
 CR 1131306  
 PDO for CR 1131306, dated 02/02/16  
 Equipment Apparent Cause Evaluation Report for CR 1131306, undated  
 WO 116748845

**Section 1R18: Plant Modifications**

Temporary modification control form WBN-1-2015-047-002  
 WO 117641714  
 Drawing N04-2215-500  
 0-MI-0.031, Temporary Leak Repair Program, Rev. 1

**Section 1R19: Post Maintenance Testing**

WO 116720683  
 WO 116730870  
 Drawing E3619E-1  
 WO 117543137  
 1-SI-72-906-A, Containment Spray Valve Position Indication Verification/Full-Stroke Exercising (Train A), Rev. 0016  
 WOs 116973384, 117443734  
 0-SI-82-17-A, 184 Day Fast Start and Load Test DG 1A-A, Rev. 0026  
 WO 116951920  
 WO 117227223

**Section 1R22: Surveillance Testing**

WO 116274908  
 WO 116966214  
 WO 117006513  
 WO 116966129  
 WO 117593789  
 Surveillance Task Sheet for WO 117061860  
 0-SI-82-12-A, Monthly Diesel Generator Start and Load Test DG 2A-A, Rev. 0052  
 0-SOI-82.03, Diesel Generator (DG) 2A-A, Rev. 0007  
 WO 117048926  
 CR 1139710  
 0-SI-70-902-S, Component Cooling System Pump C-S Quarterly Performance Test, Rev. 0027  
 0-SOI-70.01, Component Cooling Water (CCS) System, Rev. 0020  
 1-SI-62-901-A, 1A-A Centrifugal Charging Pump 1A-A quarterly Performance Test, Rev. 0031  
 1-SI-63.10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 0016

**Section 4OA2: Problem Identification and Resolution**

Drawings 1-47W811-1, 47W435-5, 47W435-7  
 Unit 1 Log dated February 17, 2016  
 Surveillance Task Sheet (STS) for WO 117006513  
 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 0016  
 1-SI-63-10.1-A ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 16 OTO1  
 1-SI-63-10.1-A ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 16 OTO-3  
 STS for WO 116495754  
 NPG-SPP-06.9.1, Conduct of Testing, Rev. 0008, Attachments 1 and 2  
 STS for WO 1164601375  
 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 0011  
 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 0011 OTO-1  
 -SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 0013  
 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 0013 OTO-1

STS for WO 116966129  
 STS for WO 116880866  
 Pre-job Briefing Checklists  
 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 0014  
 STS for WO 116780759  
 1-SOI-74.01, Residual Heat Removal System, Rev. 0002  
 STS for WO 117249066  
 STS for WO 116620152  
 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. OTO  
 STS for WO 116565785  
 1-SI-63-10.1-A, ECCS Discharge Pipes Venting – Train A Inside Containment, Rev. 0003  
 Calculation MDQ00106320110182, Calculation of Effects of Gas Accumulation in ECCS Piping,  
 Rev. 000  
 NRC Generic Letter (GL)2008-01, Managing Gas Accumulation in Emergency Core Cooling,  
 Decay Heat Removal, and Containment Spray Systems, dated January 11, 2008  
 TVA Response to GL 2008-01, dated October 11, 2008  
 Prompt Determination of Operability Documentation for Condition Report 1135820  
 NPG-SPP-06.9.1, Conduct of Testing, Rev. 0010  
 TVA CR Vault Summary Report 1070604, dated 11/25/2015  
 0-SOI-70.01, Component cooling Water (CCS) System, Rev. 0019  
 0-SOI-32.02, Auxiliary Air System, Rev. 0002

**Section 40A3: Follow-up of Events and Notices of Enforcement Discretion**

EPIP-2, Notification of Unusual Event, Rev. 35  
 Event Report, Watts Bar NOUE dated 03/09/2016  
 CRs 1147304, 1147297, 1147467  
 Log Entries dated 03/09/2016  
 Emergency Operating Instruction 1-E-0, Reactor Trip or Safety Injection  
 1-ES-0.1, Reactor Trip Response  
 1-GO-5, Unit Shutdown from 30% Reactor Power to Hot Standby  
 Watts Bar Nuclear Plant Trip Report March 22, 2016  
 1-AOI-30.1, Plant Fires, Rev. 02  
 1-AOI-30.2, Fire Safe Shutdown, Rev. 02  
 1-AOI-30.2, Fire Safe Shutdown, Rev. 03  
 1-AOI-30.2, Fire Safe Shutdown Elevation Diagrams, Rev. 00  
 1-AOI-30.2 C.36, Fire Safe Shutdown Room 737-A1A, Rev. 03  
 1-AOI-30.2 C.36, Fire Safe Shutdown Room 737-A1A, Rev. 05  
 1-AOI-30.2 C.46, Fire Safe Shutdown Room 713-A1A, Rev. 02  
 1-AOI-30.2 C.46, Fire Safe Shutdown Room 713-A1A, Rev. 03  
 1-AOI-30.2 C.32, Fire Safe Shutdown Room 757-A25, Rev. 00  
 1-AOI-30.2 C.32, Fire Safe Shutdown Room 757-A25, Rev. 02  
 1-AOI-30.2 C.65, Fire Safe Shutdown Rooms RA2, RA3, RF2 or RO-N, Rev. 00  
 1-AOI-30.2 C.65, Fire Safe Shutdown Rooms RA2, RA3, RF2 or RO-N, Rev. 02  
 1-AOI-30.2 C.25, Fire Safe Shutdown Room 757-A11, Rev. 01  
 1-AOI-30.2 C.63, Fire Safe Shutdown Room RB-ANN, Rev. 00  
 1-AOI-30.2 C.19, Fire Safe Shutdown Room 757-A1, Rev. 00  
 1-AOI-30.2 C.33, Fire Safe Shutdown Room 757-A26, Rev. 00  
 1-AOI-30.2 C.64, Fire Safe Shutdown Rooms RA1, RA4, RF1, RO-E or RO-S, Rev. 00

1-AOI-30.2 C.66, Fire Safe Shutdown Room RI-N, Rev. 01  
 1-SOI-62.01, CVCS-Charging and Letdown, Rev. 00  
 1-AOI-30.2 C.60, Fire Safe Shutdown Room All, Rev. 01

WBN-OSG4-031, "Equipment Required for Safe Shutdown per 10CFR50 Appendix R," Rev. 48  
 1-45A897-1, Manual Actions Required for Safe Shutdown Following a Fire to 10 CFR 50  
 Appendix R, Rev. 1

1010139, WBN Dual Unit Fire Protection Program Recovery Team; Fire related CVCS  
 Letdown and charging failures  
 946764, A latent issue has been identified with the Unit 1 App R FSSD 1-47A897-1  
 954895, Some Manual Operator Actions (MOAs) for U1 App R fires were not included in 1-  
 AOI-30.2 C  
 999926, WBN Fire Protection Program Recovery  
 1022308, Organizational and Programmatic (O&P) issues associated with the WBN Fire  
 Protection Report  
 1042073, Potential learning opportunity in CR reportability reviews  
 954957, Incorrect reportability and operability determination  
 787990, 2013 Triennial: Change for Drawing 1-45A897-1 Note A-52 inadequate  
 787426, 2013 Triennial - Failure to report unanalyzed condition  
 Watts Bar Nuclear Plant Fire Protection Report, Part V, Rev. 10  
 006026-RPT-03, Detailed Fire Modeling Analysis Supporting Watts Bar Spurious  
 Opening of Pressurizer PORV, Rev. 1  
 ARS-WB-15-004, Watts Bar IMC 0609 Phase 1 & 2 Report for Failed Open Pressurizer  
 Power Operated Relief Valve (PORV), Rev. 0  
 PRA Evaluation WBN-1-15-088, Rev. 0  
 006025-RPT-01, Detailed Fire Modeling Analysis Supporting Watts Bar OMA 110, Rev. 1  
 ARS-WB-15-001, Watts Bar IMC 0609 Phase 1 & 2 Report for TDAFP Control Power, OMA  
 110, Rev. 0  
 PRA Evaluation WBN-1-15-067, Rev. 2  
 006026-RPT-01, Detailed Fire Modeling Analysis Supporting Watts Bar MCR OAs 522  
 Through 525, Rev. 1  
 ARS-WB-15-002, Watts Bar IMC 0609 Phase 1 & 2 Report for Opening of Pressurizer Spray  
 Valves, OMA 522-525, Rev. 0  
 PRA Evaluation WBN-1-15-085, Rev. 0  
 ARS-WB-15-003, Watts Bar IMC 0609 Phase 1 & 2 Report for Pzr Aux Spray Valve, Main  
 Control Operator Action (MRC OA) 460 & 461, Rev. 0  
 006026-RPT-02, Detailed Fire Modeling Analysis Supporting Watts Bar VCT Analysis,  
 Rev. 0  
 ARS-WB-15-005, Watts Bar IMC 0609 Phase 1 Report for VCT Analysis Error, Rev. 0

#### **Section 40A5: Other Activities**

CR 1114975, 1116741, 1116743, 1116732  
 OPDP-1, Conduct of Operations, Rev. 37  
 NPG-SPP-07.3, Work Activity Risk Management Process, Rev. 18  
 NPG-SPP-07.3, Work Activity Risk Management Process, Rev. 16  
 0-TI-12.19, Control of Time Critical Operator Actions, Rev. 1

0-SI-0-905, Primary Pressure Boundary Isolation Valve Leak Test Residual Heat Removal Return Valves, Rev. 13

1-GO-1, Unit Startup from Cold Shutdown to Hot Standby, Rev. 4

1-GO-6, Unit Shutdown from Hot Standby to Cold Shutdown, Rev. 1

WBN-SDD-N63-4001, Safety Injection System, Rev. 33

1-SOI-62.01, CVCS-Charging and Letdown, Rev. 2

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## LIST OF ACRONYMS

ACAS	auxiliary control air system
AFW	auxiliary feedwater
AFWST	auxiliary feedwater storage tank
CAP	Corrective Action Program
CCP	centrifugal charging pump
CCS	component cooling system
CFR	<i>Code of Federal Regulations</i>
CR	condition report
CS	containment spray
CVCS	chemical and volume control system
ECCS	emergency core cooling system
EDG	emergency diesel generator
EP	emergency planning
EPIP	emergency plan implementing procedure
ERCW	essential raw cooling water
FE	functional evaluation
FPP	fire protection program
IMC	Inspection Manual Chapter
IDO	immediate determination of operability
IP	inspection procedure
LCO	limiting condition for operation
LCV	level control valve
NCV	non-cited violation
NOUE	Notice of Unusual Event
NPG-SPP	nuclear power group standard programs and processes
NRC	Nuclear Regulatory Commission
OOS	out of service
PD	performance deficiency
PDO	prompt determination of operability
PI	performance indicator
POE	past operability evaluation
PORV	power-operated relief valve
Rev.	revision
RCS	reactor coolant system
RHR	residual heat removal
SCWE	safety conscious work environment
SDP	Significance Determination Process
SSC	structures, systems, or components
SSD	safe shutdown
TDAFW	turbine-driven auxiliary feedwater
TS	technical specifications
TTV	throttle valve
TVA	Tennessee Valley Authority
UFSAR	Updated Final Safety Analysis Report
WBN	Watts Bar Nuclear Plant
WO	work order