



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

May 13, 2019

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

SUBJECT: WATTS BAR UNITS 1 AND 2 – NRC INTEGRATED INSPECTION REPORT
05000390/2019001 AND 05000391/2019001

Dear Mr. Shea:

On March 31, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Units 1 and 2. On April 11, 2019, the NRC inspectors discussed the results of this inspection with Tony Williams, Site Vice President and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented five findings of very low safety significance (Green) in this report. These findings involved violations of NRC requirements. 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 violations or significance or severity of the violations documented in this inspection report, 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, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC resident inspector at Watts Bar.

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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; and the NRC resident inspector at Watts Bar.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Omar R. López-Santiago, Chief
Reactor Projects Branch 5
Division of Reactor Projects

Docket Nos.: 05000390 and 05000391
License Nos.: NPF-90 and NPF-96

Enclosure:
Inspection Report 05000390/2019001
and 05000391/2019001

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SUBJECT: WATTS BAR UNITS 1, 2 – NRC INTEGRATED INSPECTION REPORT
05000390/2019001 AND 05000391/2019001 dated May 13, 2019

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U.S. NUCLEAR REGULATORY COMMISSION

Inspection Report

Docket Number(s): 05000390 and 05000391

License Number(s): NPF-90 and NPF-96

Report Number(s): 05000390/2019001 and 05000391/2019001

Enterprise Identifier: I-2019-001-0022

Licensee: Tennessee Valley Authority

Facility: Watts Bar, Units 1 and 2

Location: Spring City, TN 37381

Inspection Dates: January 01, 2019 to March 31, 2019

Inspectors: T. Fanelli, Senior Reactor Inspector
J. Hamman, Resident Inspector
J. Nadel, Senior Resident Inspector
G. Ottenberg, Senior Reactor Inspector
M. Riley, Senior Reactor Inspector
T. Su, Reactor Inspector
A. Thomas, Project Engineer

Approved By: Omar R. López-Santiago, Chief
Reactor Projects Branch 5
Division of Reactor Projects

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting a Quarterly inspection at Watts Bar Units 1 and 2 in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC’s program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information. Findings and violations being considered in the NRC’s assessment are summarized in the table below.

List of Findings and Violations

Failure to Maintain Configuration Control which led to an Internal Flooding Event that caused the Inoperability of the Turbine Driven Auxiliary Feedwater Pump.			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000390/2019-001 Closed	[H.4] - Teamwork	71111.15
The inspectors identified a Green finding and associated non-cited violation of Technical Specification 5.7.1.1.a when the licensee failed to maintain configuration control of the plant in accordance with NPG-SPP-10.1, “System Status Control.” Specifically, the licensee failed to adequately terminate the filling of the primary water storage tank (PWST) due to a fill valve being inadvertently left open which resulted in the PWST overflowing and dumping the excess primary water in the auxiliary building where the primary water then travelled to and penetrated the Unit 1 Turbine Driven Auxiliary Feedwater (TDAFW) pump governor control cabinet. The water ingress into the Unit 1 TDAFW pump governor control cabinet caused TDAFW pump control components to be wetted, alarms to sound in the control room, and subsequently, the Unit 1 TDAFW pump was declared inoperable.			
Failure to Meet Acceptance Criteria for Containment Closure in Mode 6			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000390/2019-002 Closed	[H.11] - Challenge the Unknown	71111.20
An NRC-identified Green finding and associated non-cited violation of Technical Specifications 5.7.1.1.a, “Procedures,” was identified for the failure to meet acceptance criteria in procedure TI-68.002, “Containment Penetrations and Closure Control,” Revision 24. Specifically, on October 6, 2018 an individual with responsibility for closure of the open X-117 Unit 1 containment penetration did not understand their duties/responsibilities, where the penetration was located, or have the proper tools staged to close the penetration.			
Failure to Account for Degradation Mechanisms in Barton Transmitters			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000390, 05000391/2019-003 Closed	None	71111.21N

The NRC identified a Green finding and associated non-cited violation of Title 10 Code of Federal Regulations (CFR) 50.49(e)(5), for the licensee's failure to account for all significant types of degradation of the Barton 764 instruments inside containment in accordance with Section 5(1) of IEEE 323-1974.

Containment Air Return Fan 1B Inoperable due to Inadequate Post Maintenance Test			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000390/2019-004 Closed	[H.5] - Work Management	71153
A self-revealed Green finding and associated non-cited violation of Technical Specifications (TS) 3.6.10, "Air Return System," was identified for the 1B containment air return fan (CARF) being inoperable for a time period longer than allowed by TS due to an inadequate post-maintenance test (PMT). Specifically, on December 11, 2018 while performing a routine surveillance test on the 1B CARF, the fan failed the force-to-open portion of the testing and this was later determined to be caused by an inadequate PMT approximately two months earlier.			

Failure to Follow System Status Control Procedure Results in Valve Misposition and Inoperability of the A train of ABGTS			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000390/2019-005, 05000391/2019-005 Closed	[H.13] - Consistent Process	71153
A self-revealed Green finding and associated non-cited violation of Technical Specifications 5.7.1.1.a, "Procedures," was identified for the failure to follow the requirements of TVA procedure NPG-SPP-10.1, System Status Control, Revision 9. Specifically, on December 8, 2018, it was discovered that the A train of the Auxiliary Gas Treatment System (ABGTS) was inoperable due to a valve misposition.			

Additional Tracking Items

Type	Issue number	Title	Report Section	Status
LER	05000390,05000391/2018-003-00	LER 2018-003-00 for Watts Bar Nuclear Plant, Units 1 and 2, Control Room Emergency Ventilation System Inoperable due to Main Control Room Door Being Left Open.	71153	Closed
LER	05000390,05000391/2018-004-00	LER 2018-004-00 for Watts Bar Nuclear Plant, Units 1 and 2, Control Room Emergency Ventilation System inoperable due to Main Control Room Door Being Left Open.	71153	Closed

URI	05000390,05000391/2018004-04	Unit 1 TDAFW Pump Inoperability (PWST Overfill)	71111.15	Closed
LER	05000390/2018-006-00	LER 2018-006-00 for Watts Bar Nuclear Plant, Unit 1, Containment Air Return Fan Inoperable for a Time Period Longer than Allowed by Technical Specifications Due to an Inadequate Post Maintenance Test.	71153	Closed
URI	05000391,05000390/2017007-03	Potential Failure to Address Environmental Qualification of Brand-Rex Cables	71111.21N	Closed
URI	05000391,05000390/2017007-04	Potential Failure to Justify Qualification of O-Rings by Commercial Grade Dedication	71111.21N	Closed
URI	05000391,05000390/2017007-05	Potential Failure to Address Environmental Qualification of Barton Transmitters	71111.21N	Closed

PLANT STATUS

Unit 1 operated at or near rated thermal power (RTP) for the entire inspection period. Unit 2 operated at or near RTP from the beginning of the inspection period until February 3, 2019, when the unit was rapidly taken offline in response to a worsening condenser tube leak. Unit 2 was started up on February 6, 2019 following successful repairs to the condenser. Unit 2 subsequently reached at or near RTP on February 9, 2019 and remained there for the remainder of the inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed plant status activities described in IMC 2515 Appendix D, "Plant Status" and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Impending Severe Weather Sample (IP Section 03.03) (1 Sample)

The inspectors evaluated readiness for impending adverse weather conditions for high local precipitation and local flooding from February 21, 2019 through February 25, 2019.

71111.04 - Equipment Alignment

Partial Walkdown (IP Section 02.01) (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) 1B train of containment spray while the 1A train was out of service (OOS) for planned maintenance on January 24, 2019.
- (2) 1B train of auxiliary feedwater while the 1A train was OOS for planned maintenance on February 4, 2019
- (3) 2A train of residual heat removal (RHR) while the 2B RHR pump was OOS for planned maintenance on February 11, 2019

71111.05Q - Fire Protection

Quarterly Inspection (IP Section 03.01) (5 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) Auxiliary Building elevation 676' on February 12, 2019
- (2) Auxiliary Building elevation 692'-03 on February 12, 2019
- (3) Auxiliary Building elevation 757' on March 12, 2019
- (4) Intake Pumping Station elevation 711' and 722' on March 17, 2019
- (5) Intake Pumping Station elevation 728' and 741' on March 17, 2019

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 02.02a.) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

Unit 2 Auxiliary Building elevation 713' Penetration Room

71111.07A - Heat Sink Performance

Annual Review (IP Section 02.01) (1 Sample)

The inspectors evaluated readiness and performance of:

WO 119667926, 2-TI-79.824, Diesel Generator 2B-B Jacket Water Cooler Performance Test on February 27, 2019

71111.11Q - Licensed Operator Regualification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

The inspectors observed and evaluated licensed operator performance in the Control Room during U2 startup following a main condenser tube leak on February 6, 2019.

Licensed Operator Regualification Training/Examinations (IP Section 03.02) (1 Sample)

On February 26, 2019, inspectors observed simulator as-found exam per scenario 3-OT-SRE-1902AF1, Revision 0, component cooling water system pump loss, steam generator tube leak, rod control cluster assembly drop, and steam generator tube rupture.

71111.12 - Maintenance Effectiveness

Quality Control (IP Section 02.02) (1 Sample)

The inspectors evaluated maintenance and quality control activities associated with the following equipment performance activities:

WO 117666607, Inspectors observed pre and post weld quality control verification for an ASME section XI repair to 1-RFV-70-561B-B, the 1B-B safety injection pump lube oil cooler component cooling system outlet relief valve.

Routine Maintenance Effectiveness Inspection (IP Section 02.01) (2 Samples)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

- (1) CR 1463113, Unit 1 turbine driven auxiliary feedwater pump failure resulting from wetting of controls due to inadvertent overflow of the primary water storage tank
- (2) CR 1474341, Unit 1 B train containment air recirculation fan failed quarterly surveillance test 1-SI-30-26-B due to inadequate post maintenance testing

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) Risk assessment for January 24, 2019, with the 1B containment spray pump out of service for planned maintenance
- (2) Risk assessment for February 4, 2019, with the A station air compressor and the 1A motor driven auxiliary feedwater pump out of service for planned maintenance during the U2 forced outage due to a condenser tube leak
- (3) Risk assessment for February 11, 2019, with the C-S component cooling water pump and the 2B-B residual heat removal pump out of service for planned maintenance
- (4) Risk assessment for February 20, 2019, when the spent fuel pool A train heat exchanger was removed from service along with multiple other pieces of equipment

71111.15 - Operability Determinations and Functionality Assessments

Sample Selection (IP Section 02.01) (5 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) Prompt Determination of Operability (PDO) for CR 1491636, 1B-B CCP declared operable but degraded due to excessive oil leakage on February 19, 2019
- (2) Immediate Determination of Operability (IDO) from WO 119750820, 2-SI-3-903-B, CR 1491155, when 2-LCV-3-171 failed to meet acceptance criteria but met limiting value of full stroke time
- (3) IDO and PDO for CR 1490444, Penetration Room Elev. 713' 2B-B cooler, 2-CLR-30-197 after an emergency raw cooling water (ERCW) leak of ~1 quart/min was identified with the cooler in-service
- (4) Past operability evaluation (POE) for CR 1476680, turbine driven auxiliary feedwater pump operability following primary water tank overflow event on November 4, 2018 and subsequent discovery that the turbine driven auxiliary feedwater pump (TDAFWP) control cabinet lacked conduit seals that would prevent water ingress
- (5) IDO for CR 1491007, hot tap ERCW on February 13, 2019 - installed valve has small leak-by

71111.19 - Post Maintenance Testing

Post Maintenance Test Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the following post maintenance tests:

- (1) WO 120124155, motor driven auxiliary feedwater pump 1A-A lube oil system test following lube oil pump/motor replacement on February 4, 2019
- (2) WO 119684206, 2B residual heat removal pump room cooler motor PMT following scheduled component outage on February 11, 2019
- (3) WO 120252992, Unit 1 elevation 737' 1B-B Penetration Room Cooler PMT following maintenance to replace the cooler motor on February 14, 2019
- (4) WO 119760175, 1B-B safety injection pump start and run in accordance with 1-SOI-63.01, Safety Injection System, following planned maintenance to inspect, clean, sample oil, and change oil on the associated pump motor on February 27, 2019
- (5) WO 117666607, VT-4 leak check following repair to 1B-B safety injection pump lube oil cooler component cooling water system relief valve 1-RFV-70-561B on February 27, 2019

71111.21N - Design Bases Assurance Inspection (Programs)

The inspectors evaluated Environmental Qualification program information to facilitate closure of the unresolved items opened on August 7, 2017, in Design Bases Assurance Inspection (Programs) Report 05000390, 391/2017007 (ADAMS Accession No. ML17220A153).

Select Sample Components to Review - Primary Containment (Inside Containment) (IP Section 02.01) (1 Partial)

WBNEQ-SPLC-002, Raychem medium voltage motor connection kits

Select Sample Components to Review - Risk Significant/Low Design (Inside/Outside Containment) (IP Section 02.01) (1 Partial)

WBN-1-FT-072-0013-G, containment spray header B flow transmitter

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

FLEX Testing (IP Section 03.02) (1 Sample)

WO 120357399, 0-TI-26.102, 5000 GPM Dominator Portable Diesel Pump (5DPDP) Operating Procedure on March 28, 2019

In Service Testing (IST) (IP Section 03.01) (1 Sample)

WO 119750808, 2-SI-3-901-B, Motor Driven Auxiliary Feedwater Pump 2B-B Quarterly Performance Test on February 11, 2019

Surveillance Testing (IP Section 03.01) (4 Samples)

- (1) WO 119724508, 1-SI-30-26-A, Containment Air Return Fan 1A-A Quarterly Operability Test on February 5, 2019
- (2) WO 119750786, 1-SI-99-10-B 62 Day Functional Test of SSPS Train B and Reactor Trip Breaker B on February 13, 2019
- (3) WO 119750795, 2-SI-74-901-B Residual Heat Removal Pump 2B-B Quarterly Performance Test on February 15, 2019
- (4) WO 119667904, 0-SI-82-12-B Monthly Diesel Generator Start and Load Test DG 2B-B on February 27, 2019

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

BI01: Reactor Coolant System (RCS) Specific Activity Sample (IP Section 02.10) (2 Samples)

- (1) Unit 1 (Q1 2018 through Q4 2018)
- (2) Unit 2 (Q1 2018 through Q4 2018)

IE01: Unplanned Scrams per 7000 Critical Hours Sample (IP Section 02.01) (2 Samples)

- (1) Unit 1 (Q1 2018 through Q4 2018)
- (2) Unit 2 (Q1 2018 through Q4 2018)

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02) (2 Samples)

- (1) Unit 1 (Q1 2018 through Q4 2018)
- (2) Unit 2 (Q1 2018 through Q4 2018)

IE04: Unplanned Scrams with Complications (USwC) Sample (IP Section 02.03) (2 Samples)

- (1) Unit 1 (Q1 2018 through Q4 2018)
- (2) Unit 2 (Q1 2018 through Q4 2018)

71152 - Problem Identification and Resolution

Annual Follow-up of Selected Issues (IP Section 02.03) (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

CR 1244348, 2016 CDBI URI on GDC 17 compliance when CSST A or B are credited as TS offsite power source and the 6.9kV SDBDs are aligned to maintenance feed

71153 - Followup of Events and Notices of Enforcement Discretion

Event Followup (IP Section 03.01) (1 Sample)

The inspectors evaluated the licensee's response to a condenser tube leak and subsequent shutdown of Unit 2 on February 3, 2019. No findings of significance were identified.

Event Report (IP Section 03.02) (3 Samples)

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

- (1) LER 390/391-2018-003-00 for Watts Bar Nuclear Plant, Units 1 and 2, Control Room Emergency Ventilation System inoperable due to main Control Room door being left open.

The circumstances surrounding this LERs are documented in the Results section.

- (2) LER 390/391-2018-004-00 for Watts Bar Nuclear Plant, Units 1 and 2, Control Room Emergency Ventilation System inoperable due to Main Control Room Door Being Left Open.

The inspectors reviewed the above LER and determined that the licensee complied with applicable requirements, Technical Specifications, and 50.72/50.73 reporting criteria. Therefore, no violation of NRC requirements occurred.

- (3) LER 390-2018-006-00 for Watts Bar Nuclear Plant, Unit 1, Containment Air Return Fan inoperable for a time period longer than allowed by Technical Specifications due to an inadequate post maintenance test.

The circumstances surrounding this LER are documented in the Results section.

INSPECTION RESULTS

Failure to Maintain Configuration Control which led to an Internal Flooding Event that caused the Inoperability of the Turbine Driven Auxiliary Feedwater Pump.			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000390/2019-001 Closed	[H.4] - Teamwork	71111.15
The inspectors identified a Green finding and associated non-cited violation of Technical Specification 5.7.1.1.a when the licensee failed to maintain configuration control of the plant in accordance with NPG-SPP-10.1, "System Status Control." Specifically, the licensee failed to adequately terminate the filling of the primary water storage tank (PWST) due to a fill valve being inadvertently left open which resulted in the PWST overflowing and dumping the excess primary water in the auxiliary building where the primary water then travelled to and penetrated the Unit 1 Turbine Driven Auxiliary Feedwater (TDAFW) pump governor control cabinet. The water ingress into the Unit 1 TDAFW pump governor control cabinet caused TDAFW pump control components to be wetted, alarms to sound in the control room, and subsequently, the Unit 1 TDAFW pump was declared inoperable.			

Description:

On November 4, 2018, the dayshift operations crew began filling the PWST in accordance with station operating instructions, 0-SOI-59.01, "Demineralized Water System," and 0-SOI-81.01, "Primary Makeup Water System."

Because the PWST fill was not yet complete at the end of dayshift, the dayshift operations crew turned over the process to the nightshift operations crew; however, inadequate turnover between the two shifts contributed to the nightshift crew losing configuration control of the system alignment being used to fill the PWST. Specifically, the inspectors identified that the controlled copy of 0-SOI-81.01, and the steps that were complete/not yet complete within it, were not adequately turned over to the nightshift crew.

NPG-SPP-10.1, "System Status Control," Section 3.2.3, "Maintaining Status Control," Paragraph D states: "Whenever any Operations in-process plant evolution extends past shift turnover, the affected Unit Supervisor will maintain the controlled copy of the procedure."

At 20:12 on November 4, 2018, the nightshift operations crew determined the PWST was adequately filled and proceeded to terminate the flow to the PWST. They did so by closing a valve in accordance with 0-SOI-59.01. However, at the time, the operators were not aware of another valve that needed to be closed in accordance with 0-SOI-81.01 to adequately terminate the flow to the PWST because the operators, as the inspectors found, had not maintained the appropriate system status control in accordance with NPG-SPP-10.1, Section 3.2.3, Paragraph D. In fact, the inspectors identified that the valve directed to be closed by 0-SOI-81.01 should have been closed first and the PWST fill would have been terminated at that point. At the end of the 0-SOI-81.01 section for terminating the fill, the operators would have then been directed back to 0-SOI-59.01 to make the final valve closures and alignment changes.

At approximately 20:22 on November 4, 2018, the main control room received the PWST Level HI/LO alarm. Shortly thereafter, at approximately 20:30, operators in the auxiliary building found water running down the sides of the Unit 1 TDAFW pump room. The operators determined that this water was coming from the Unit 1 PWST overflow relief line that discharges into the ERCW pipe tunnel, which runs above the Unit 1 TDAFW pump room. In order, to isolate the overflowing, operators immediately closed a valve that would have otherwise not been closed had the additional valve in procedure 0-SOI-81.01, identified by the inspectors above, been closed at the appropriate time. At approximately 21:38 that night, the main control room received the Unit 1 TDAFW pump electrical overspeed trip alarm, which was later determined to be caused from water ingress into the Unit 1 TDAFW pump governor control cabinet that is mounted to the exterior wall of the U1 TDAFW pump room and was therefore wetted by the PWST overflow. The Unit 1 TDAFW pump was subsequently declared inoperable because the pump would not have operated as designed had it been called upon to function.

Corrective Action(s):

The immediate corrective actions taken by the licensee following the overflow event were to validate system lineup, ensure all components were in the proper configuration, identify other on-going activities being performed across shifts to ensure appropriate system status control, and implement a standing order to ensure all procedure sections that are in progress at the end of the shift are returned to the main control room (MCR) so that the evolution can be appropriately turned over to the oncoming supervisor. Additional corrective actions included

sealing the Unit 1 TDAFW pump governor control cabinet to prevent any other water ingress occurrence and to review and evaluate the potentially confusing nature of the PWST fill process being implemented by two different system operating instructions concurrently.

Corrective Action Reference(s): This issue is being tracked in TVA's corrective action program by CR 1501994.

Performance Assessment:

Performance Deficiency: The failure to maintain adequate system configuration control when filling the PWST, as required by station procedure NPG-SPP-10.1, "System Status Control," Revision 9, Section 3.2.3, "Maintaining Status Control," Paragraph D was a performance deficiency. Specifically, the Unit Supervisor did not maintain the controlled copies of the in-process procedures, which led to the loss of configuration control that caused the PWST overflow.

Screening: The performance deficiency is more-than-minor because it is associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e. core damage). Specifically, the performance deficiency resulted in the inoperability of the TDAFW pump, thereby adversely affecting the availability of this mitigating system to respond to initiating events.

Significance: The inspectors assessed the significance of the finding using Appendix A, "Significance Determination of Reactor Inspection Findings for At - Power Situations". In accordance with Inspection Manual Chapter (IMC) 0609, Attachment 4, "Initial Characterization of Findings," the inspectors determined the Mitigating Systems cornerstone was affected due to the degradation of a short-term heat removal system (i.e. Auxiliary Feedwater). The inspectors screened the finding using IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions," Section A, "Mitigating SSCs and Functionality." The inspectors answer "no" to the four screening questions located in IMC 0609, Appendix A, Exhibit 2, Section A; and therefore, determined the significance of this finding to be Green.

Cross-cutting Aspect: H.4 – Teamwork: The finding involved a cross-cutting aspect of teamwork in the Human Performance area (H.4) as defined in IMC 0310, "Aspects Within the Cross-Cutting Areas" because individuals and workgroups failed to communicate and coordinate their activities within and across organizational boundaries to ensure nuclear safety is maintained. In other words, the inadequate turnover across shifts significantly contributed to the nightshift losing system configuration control and thereby allowing water to penetrate the Unit 1 TDAFW pump governor control cabinet.

Enforcement:

Violation: Technical Specification 5.7.1, "Procedures," in subsection 5.7.1.1.a, requires that written procedures covering activities that are recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, which includes equipment control activities (e.g. locking and tagging) in section 1.c, be established, implemented, and maintained. Contrary to the above, on November 4, 2018, the licensee failed to adequately implement its equipment control procedure, NPG-SPP-10.1, "System Status Control," when it performed routine operation of the PWST system which led to the inoperability of a mitigating system (i.e. AFW).

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Meet Acceptance Criteria for Containment Closure in Mode 6			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000390/2019-002 Closed	[H.11] - Challenge the Unknown	71111.20
<p>An NRC-identified Green finding and associated non-cited violation of Technical Specifications 5.7.1.1.a, "Procedures," was identified for the failure to meet acceptance criteria in procedure TI-68.002, "Containment Penetrations and Closure Control," Revision 24. Specifically, on October 6, 2018 an individual with responsibility for closure of the open X-117 Unit 1 containment penetration did not understand their duties/responsibilities, where the penetration was located, or have the proper tools staged to close the penetration.</p>			
<p><u>Description:</u> On October 12, 2018, during the Unit 1 refueling outage, inspectors reviewed the status of containment closure in accordance with inspection procedure 71111.20. Inspectors reviewed the log book for currently tracked open containment penetrations, interviewed individuals with penetration responsibility regarding their duties and equipment, and reviewed procedural requirements for containment closure contained in TVA procedure TI-68.002, "Containment Penetrations and Closure Control," Revision 24. Several deficiencies were identified by the inspectors and the licensee documented these in CRs 1455741, 1455715, and 1455769.</p> <p>The licensee subsequently performed its own reviews as a follow-up to the inspectors' findings and discovered that for approximately 6 hours on October 6, 2018, an individual with responsibility for closure of the open X-117 containment penetration did not understand their duties/responsibilities, where the penetration was located, or have the proper tools staged to close the penetration. Penetration X-117 is a 16-inch penetration used for temporary power and communications cables. On October 6, 2018, Unit 1 was in mode 6 and core reload was in progress. It was 21 days after the initial plant shutdown.</p> <p>Inspectors reviewed TVA procedure TI-68.002, "Containment Penetrations and Closure Control," Revision 24, section 5, "Acceptance Criteria," which requires that "containment breaches can be closed after loss of RHR or occurrence of a fuel handling accident." It was determined that for a period of 6 hours on October 6, 2018, this acceptance criteria was not met for penetration X-117.</p> <p>Corrective Action(s): At the time of discovery, the penetration was no longer being tracked and the unit was operating at full power. Corrective actions planned include a revision to TI-68.002 to ensure compliance is more readily assured by including specific signature pages that include acknowledgement of responsibilities and directions on containment penetration closure.</p> <p>Corrective Action Reference(s): These issues are being tracked in TVA's corrective action program by Condition Reports</p>			

1455741, 1455715, 1455769, 1479735, 1480875, and 1486234.

Performance Assessment:

Performance Deficiency: The failure to follow TVA procedure TI-68.002, "Containment Penetrations and Closure Control," Revision 24, section 5, "Acceptance Criteria," was a performance deficiency. Specifically, it was determined that for a period of 6 hours on October 6, 2018, this acceptance criteria was not met for Unit 1 penetration X-117.

Screening: The performance deficiency was determined to be more than minor because it is associated with the Human Performance attribute of the Barrier Integrity Cornerstone and adversely affects the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events. Specifically, the acceptance criteria for containment closure as defined in TI-68.002 was not met for a period of 6 hours on October 6, 2018.

Significance: The inspectors assessed the significance of the finding using Appendix H, "Containment Integrity SDP". In accordance with IMC 0609, Attachment 4, the inspectors determined the Barrier Integrity cornerstone was affected due the impact to the containment barrier. The inspectors used the SDP Appendix Router to arrive at IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings." The inspectors determined that the finding required routing to IMC 0609 Appendix H, "Containment Integrity Significance Determination Process" in accordance with IMC 0609, Appendix G, Attachment 1, Exhibit 4, "Barrier Integrity Screening Questions," Section B, "Reactor Containment," step 6, because the finding degrades the ability to close or isolate the containment. The inspectors determined the finding represents a type B finding that only affected LERF and the applicable time period for the finding is POS 3 as defined in section 03.02 of Appendix H. As such, the inspectors determined that the finding screened to Green in accordance with Appendix H section 07.02, step 2.1, because it is a POS 3 finding (i.e. the reactor was in mode 6) that occurred after the first 8 days of the outage.

Cross-cutting Aspect: H.11 - Challenge the Unknown: Individuals stop when faced with uncertain conditions. Risks are evaluated and managed before proceeding. The finding had a cross-cutting aspect in the Challenge the Unknown attribute of the Human Performance area as defined in IMC 0310, "Aspects Within the Cross- Cutting Areas," because multiple individuals and supervisors failed to stop and question poorly understood roles/duties prior to taking responsibilities for Unit 1 containment penetration X-117 on October 6, 2018.

Enforcement:

Violation: Technical Specification 5.7.1, "Procedures," requires in section 5.7.1.1.a that written procedures be established, implemented, and maintained covering activities that are recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, which includes procedures for maintaining containment integrity in section 3.f.(1). Contrary to the above, the licensee failed to adequately implement the acceptance criteria for containment closure as defined in procedure TI-68.002, "Containment Penetrations and Closure Control," Revision 24, on Unit 1 for a period of 6 hours on October 6, 2018.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

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Failure to Account for Degradation Mechanisms in Barton Transmitters			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV05000390, 05000391/2019-003 Closed	None (NPP)	71111.21N

The NRC identified a Green finding and associated non-cited violation of Title 10 Code of Federal Regulations (CFR) 50.49(e)(5), for the licensee's failure to account for all significant types of degradation of the Barton 764 instruments inside containment in accordance with Section 5(1) of IEEE 323-1974.

Description: The purpose of Barton 764 instrument WBN-1-FT-072-0013-G was to provide a signal to the containment spray system's recirculation valves to prevent pump burn out when flow was less than 1,500 gallons per minute. Equipment Qualification Data Package (EQDP) WBNEQ-XMTR-001, specified the qualification standards for these instruments included IEEE Standard 323-1974, as supplemented by NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," Rev. 1. Section 5 of IEEE 323-1974, established that the principles and procedures for demonstrating the qualification of Class IE equipment include: (1) Assurance that the severity of the qualification methods equal or exceed the maximum anticipated service requirements and conditions, and (2) Assurance that any extrapolation or inference be justified by allowances for known potential failure modes and the mechanism leading to them.

The inspectors identified two examples of a performance deficiency where the licensee did not justify changes to the qualified life of the Barton 764 transmitters inside containment by failing to appropriately account for all significant types of degradation.

Example 1

On July 7, 1995, Calculation WBNAPS2110, "Material Aging Calculation for Barton Model 764 Transmitters," determined that the qualified life of the sensor fluid and internal O-ring seals of the Barton 764 transmitter was 40 years, based on aging of a Barton 351 transmitter for 739 hours. However, Westinghouse actually aged the Barton 764 sensor silicone fluid and O-ring seals for 350 hours, equivalent to approximately 22.5 years inside containment. The licensee replaced the 350 hours aging conducted on the Barton 764 transmitter with 739 hours from a Barton 351 sensor qualification report. The EQDP did not establish that the Barton 764 and Barton 351 transmitters were similar, and the Barton 351 report did not identify any Barton 764 configuration as qualified by the testing. Since some of the Barton transmitters have been installed since plant startup (1995) and have not had the O-rings replaced, the inspectors determined that the internal O-rings had been installed in containment for approximately 24 years. Additionally, the calculation did not consider the effects of higher localized temperatures. To obtain reasonable assurance that the transmitters could perform their intended safety function, the licensee performed an engineering assessment that evaluated temperature data of each impacted transmitter from 2003 to 2010. When using this data, the licensee concluded that the sensor fluid and O-rings would be qualified for 28.87 years and that there was reasonable assurance that the transmitters could perform their intended safety function.

Example 2

On July 7, 1995, Calculation WBNAPS2110, determined that the qualified life of the metal film resistors in the Barton 764 transmitter was 41.1 years inside containment, based on service temperatures of 120°F with an abnormal temperature of 130°F. The inspectors determined that the calculation did not consider the localized temperatures of the transmitters. NRC Information Notice 87-65, Plant Operation Beyond Analyzed Conditions, and Information Notice 89-30, High Temperature Environments at Nuclear Power Plants, informed licensees of a generic problem for pressurized water reactors where operating experience has indicated that temperatures local to instruments often exceeded the measured bulk temperatures. Additionally, the calculation did not account for the internal temperature rises of the metal film resistor due to self-heating effects. Consideration of heat rise in the limiting subcomponent leads to a reduction in the overall qualified life of the transmitter. To obtain reasonable assurance that the transmitters could perform their intended safety function, the licensee performed an evaluation which determined a qualified life of approximately 31 years for the metal film resistors when using a conservative heat rise of 10°F. To date, some transmitters have been in service for approximately 24 years.

Corrective Action(s): The licensee entered these issues into their corrective action program as condition reports (CRs) 1488848 and 1502448. The licensee reviewed temperature data from 2003-2010 to provide reasonable assurance that the internal O-rings in the transmitters could perform their intended function until they could be replaced. Additionally, the licensee evaluated the impact of a 10°F heat rise of on the qualified life of the transmitter and determined that the transmitter was currently within its qualified life.

Corrective Action Reference(s): CRs 1488848 and 1502448

Performance Assessment:

Performance Deficiency: The failure to account for all significant types of degradation of the Barton 764 instruments inside containment was a performance deficiency. Specifically, the licensee failed to justify the similarity of sensor fluid and internal O-ring seal materials of the Barton 764 transmitter with the Barton 351 transmitter and failed to account for the heat rise of the metal film resistor within the Barton Transmitter.

Screening: The inspectors determined the performance deficiency was more than minor because if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, the qualified life of the transmitter was reduced to less than its currently scheduled replacement frequency.

Significance: The inspectors assessed the significance of the finding using Inspection Manual Chapter (IMC) 0609, Att. 4, "Initial Characterization of Findings," issued October 7, 2016, for the Mitigating Systems cornerstone, and IMC 0609, App. A, "The Significance Determination Process (SDP) for Findings At-Power," issued June 19, 2012, and determined the finding was of very low safety significance (Green) because the finding was a deficiency affecting the qualification of a mitigating structure, system, or component (SSC) and the SSC maintained its operability.

Cross-cutting Aspect: Not Present Performance. No cross cutting aspect was assigned to this finding because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

Violation: Title 10 CFR 50.49(e)(5) required that, "Equipment qualified by test must be preconditioned by natural or artificial (accelerated) aging to its end-of-installed life condition. Consideration must be given to all significant types of degradation which can have an effect on the functional capability of the equipment. If preconditioning to an end-of-installed life condition is not practicable, the equipment may be preconditioned to a shorter designated life. The equipment must be replaced or refurbished at the end of this designated life unless ongoing qualification demonstrates that the item has additional life."

Contrary to the above, since July 7, 1995, the licensee failed to precondition the Barton 764 transmitters to their end-of-installed life condition and to consider all significant types of degradation which can have an effect on the functional capability of the equipment.

This finding closes URI 05000390, 05000391/2017007-05.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Observation	71152
<p>The inspectors reviewed corrective actions taken by the licensee following the identification of an unresolved item (URI) in the 2016 component design basis inspection (CDBI) at Watts Bar Nuclear Plant (Inspection Reports 05000390/2016011, 05000391/2016011). The URI was identified after discovering a discrepancy in an engineering calculation that evaluated the common service station transformers (CSSTs) A and B ability to satisfy 10 CFR 50, Appendix A, General Design Criterion (GDC) 17 requirements. After the issue was identified, the licensee took prompt corrective action to ensure the "maintenance feed alignment" would not be implemented at the Watts Bar Nuclear Plant (CR 1244348). Corrective actions included, in part, placing caution order cards on the 6.9kV maintenance feeder breaker switches that identified the CSST A/B are not to be aligned to replace CSST C/D for technical specification compliance. Another corrective action the licensee developed was to update Operations procedures to preclude connecting the shutdown boards to the USSTs through the unit boards. The inspectors reviewed the applicable Operations procedures and found that some were in fact updated; however, others had not been. The licensee generated another CR to ensure that all required procedures that need to be revised are captured and are updated with the appropriate NOTE, CAUTION, or STEP to meet the requirements for operation of the shutdown boards on the maintenance feeder (CR 1488549). The inspectors also found instances where the licensee manipulated the 6.9kV maintenance feeder breaker switches in the control room with the caution order cards installed on them; however, the inspectors determined these instances were of no safety significance because the unit boards were not being fed from the USSTs. Despite this fact, it was determined that the licensee's intention was to never manipulate these switches following the 2016 CDBI until further evaluation was documented and approved. The inspectors provided this observation to the licensee as well.</p>	

Minor Violation	71153
<p>Minor Violation: On March 26, 2018, the licensee did not properly log entry into Technical Specification (TS) Limiting Condition for Operation (LCO) 3.7.10, Condition B, for Unit 2 in the Operations Log. The licensee determined that the applicable actions had been taken and</p>	

achieved within the required action timeframe due to Unit 1 simultaneously entering in the same TS LCO due to a common plant system being inoperable (i.e. Control Room Emergency Ventilation System). The licensee appropriately logged the Unit 1 entry into TS LCO 3.7.10; however, the licensee's failure to appropriately log the Unit 2 entry into TS LCO 3.7.10 was a performance deficiency because the licensee failed to follow procedure OPDP-1, "Conduct of Operations," which requires the logging of LCO action statement entries and exits. The performance deficiency is a violation of TS 5.7.1, "Procedures," because in TS subsection 5.7.1.1.a, written procedures covering activities that are recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, which includes log entries in section 1.h, are required to be established, implemented, and maintained. OPDP-1 is a procedure required to be implemented by TS 5.7.1. This minor issue is associated with LER 390/391-2018-003 for Watts Bar Nuclear Plant, Units 1 and 2, Control Room Emergency Ventilation System inoperable due to Main Control Room Door Being Left Open.

Screening: The inspectors determined the performance deficiency was minor. The performance deficiency is minor because it could not be reasonably viewed as a precursor to a significant event; if left uncorrected, it would not have the potential to lead to a more significant safety concern; it does not relate to a performance indicator, and therefore, could not cause a performance indicator to exceed a threshold; and finally, it is not associated with a cornerstone attribute listed at the end of Inspection Manual Chapter 0612, Appendix B, and therefore, could not adversely affect any associated cornerstone objective.

Enforcement: This failure to comply with TS 5.7.1 constitutes a minor violation that is not subject to enforcement action in accordance with the NRC's Enforcement Policy.

Containment Air Return Fan 1B Inoperable due to Inadequate Post Maintenance Test			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000390/2019-004 Closed	[H.5] - Work Management	71153
<p>A self-revealed Green finding and associated non-cited violation of Technical Specifications 3.6.10, "Air Return System," was identified for the 1B containment air return fan (CARF) being inoperable for a time period longer than allowed by TS due to an inadequate post-maintenance test (PMT). Specifically, on December 11, 2018, while performing a routine surveillance test on the 1B CARF, the fan failed the force-to-open portion of the testing and this was later determined to be caused by an inadequate PMT approximately two months earlier.</p>			
<p>Description: On October 17, 2018, during the U1R15 Fall refueling outage, personnel completed planned maintenance to replace damper seals and to install access panels on the ductwork associated with the 1B CARF. The PMT for these work activities was conducted by work order 119946772. This work order involved installing wooden blocks and a tarp across the backdraft damper to ensure no air is transferred from upper to lower containment when the CARF is started. The CARF was started in accordance with work order 119946772 to obtain differential pressure across all of the backdraft dampers and a smoke test was also performed to ensure no leakage. However, work order 119946772 did not include requirements to perform a "push test" once the wooden blocks and the tarp were removed. The maintenance method for installing and removing the wooden blocks is to jam them in-between the damper frame and the counterweight and secure them with a hammer.</p>			

On December 11, 2018, a routine quarterly surveillance test was performed on the 1B CARF in accordance with 1-SI-30-26-B, Containment Air Return Fan 1B-B Quarterly Operability Test, Revision 18. The damper force-to-open “push test” as-found and as-left measurements exceeded the TS 3.6.10 limit of less than or equal to 92.4 in-lbs. The 1B CARF was declared inoperable and 7-day TS LCO 3.6.10.A was entered. Subsequent troubleshooting determined that a counterweight was loose and out of position. The counterweight was tightened and the as-left “push test” measurement was 51.18 in-lbs.

The licensee determined in a past operability evaluation that firm evidence existed that the counterweight was affected by the PMT activities on October 17, 2018. It was also noted that no other maintenance was performed on the CARF in the intervening time period. As a result, the licensee determined that the 1B CARF was inoperable from the time Unit 1 entered mode 4, on October 22, 2018 until the issue was corrected on December 11, 2018. This was reported as a condition prohibited by TS in LER 390-2018-006-00 on February 11, 2019.

The inspectors reviewed NPG-SPP-06.3, Pre/Post Maintenance Testing, Revision 2. Step 3.2.2.A.1 requires that, “Post maintenance testing shall be based on the extent of maintenance performed. The PMT shall be sufficiently comprehensive to ensure that the maintenance performed does not adversely affect the equipment’s ability to perform its intended function, that the original deficiency has been corrected, and that no new or related problems were created by the maintenance activity.”

Corrective Action(s): The licensee immediately fixed the loose counterweight and restored the 1B CARF to operability on December 11, 2018. Additional corrective actions included a procedure revision to require a “push test” after fan testing where the use of blocking devices could impact the dampers.

Corrective Action Reference(s): This issue is being tracked in TVA’s corrective action program by Condition Report 1474341.

Performance Assessment:

Performance Deficiency: The failure to follow TVA procedure NPG-SPP-06.3, Pre/Post Maintenance Testing, Revision 2, step 3.2.2.A.1 was a performance deficiency. Specifically, the PMT performed under WO 119946772 was not sufficiently comprehensive to ensure the maintenance performed did not adversely affect the ability of the 1B CARF to perform its intended function.

Screening: The performance deficiency was determined to be more than minor because it is associated with the Procedure Quality attribute of the Barrier Integrity Cornerstone and adversely affects the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events. Specifically, the 1B CARF was inoperable for a period of approximately 50 days.

Significance: The inspectors assessed the significance of the finding using Appendix H, “Containment Integrity SDP”. In accordance with IMC 0609, Attachment 4, the inspectors determined the Barrier Integrity cornerstone was affected due the impact to the containment barrier. The inspectors used the SDP Appendix Router to arrive at IMC 0609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” The inspectors determined that the finding required routing to IMC 0609 Appendix H, “Containment Integrity

Significance Determination Process” in accordance with IMC 0609, Appendix A, Exhibit 3, “Barrier Integrity Screening Questions,” Section B, “Reactor Containment,” step 1, because the finding is related to containment heat removal components. In IMC 0609 Appendix H the inspectors determined the finding represents a type B finding that only affected LERF and because the CARFs are not important to LERF in an ice condenser containment in accordance with table 4.1, “Containment-Related SSCs Considered for LERF Implications,” it screens to Green.

Cross-cutting Aspect: H.5 - Work Management: The organization implements a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. The work process includes the identification and management of risk commensurate to the work and the need for coordination with different groups or job activities. The finding had a cross-cutting aspect in the Work Management attribute of the Human Performance area as defined in IMC 0310, “Aspects Within the Cross- Cutting Areas,” because the PMT work was performed without personnel being aware of their surroundings and risk to other required functions/equipment. Likewise, the work process did not adequately include the identification and management of risk commensurate to the work.

Enforcement:

Violation: Technical Specification 3.6.10, “Air Return System (ARS),” LCO required action 3.6.10.A.1 requires that an ARS train be restored to operable status with a completion time of 72 hours. Contrary to the above, on December 11, 2018, it was self-revealed during surveillance testing that the 1B CARF had been inoperable for a period of approximately 50 days due to a previously performed inadequate PMT on October 17, 2018.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Follow System Status Control Procedure Results in Valve Misposition and Inoperability of the A train of ABGTS

Cornerstone	Significance	Cross-cutting Aspect	Report Section
Barrier Integrity	Green NCV 05000390/2019-005, 05000391/2019-005 Closed	[H.13] - Consistent Process	71153

A self-revealed Green finding and associated non-cited violation of Technical Specifications 5.7.1.1.a, “Procedures,” was identified for the failure to the requirements of TVA procedure NPG-SPP-10.1, System Status Control, Revision 9. Specifically, on December 8, 2018, it was discovered that the A train of the Auxiliary Gas Treatment System (ABGTS) was inoperable due to a valve misposition.

Description: On December 8, 2018, during performance of the monthly surveillance test run of the ABGTS in accordance with 0-SI-30-8-A, Auxiliary Building Gas Treatment System Train A Operational Test, Revision 19, isolation damper 0-FCO-30-280-A did not open as expected when the A train of the ABGTS was started. Auxiliary Building local pressure indications were checked and found to be off scale low (more negative than -0.51 inches of water). Operators declared the A train of ABGTS inoperable and entered TS LCO 3.7.12 condition A. The

isolation damper was opened using a main control room hand switch and Auxiliary Building pressure began to rise. The hand switch was then taken to close and the damper fully closed with the corresponding Auxiliary Building pressure returning to its unacceptably low value.

Further troubleshooting identified that the equalizing valve, 0-EQIV-30-149D, for pressure controller 0-PDT-30-149-A, was slightly open when it was expected to be fully closed. This prevented the pressure controller from opening damper 0-FCO-30-280-A, which would then allow a separate modulating damper to control pressure in the Auxiliary Building.

The licensee investigated the history of operation for equalizing valve 0-EQIV-30-149D and the surveillance history for the A train of ABGTS. It was found that ABGTS had been successfully run without pressure anomalies during its prior monthly surveillance on November 10, 2018. No maintenance, other work, or procedurally directed manipulations could be found associated with equalizing valve 0-EQIV-30-149D. The licensee noted that due to the location and orientation of the equalizing valve, which is sticking out from the manifold approximately 9 inches off the floor on the 757 ft. refueling deck elevation in the auxiliary building, the valve was likely inadvertently bumped sometime between November 10, 2018 and December 8, 2018. It was also noted that, while not in a high travel path, the area around the valve was used to stage various equipment during and after the U1R15 refueling outage. However, since no firm evidence exists regarding the time of the inadvertent bumping, time of discovery was used in the licensee's past operability evaluation and the A train of ABGTS was determined to have been operable until the surveillance on December 10, 2018.

Residents reviewed the requirements of NPG-SPP-10.1, System Status Control, Revision 9. Section 3.2.8, Bump Protection, outlines the protection requirements for plant components necessary to prevent inadvertent bumping of plant equipment. Section 3.2.8.C contains a matrix that assigns bump protection requirements based on a combination of the probability (high or low) and the consequence (significant or insignificant) of the component being bumped. The equalizing valve would be assigned low probability, since it is not in a high traffic area, and significant consequence, since it could cause the TS inoperability of plant equipment. Per the requirements of section 3.2.8.C, this combination requires some kind of identification, such as signage, to raise the sensitivity to inadvertent bumping of the equipment. The licensee did not have any form of identification present in the area of equalizing valve 0-EQIV-30-149D.

Corrective Action(s): Immediate corrective actions consisted of restoring the configuration control of equalizing valve 0-EQIV-30-149D and completing surveillance testing on A train ABGTS to return it to service. Temporary bump protection was also installed on the equalizing valve.

Corrective Action Reference(s):

This issue is being tracked in TVA's corrective action program by Condition Report 1473692.

Performance Assessment:

Performance Deficiency: The failure to follow TVA procedure NPG-SPP-10.1, System Status Control, Revision 9, section 3.2.8.C was a performance deficiency. Specifically, section 3.2.8.C required some type of identification to raise the sensitivity to bumping equalizing valve 0-EQIV-30-149D.

Screening: The performance deficiency was determined to be more than minor because it is associated with the Configuration Control attribute of the Barrier Integrity Cornerstone and adversely affects the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system, and containment) protect the public from radionuclide releases caused by accidents or events. Specifically, the A train of ABGTS was inoperable due to the performance deficiency.

Significance: In accordance with IMC 0609, Attachment 4, the inspectors determined the Barrier Integrity cornerstone was affected due to the impact to the Auxiliary Building Secondary Containment barrier. The inspectors used the SDP Appendix Router to arrive at IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The inspectors determined that the finding screened to Green in accordance with IMC 0609, Appendix A, Exhibit 3, "Barrier Integrity Screening Questions," Section C, "Control Room, Auxiliary, Reactor, or Spent Fuel Pool Building," because the finding only represented a degradation of the radiological barrier function provided for the auxiliary building.

Cross-cutting Aspect: H.13 - Consistent Process: Individuals use a consistent, systematic approach to make decisions. Risk insights are incorporated as appropriate. The finding had a cross-cutting aspect in the Consistent Process attribute of the Human Performance area as defined in IMC 0310, "Aspects Within the Cross- Cutting Areas," because the licensee failed to consistently apply the bump protection process requirements outlined in NPG-SPP-10.1.

Enforcement:

Violation: Technical Specification 5.7.1, "Procedures," in subsection 5.7.1.1.a, requires that written procedures covering activities that are recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, which includes equipment control activities (e.g. locking and tagging) in section 1.c, be established, implemented, and maintained. Contrary to the above, on December 8, 2018, the licensee failed to adequately implement procedure, NPG-SPP-10.1, "System Status Control," when it was discovered that an A train ABGTS equalizing valve had been inadvertently bumped due to not meeting procedural requirements for identification to raise the sensitivity to bumping specific equipment.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Unresolved Item (Closed)	Unit 1 TDAFW Pump Inoperability (PWST Overfill) 05000390,05000391/2018004-04	71111.15
<p>Description: Unresolved Item (URI) 05000390/2018-004-003 was opened in inspection report 05000390, 391/2018004 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19036A682) to determine if a performance deficiency existed associated with a November 4, 2018, event where the primary water storage tank was overfilled and caused the inoperability of the TDAFW pump due to water ingress into an electronic governor control cabinet.</p> <p>Inspectors reviewed additional information provided by the licensee, performed further inspection, and held discussions with representatives from the licensee.</p> <p>The results of this review are documented in this inspection report as Failure to Maintain</p>		

Configuration Control which led to an Internal Flooding Event that caused the Inoperability of the Turbine Driven Auxiliary Feedwater Pump.

Corrective Action Reference(s): This issue is being tracked in TVA's corrective action program by CR 1501994.

Unresolved Item (Closed)	Potential Failure to Address Environmental Qualification of Brand-Rex Cables 05000391,05000390/2017007-03	71111.21N
<p>Description: Unresolved Item (URI) 05000390, 391/2017007-03 was opened in inspection report 05000390, 391/2017007 (ADAMS Accession No. ML17220A153) to determine if a performance deficiency existed associated with the adequacy of the licensee's justification for the qualified life of Brand-Rex cables, documented in EQ binder WBNEQCABL-050. Specifically, the URI was opened to determine if the licensee's implementation of confidence limits, their methodology for the selection of the end of life failure mechanism, or their methodology to eliminate data points in the Arrhenius plots constituted a performance deficiency.</p> <p>Inspectors reviewed additional information provided by the licensee, performed further inspection, and held discussions with an NRC environmental qualification panel to resolve this URI. Additionally, the inspectors reviewed the updated guidance in ADAMS Accession Number ML18338A088 and Inspection Manual Chapter Inspection Procedure 71111.21N (Accession No. ML19036A556), which stated that:</p> <p>"Beyond ensuring that vendor programs satisfy the 10 CFR Part 50, Appendix B, requirements and confirming that EQ equipment is received as procured, licensees are not required to validate information (e.g., activation energy) contained in the EQ reports provided by Appendix B vendors."</p> <p>Based on the additional review and the above-mentioned guidance, the inspectors did not identify a performance deficiency associated with the Brand-Rex cables.</p> <p>Corrective Action Reference(s): N/A</p>		

Unresolved Item (Closed)	Potential Failure to Justify Qualification of O-Rings by Commercial Grade Dedication 05000391,05000390/2017007-04	71111.21N
<p>Description: Unresolved Item (URI) 05000390, 391/2017007-04 was opened in inspection report 05000390, 391/2017007 (ADAMS Accession No. ML17220A153) to determine if a performance deficiency existed associated with the adequacy of critical characteristics identified for commercial grade dedication of O-rings used in an EQ application.</p> <p>The inspectors reviewed additional information provided by the licensee, including commercial grade dedication documentation from the vendor and independent technical assessments of their commercial grade dedication process. The inspectors noted that the O-rings in question were sourced from the same manufacturer (Parker Hannifin) as those used by Westinghouse and Cameron/Barton (the original O-ring suppliers prior to the change in 2008). Based on the above information, the inspectors determined that the licensee had</p>		

reasonable assurance of a like-for-like material replacement for the original Westinghouse/Cameron supplied O-rings, and therefore, no performance deficiency existed.

Corrective Action Reference(s): N/A

Unresolved Item (Closed)	Potential Failure to Address Environmental Qualification of Barton Transmitters 05000391,05000390/2017007-05	71111.21N
<p>Description: Unresolved Item (URI) 05000390, 391/2017007-05 was opened in inspection report 05000390, 05000391/2017007 (ADAMS Accession No. ML17220A153) to determine if a performance deficiency and violation of 10 CFR 50.49 requirements existed. The inspectors questioned: (1) the justification for the qualified life of the cover and oil-seal O-rings; (2) if internal heat rise of the metal film resistor was evaluated in the justification for the qualified life of the transmitter electronics; (3) the implementation of the accelerated aging (Arrhenius) methodology in accordance with the IEEE Standard 101-1972; and (4) the justification for the activation energy used for the metal film resistor and the demonstration of synergistic effects and uncertainties.</p> <p>For Item 1, the inspectors reviewed the licensee's aging analysis and determined that the justification for the qualified life of the transmitter O-rings did not consider the appropriate aging time in the analysis. This review resulted in a performance deficiency and constituted a violation of NRC requirements.</p> <p>For Item 2, the inspectors reviewed the licensee's aging analysis and determined that the analysis did not account for the internal heat rise of the metal film resistor. This review resulted in a performance deficiency and constituted a violation of NRC requirements.</p> <p>For Item 3, the inspectors reviewed safety evaluation reports, calculations, procedures, and EQDP WBNEQ-XMTR-001, "Westinghouse/Barton 764 Differential Pressure Transmitters (Lot 7 and 4), Rev. 34. The inspectors did not identify a performance deficiency or violation of NRC requirements with the licensee's implementation of the accelerated aging (Arrhenius) methodology.</p> <p>For Item 4, the inspectors reviewed additional information provided by the licensee, performed further inspection, and held discussions with an NRC environmental qualification panel to resolve this URI. Additionally, the inspectors reviewed the updated guidance in ADAMS Accession Number ML18338A088 and Inspection Manual Chapter Inspection Procedure 71111.21N (Accession No. ML19036A556), which stated that:</p>		
<p>"Beyond ensuring that vendor programs satisfy the 10 CFR Part 50, Appendix B, requirements and confirming that EQ equipment is received as procured, licensees are not required to validate information (e.g., activation energy) contained in the EQ reports provided by Appendix B vendors."</p> <p>Based on the additional review and the above-mentioned guidance, the inspectors did not identify a performance deficiency associated with the justification for the activation energy used for the metal film resistor and the demonstration of synergistic effects and uncertainties.</p> <p>Corrective Action Reference(s): CRs 1488848 and 1502448</p>		

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On April 11, 2019, the inspector presented the quarterly resident inspector inspection results to Tony Williams, Site Vice President and other members of the licensee staff.
- On March 29, 2019, the inspector presented the Design Bases Assurance Inspection (programs) URI Closure Exit Meeting to Jonathan Johnson, Licensing Manager and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Corrective Action Documents	1171243		
		1312745		
		1426621		
		1478088		
		1478089		
		1478096		
		1500064		
		1502170		
71111.01	Procedures	0-TI-443 (Bases)	External Flood Protection Program Bases Document	3
		NPG-SPP-09.22	External Flood Protection	1
71111.01	Work Orders	119570061		
		120141395		
71111.04	Drawings	0-47W803-2	Flow Diagram Auxiliary Feedwater System	7
		2-47W810-1	Flow Diagram Residual Heat Removal System	26
71111.04	Miscellaneous	SDD-N3-3B-4002	Auxiliary Feedwater System	0027
71111.04	Procedures	1-SOI-3.02	Auxiliary Feedwater System	0022
		1-SOI-72.01 Attachment 1V	Containment Spray System Valve Checklist 1-72.01-1V	0
		2-SOI-74.01	Residual Heat Removal System	0013
		2-SOI-74.01, ATT 1P	Power Checklist 2-74.01-1P	0008
		2-SOI-74.01, ATT 1V	Valve Checklist 2-74.01-1V	0000
		2-SOI-74.01, ATT 2P	Power Checklist 2-74.01-2P	0000
		2-SOI-74.01, ATT 2V	Valve Checklist 2-74.01-2V	0000
71111.05Q	Corrective Action Documents	1499907		
71111.05Q	Fire Plans	AUX-0-676-01	WBN prefire plan for Aux. Bldg. Elev. 676	3
		AUX-0-692-03	WBN prefire plan for Aux. Bldg. Elev. 692 Zone 03	6

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		AUX-0-757-01	WBN Prefire Plan	2
		AUX-0-757-02	WBN Prefire Plan	4
		AUX-0-757-03	WBN Prefire Plan	4
		AUX-0-757-03	WBN Prefire Plan	5
		AUX-0-757-04	WBN Prefire Plan	5
		AUX-0-757-04	WBN Prefire Plan	3
		IPS-0-711-01	WBN pre-fire plan for IPS Elev. 711' and 722'	2
		IPS-0-728-01	WBN pre-fire plan for IPS Elev. 728' and 741'	2
71111.06	Calculations	WBNOSG4099	Moderate Energy Line Break Flooding Study	016
71111.06	Corrective Action Documents	1490444		
71111.06	Drawings	47W479-5	Mechanical Drains & Embedded Piping (Floor Drains)	21
71111.07A	Corrective Action Documents	1500085		
71111.07A	Engineering Evaluations	EWR-19-MEC-082-223	Evaluate 02/27/2019 fouling results for the 2B-B EDG Jacket Water Heat Exchangers	
71111.07A	Miscellaneous	EPRI NP-7552, Dec. 1991	Heat Exchanger Performance Monitoring Guidelines	
		Generic Letter 89-13	Service Water System Problems Affecting Safety-Related Equipment	
		SDD-N3-82-4002	Standby Diesel Generator System Unit 1 / Unit 2	0025
71111.07A	Procedures	2-TI-79.824	Diesel Generator 2B-B Jacket Water Cooler Performance Test	0001
71111.07A	Work Orders	119667926		
71111.12	Corrective Action Documents	1463113		
		1463499		
		1472204		
		1474341		
		1476680		
71111.12	Drawings	3NC3001	Valve Code Drawing sheet 5	2
71111.12	Miscellaneous	LER 390-2018-006-00		
		NUMARC 93-01	Industry Guideline for Monitoring the Effectiveness of	2

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Maintenance at Nuclear Power Plants	
		WBN Engineering Department Standing Order 2019-03	Guidance for Information and Reference Use Procedures	0
71111.12	NDE Reports		TVA Record of Liquid Penetrant Exam	02/26/2019
71111.12	Operability Evaluations	Past Operability Evaluation for CR 1474341		
71111.12	Procedures	0-TI-119	Maintenance Rule Performance Indicator Monitoring, Trending and Reporting – 10CFR50.65	0009
		NPG-SPP-03.4	Maintenance Rule Performance Indicator Monitoring, Trending and Reporting – 10CFR50.65	3
		NPG-SPP-06.3	Pre/Post-Maintenance Testing	2
71111.12	Work Orders	119946772		
71111.13	Corrective Action Documents	1492077		
		1492360		
71111.13	Miscellaneous	WBN-SDD-N3-78-4001	Spent Fuel Pool Cooling and Cleaning System Unit 1/Unit 2	0024
71111.13	Procedures	0-AOI-45	Loss of Spent Fuel Pool Level or Cooling	0007
		1-PI-OPS-1-PE	Protected Equipment	0021
		1-PI-OPS-1-PE	Protected Equipment	0021
		1-PI-OPS-1-PE	Protected Equipment	0021
		1493484		
		1493785		
		3-OT-AOI4500	Loss of Spent Fuel Pool Level or Cooling	6
		NPG-SPP-09.11.1	Equipment Out of Service Management Daily EOOS report	0012
		NPG-SPP-09.11.1	Equipment Out of Service Management Daily EOOS report	0012
		NPG-SPP-09.11.1	Equipment Out of Service Management Daily EOOS report	12

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.15	Calculations	WBNOSG4099	Moderate Energy Line Break Flooding Study	016
71111.15	Corrective Action Documents	1426051		
		1463113		
		1463165		
		1463499		
		1476680		
		1490444		
		1491007		
		1491155		
		1491412		
		1491444		
		1491579		
		1491636		
		1492081		
		1492091		
		1496651		
71111.15	Drawings	0-47W819-1	Flow Diagram Primary Water	1
		0-47W856-1	Diagram Demineralized Water and Cask Decon System	7
		0-47W872-1	Flow Diagram Demineralized Water Storage And Distribution System	0
		1-47W819-2	Flow Diagram Primary Water	0
		8002577	Turbine Positioner Panel Layout	D
71111.15	Engineering Changes	DCN 58314	Replace Unit 1 TDAFW Governor Valve Controller with Digital Controller	
		WAT-D-8677, 10/31/1991	Condensate Storage Tank Volume Requirements (Cooldown Analysis Using TREAT Code) Final Report	
71111.15	Miscellaneous	Branch Technical Position 3-3-2	March 2007	3
		NEMA Enclosure		Nov. 2005

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		Types		
		SDD-N3-3B-4002	Auxiliary Feedwater System Unit 1 / Unit 2	27
		WBNOSG4103	MELB Safe Shutdown Analysis	11
71111.15	Procedures	0-SOI-59.01	Demineralized Water System	0015
		0-SOI-81.01	Primary Makeup Water System	0011
		0-TI-100.014	ASME Section XI Repairs and Replacements Operator Logs	0001
		2-SI-3-903-B	Valve Full Stroke Exercising During Plant Operation Auxiliary Feedwater (Train B)	0009
		MAI-3.1	Installation of Electrical Conduit Systems and Conduit Boxes	0027
		NPG-SPP-09.1.21	Inservice Testing Evaluations and Reference Values Attachment 4	0000
		NPG-SPP-10.1	System Status Control	0009
71111.15	Radiation Surveys	NPG-SPP-09	ASME Section XI Repair/Replacement Activities Program	0004
71111.15	Work Orders	117997708	Implement DCN 58314 – Install Panel L-326A and Associated Conduit and Cabling	
		119750820		
71111.19	Drawings	1-47W803-3-CC	Flow Diagram Main and Auxiliary Feedwater (Lube Oil System)	
		3NC3001	Valve Code Drawing sheet 5	2
71111.19	Engineering evaluations	19ELE030220		
71111.19	Procedures	0-MI-0.011	Safety/Relief Valves	11
		0-TI-5.002	Flow Testing of Ventilation Systems	0003
		1-SOI-3.02	Auxiliary Feedwater System	0022
		PM M2125V	Cleaning and Lubrication of CS, SIS, and CVCS Pump Motors	6
		PM M8405V	Lubrication of Reliance Integral HP Motors with EQ Requirements	6
71111.19	Work Orders	119660505		
		119684206		
		120124155		
		120252992		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21N	Calculations	WBNAPS2-110	Material Aging Calculation for Barton Model 764 Transmitters (WBNEQ-XMTR-001)	1
71111.21N	Corrective Action Documents Resulting from Inspection	CR 1488848		
		CR 1502448		
71111.21N	Engineering Evaluations	Response to URI 05000390, 391/2017008-03	Brand Rex Cable Activation Energy and Qualified Life	
71111.21N	Miscellaneous	ADAMS Accession ML18338A088	Former FAQ Responses	December 4, 2018
		ADAMS Accession ML19036A556	IP 71111.21N, Design Bases Assurance Inspection (Programs)	February 5, 2019
		NUREG-0847, Supplement 15	Safety Evaluation Report Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2	June 1995
		WBNEQ-XMTR-001	764 Differential Pressure Transmitters (Lot 7 and 4)	34
71111.21N	Procedures	DS-M18.14.1	Design Standard for Environmental Qualification of Electrical Equipment in Harsh Environments	3
		NPG-SPP-09.2	Equipment Environmental Qualification Program	8
71111.22	Corrective Action Documents	1490808		
		1502674		
		1503031		
71111.22	Drawings	1-47W866-1	Flow Diagram Heating and Ventilation Air Flow	69
71111.22	Miscellaneous	11577	DAA-P-7900 Heavy Duty Back Draft Damper	902
		3-OT-SYS030D	Containment Air Return Fans	7
		N3-30RB-4002	Reactor Building Ventilation System	19
71111.22	Procedures	0-SI-82-12-B	Monthly Diesel Generator Start and Load Test DG 2B-B	0056
		0-TI-26.102	5000 GPM Dominator Portable Diesel Pump (5DPDP) Operating Procedure	0002
		1-SI-30-26-A	Containment Air Return Fan 1A-A Quarterly Operability Test	0017

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		1-SI-99-10-B	62 Day Functional Test of SSPS Train B and Reactor Trip Breaker B	0067
		2-SI-3-901-B	Motor Driven Auxiliary Feedwater Pump 2B-B Quarterly Performance Test	0008
		2-SI-74-901-B	Residual Heat Removal Pump 2B-B Quarterly Performance Test	0009
71111.22	Work Orders	119667904		
		119724508		
		119750786		
		119750795		
		119750808		
		120357399		
71151	Procedures	1-SI-211-1-B	18 Month 6.9kV Shutdown Board 1B-B Automatic and Manual Transfer Tests	2
		1-SI-68-28	Primary Radiochemistry Requirements	26
		2-SI-68-28	Primary Radiochemistry Requirements	3
71151	Work Orders	119025249		
		119065391		
		119529793		
71152	Corrective Action Documents	1244275		
		1244348		
		1245056		
		1310832		
		1313954		
		1488549		
71152	Procedures	0-SI-211-1	18 Month 6.9kV Shutdown Boards Transfer from Normal to Alternate Supply	13
71152		0-SOI-200.04	CSST C & D and Supply Breakers to 6.9kV Shutdown Boards	6
71152		0-SOI-200.05	CSST A & B	9
71152		0-SOI-211.01	6.9kV Shutdown Board 1A-A	4
71152		0-SOI-211.02	6.9kV Shutdown Board 1B-B	4
71152		0-SOI-211.03	6.9kV Shutdown Board 2A-A	4

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71152		0-SOI-211.04	6.9kV Shutdown Board 2B-B	3
71152		1-SI-211-1-A	18 Month 6.9kV Shutdown Board 1A-A Automatic and Manual Transfer Tests	2
		2-SI-211-1-A	18 Month 6.9kV Shutdown Board 2A-A Automatic and Manual Transfer Tests	3
		2-SI-211-1-B	18 Month 6.9kV Shutdown Board 2B-B Automatic and Manual Transfer Tests	4
71153	Corrective Action Documents	1474341		
		1503829		
71153	Engineering Evaluations	WBN Engineering Department Standing Order 2019-03	Guidance for Information and Reference Use Procedures	0
71153	Miscellaneous	LER 390-2018-006-00		
71153	Operability Evaluations	Past Operability Evaluation for CR 1474341		
71153	Procedures	NPG-SPP-06.3	Pre/Post-Maintenance Testing	2
		OPDP-1	Conduct of Operations	0043
71153	Work Orders	119946772		