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

May 11, 2022

Mr. Jim Barstow
Vice President Nuclear Regulatory
Affairs & Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT – INTEGRATED INSPECTION REPORT 05000390/2022001 AND 05000391/2022001

Dear Mr. Barstow:

On March 31, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Watts Bar Nuclear Plant. On April 28, 2022, the NRC inspectors discussed the results of this inspection with Mr. Anthony Williams and other members of your staff. The results of this inspection are documented in the enclosed report.

Two findings of very low safety significance (Green) are documented in this report. Two of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the 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 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 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 Nuclear Plant.

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 Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

Signed by Stephen, Tom
on 05/11/22

Thomas A. Stephen, Chief
Projects Branch 5
Division of Reactor Projects

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

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV

SUBJECT: WATTS BAR NUCLEAR PLANT – INTEGRATED INSPECTION REPORT 05000390/2022001 AND 05000391/2022001 DATED MAY 11, 2022

DISTRIBUTION
S. Price, RII
M. Kowal, RII/EICS
N. Doiley, RII/EICS
RidsNrrPM
RidsNrrDRO
PUBLIC

ADAMS ACCESSION NUMBER: ML22130A191

X SUNSI Review		X Non-Sensitive ☐ Sensitive		X Publicly Available ☐ Non-Publicly Available	
OFFICE	RII/DRP	RII/DRP	RII/DRP		
NAME	S. Ninh	W. Deschaine	T. Stephen		
DATE	05/10/2022	05/11/2022	05/11/2022		

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000390 and 05000391
License Numbers:	NPF-90 and NPF-96
Report Numbers:	05000390/2022001 and 05000391/2022001
Enterprise Identifier:	I-2022-001-0027
Licensee:	Tennessee Valley Authority
Facility:	Watts Bar Nuclear Plant
Location:	Spring City, TN 37381
Inspection Dates:	January 01–March 31, 2022
Inspectors:	T. Beck, General Engineer NRAN J. Brown, Senior Physical Security Inspector N. Childs, Resident Inspector P. Cooper, Senior Reactor Inspector W. Deschaine, Senior Resident Inspector S. Downey, Senior Reactor Inspector C. Franklin, Reactor Inspector K. Miller, Resident Inspector
Approved By:	Thomas A. Stephen, Chief Projects Branch 5 Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Watts Bar Nuclear Plant, 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.

List of Findings and Violations

Failure to Appropriately Assess and Manage Risk that Results in Reactor Trip			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000391/2022001-01 Open/Closed	[H.5] - Work Management	71153
A self-revealed green finding and associated non-cited violation (NCV) of 10 CFR 50.65(a)(4) was identified when the licensee failed to assess risk associated with performing a breaker swap on the Unit 2C Board, leading to a reactor trip. Specifically, the licensee failed to characterize the activity as high risk, in accordance with risk management procedure NPG-SPP-07.3, Work Activity and Risk Management Process.			

Failure to Follow Surveillance Log Procedures in Mode 6			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000391/2022001-02 Open/Closed	[H.12] - Avoid Complacency	71153
A self-revealed, green finding and associated NCV of Watts Bar Unit 2 TS 3.9.5, "RHR and Coolant Circulation - High Water Level," was identified for the licensee's failure to follow surveillance log procedures which ensure SR 3.9.5.1 is met.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000391/2021-001-00	LER 2021-001-00 for Watts Bar Nuclear Plant, Unit 2, Automatic Reactor Trip on Main Turbine Trip caused by Main Feed Pump Trip due to Low Condenser Vacuum	71153	Closed
LER	05000391/2020-003-00	LER 2020-003-00 for Watts Bar Nuclear Plant, Unit 2 re Low RHR Flow in Mode 6 Results in a Condition Prohibited by Technical Specifications	71153	Closed

PLANT STATUS

Unit 1 operated at or near rated thermal power (RTP) from the beginning of the inspection period until March 17th, when it was reduced to 40 percent RTP for main condenser tube cleaning to restore margin. The unit was returned to 100 percent RTP on March 20, where it remained for the remainder of the inspection period.

Unit 2 began the inspection period at 95 percent rated thermal power. On March 1, 2022, the unit was shutdown for a planned refueling outage (U2R4) where it remained for the rest 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 activities described in IMC 2515, Appendix D, "Plant Status," conducted routine reviews using IP 71152, "Problem Identification and Resolution," observed risk significant activities, and completed on-site portions of IPs. 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 03.02) (1 Sample)

(1) The inspectors evaluated the adequacy of the overall preparations to protect risk-significant systems from impending severe weather of high winds and rain on March 7, 2022.

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (3 Samples)

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

(1) B train emergency gas treatment system (EGTS) on January 6, 2022
(2) 1B emergency diesel generator (EDG) during the 1A EDG component outage on February 2, 2022
(3) Unit 2 residual heat removal (RHR) system during Unit 2 steam generator replacement outage (U2R4) on March 4, 2022

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

(1) Auxiliary Building, elevation 772' (480V Board Rooms) on January 12, 2022
(2) Auxiliary Building, elevation 737' on January 13, 2022
(3) Auxiliary Building, elevation 757' Auxiliary Control Room, Auxiliary Instrument Rooms, and 125V Vital Battery Board Rooms on February 17, 2022
(4) Auxiliary Building, elevation 713' Penetration Rooms on March 20, 2022

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

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

(1) The inspectors observed and evaluated licensed operator performance in the control room during the Unit 2 shutdown & cooldown on March 1–2, 2022.

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

(1) The inspectors observed and evaluated the following licensed operator requalification simulator scenarios: crew 3 group 3B on January 13, 2022; crew 1 group 1B on January 19, 2022; crew 5 group 5B on January 26, 2022; crew 3 group 3B on February 2, 2022. All of these observations make up one sample.

71111.12 - Maintenance Effectiveness

Quality Control (IP Section 03.02) (1 Sample)

The inspectors evaluated the effectiveness of maintenance and quality control activities to ensure the following SSC remains capable of performing its intended function:

(1) 1A EDG lube oil circulating pump on February 2, 2022

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

(1) Risk assessment for (week of) January 10, 2022, with the 1B centrifugal charging pump (CCP) and the B train 6.9kV shutdown board room chiller out of service (OOS) for planned maintenance

(2) Risk assessment for (week of) January 17, 2022, with the Unit 2 steam generator #4 level indicating controller (2-LIC-3-171A-B) and the B train 6.9kV shutdown board room chiller OOS for emergent and planned maintenance
(3) Risk assessment for (week of) January 31, 2022, with the 1A-A emergency diesel generator OOS for planned maintenance. This planned maintenance was greater than 50% of 10-day limiting condition for operation (LCO) time.
(4) Unit 2 blackout testing & mode 5 & 6 activities during the week of March 1, 2022
(5) Risk assessment for (week of) March 7, 2022, with testing on the A and B train shutdown boards for Unit 2 and the Unit 2 core being off-loaded

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (2 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

(1) CR 1656316 - Not all acceptance criteria met in 0-SI-67-905-A
(2) CR 1747769 - Train A auxiliary building gas treatment system (ABGTS) was placed in service four hours after painting activities in auxiliary building elevation 737, contrary to 0-TI-215

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (7 Samples)

The inspectors evaluated the following post-maintenance testing activities to verify system operability and/or functionality:

(1) 2-SI-903-B, Valve Full Stroke Exercising During Plant Operation – Auxiliary Feedwater (Train B), for Valve 2-LCV-3-171 on January 14, 2022, after corrective maintenance (Work Order 122641659) for a failed Unit 2 Steam Generator #4 Level Indicating Controller (2-LIC-3-171A-B)
(2) 2-SI-903-B, Valve Full Stroke Exercising During Plant Operation – Auxiliary Feedwater (Train B), for Valve 2-LCV-3-171 on January 23, 2022, after corrective maintenance (Work Order 122660908) for a failed Unit 2 Steam Generator #4 Level Indicating Controller (2-LIC-3-171A-B)
(3) 0-SI-82-20-B, 184 Day Fast Start and Load Test DG 2B-B, after replacing the power pack on engine 2B2, cylinder #14 due to the discovery of water in the cylinder, documented in Work Order (WO) 122688966
(4) 0-SI-82-17-A, 184 Day Fast Start and Load Test DG 1A-A, after replacement of the 2301A Woodward Governor Control Unit under WO 121852685
(5) 2-SI-0-902, Unit 2 In-service Testing of Safety and Relief Valves, after the component cooling system (CCS) RHR pump 2B-B return relief valve was removed and rebuilt, documented in WO 122059557
(6) WO 122344993, Static Diagnostic Testing (MOVATS) of the Limitorque motor actuator (2-MVOP-074-0009-B) on March 18, 2022, after corrective maintenance (WO 120510973) was done to adjust a packing gland to stop historical valve stem packing leakage

(7) 1-SI-63-901-B, Safety Injection Pump (SIP) 1B-B Quarterly Performance Test on March 22, 2022, after preventative maintenance was completed on the 1B-B SIP under WO 121978505.

71111.20 - Refueling and Other Outage Activities

Refueling/Other Outage Sample (IP Section 03.01) (1 Partial)

(1) (Partial)
The inspectors evaluated refueling outage Unit 2 R4 activities from March 1–March 31, 2022. The inspectors completed inspection procedure Sections 03.01.A and B.

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance testing activities to verify system operability and/or functionality:

Surveillance Tests (other) (IP Section 03.01) (4 Samples)

(1) WO 121879791, Surveillance Instruction 2-SI-63-917, Testing of Cold Leg Accumulator Check Valves, on March 6, 2022
(2) WO 121879743, Surveillance Instruction 2-SI-63-907, Residual Heat Removal Hot Leg and Cold Leg Injection Check Valve Testing During Refueling Outages, on March 6, 2022
(3) WO 122196549, 0-SI-70-902-S, Component Cooling System Pump C-S Quarterly Performance Test, on February 8, 2022
(4) WO 121879725, 2-SI-63-906, Safety Injection Check Valve Full-Flow Testing During Refueling Outages, on March 9, 2022

Inservice Testing (IP Section 03.01) (1 Sample)

(1) WO 122141930, Surveillance Instruction 2-SI-3-902, Turbine Driven Auxiliary Feedwater Pump 2A-S Quarterly Performance Test, on January 4, 2022

Containment Isolation Valve Testing (IP Section 03.01) (1 Sample)

(1) WO 121881796, Surveillance Instruction 2-SI-30-701, Containment Isolation Valve Local Leak Rate Test Purge Air, on March 7, 2022

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

MS06: Emergency AC Power Systems (IP Section 02.05) (2 Samples)

(1) Unit 1 (April 1–December 31, 2021)
(2) Unit 2 (April 1–December 31, 2021)

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

(1) Unit 1 (April 1–December 31, 2021)
(2) Unit 2 (April 1–December 31, 2021)

BI02: RCS Leak Rate Sample (IP Section 02.11) (2 Samples)

(1) Unit 1 (April 1–December 31, 2021)
(2) Unit 2 (April 1–December 31, 2021)

71153 - Follow Up of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (2 Samples)

The inspectors evaluated the following licensee event reports (LERs):

(1) LER 391/2020-003-00, Low RHR Flow in Mode 6 Results in a Condition prohibited by Technical Specifications (ADAMS Accession No. ML20356A291). The inspection conclusions associated with this LER are documented in this report under Inspection Results Section.
(2) LER 391/2021-001-00, Automatic Reactor Trip on Main Turbine Trip caused by Main Feed Pump Trip due to Low Condenser Vacuum (ADAMS Accession No. ML21130A027). The inspection conclusions associated with this LER are documented in this report under Inspection Results Section.

OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL

50001 - Steam Generator Replacement Inspection

Design and Planning + Steam Generator Removal Inspection

During the Watts Bar Unit 2 Spring 2022 refueling outage, all four of the Westinghouse model D3 (Alloy 600) original steam generators (OSGs) were replaced with Westinghouse Model 68AXP (Alloy 690) replacement steam generators (RSGs). This inspection report documents inspection activities completed during the first quarter of 2022, as required by IP 50001, Steam Generator Replacement Inspection.

Steam Generator Replacement Inspection (6 Samples)

(1) Design Changes and Modifications to Systems, Structures, and Components – 10 CFR 50.59 Review (Sections 02.02.a.1 and 02.02.a.2)

The inspectors reviewed the following engineering design change packages for key design aspects and modifications of the replacement steam generators and verified that changes to the facility as described in the UFSAR were reviewed and documented in accordance with 10 CFR 50.59. This included verifying that the ASME Code requirements used to construct the replacement steam generators, piping, and other components, were reconciled with those used to construct the original components when required; that the replacement steam generators comply with the appropriate NRC requirements and the ASME Code; and that other plant modifications required for the removal of the original steam generators and the

installation of the replacement steam generators comply with NRC requirements and the ASME Code. To complete these reviews, the inspectors used IPs 71111.17T, 71111.18, and 71111.21M as guidance in accordance with IP 50001.

- Design Change Notice (DCN) 66293, R1 Containment Modifications
- DCN 66311, Replacement Steam Generator and Piping Insulation
- DCN 66313, Large Bore Piping Modifications
- DCN 66314, Original Steam Generator (OSG) Removal / Replacement Steam Generator (RSG) Installation
- DCN 66315, Small Bore Piping Modifications
- DCN 66317, Civil & Mechanical Interference Removal for the Unit 2 Replacement Steam Generator Project
- DCN 66349, Electrical Interference Removal for the Unit 2 Replacement Steam Generator Project
- DCN 66474, Watts Bar Unit 2 Replacement Steam Generator (RSG) – Environmental Qualification (EQ) Impacts
- DCN 66476. Watts Bar Unit 2 Replacement Steam Generator (RSG) – SG Vessel Impacts
- DCN 66477, WBN2 Replacement Steam Generator – Feedwater Impacts
- DCN 66478, WBN2 Replacement Steam Generator – Instrumentation and Control (I&C) Impacts
- Design Equivalent Change (DEC) 100228, WBN2 Replacement Steam Generator – SG Narrow Range (NR) Level Transmitter Impacts

(2) Review of Engineering Design, Modification, Testing, and Analysis Associated with Steam Generator (SG) Lifting and Rigging (Section 02.02.b)

The inspectors reviewed the adequacy of the Steam Generator Replacement Project (SGRP) lifting programs as described in engineering package 31814-EP-C-004, “Rigging and Transport,” assuring that it was prepared in accordance with regulatory requirements, appropriate industrial codes, and standards; and verified that the maximum anticipated loads to be lifted would not exceed the capacity of the lifting equipment and supporting structures.

The inspectors reviewed the adequacy of the haul route evaluation, placement of temporary protection for plant commodities and haul route upgrades required to prepare the haul route for load testing and transport of the steam generators as described in engineering package, 31814-EP-C-006, “Haul Route and RSG Offload.” The inspectors verified that they had been prepared in accordance with regulatory requirements, appropriate industrial codes, and standards, and also discussed the transport path load testing with SGRP Engineering personnel.

(3) Security Considerations Associated with Vital and Protected Area Barriers and Plans to Minimize Adverse Impacts on the Operating Unit and Common Systems (Section 02.02.d.1 and 02.02.d.2)

An NRC security inspector reviewed the concept of operations with licensee security representatives and determined that the licensee would have appropriate measures in place by the time the actual outage work would begin. The inspector received an

overview of the licensee's security plan and discussed specific areas associated with vital and protected areas barriers that could be affected during replacement activities and concluded that they were operational and that the licensee was in compliance with security requirements. The inspector also reviewed licensee controls and plans to minimize any adverse impact on the operating unit and common systems and determined that they were adequate and appropriate. These activities were completed prior to the SGR outage.

(4) Activities Associated with Lifting and Rigging (Section 02.03b)

The inspectors examined the SGRP lifting equipment necessary to perform steam generator rigging and transport; design evaluation/erection/use and disassembly of the outside lift system (OLS); removal of sections of the shield building dome concrete, steel containment vessel, and SG compartment concrete; and load drop protection.

(5) Old SG Removal (Section 02.03.c)

The inspectors observed various portions of the process of the old steam generators (OSG) being lifted from the steam generator (SG) cubicle through the temporary penetrations in the steel containment vessel and shield building to the hydraulic trailer transporter. During these observations the inspectors performed visual inspections of the OLS and the hydraulic trailer transporter.

(6) Operating Conditions throughout the SGRP Process (Section 02.03.f)

The inspectors routinely inspected the following activities as they occurred throughout this inspection period:

- establishment of operating conditions including defueling, RCS drain down, and system isolation and safety tagging/blocking
- implementation of radiation protection controls
- implementation of controls for excluding foreign materials in the primary and secondary side of the SGs and in the related RCS openings
- installation, use, and removal of temporary services directly related to steam generator replacement activities

INSPECTION RESULTS

Failure to Appropriately Assess and Manage Risk that Results in Reactor Trip			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000391/2022001-01 Open/Closed	[H.5] - Work Management	71153
A self-revealed green finding and associated non-cited violation (NCV) of 10 CFR 50.65(a)(4) was identified when the licensee failed to assess risk associated with performing a breaker swap on the Unit 2C Board leading to a reactor trip. Specifically, the licensee failed to characterize the activity as high risk in accordance with risk management procedure NPG-SPP-07.3, Work Activity and Risk Management Process.			

Description: At 1004 on March 17, 2021, Watts Bar Unit 2 had an automatic reactor trip due to turbine trip, which was caused by both main feed pumps (MFPs) tripping due to loss of condenser vacuum. In LER 391/2021-001-00, the licensee stated, "the direct cause of the event was failure of a close latch to maintain an alternate supply breaker open after installation in the Unit 2C Board. The alternate supply breaker closed causing the normal supply breaker to open, de-energizing the Unit 2C Board. The 2C condenser circulating water (CCW) Pump lost power causing a reduction of CCW flow and subsequent main feed pump trip on low condenser vacuum." The 2D CCW Pump was OOS for maintenance activities both prior to and throughout this event.

Procedure NPG-SPP-07.3, Work Activity Risk Management Process, section 3.3, Risk Characterization and Preapproval Determination, requires an initial and a final risk characterization be performed using Attachment 2, Risk Characterization and Operational Impact. Attachment 2 requires that work activities meeting certain criteria be characterized as high risk. Criterion 1.3 of this attachment includes physical activities that are "performed on, connected to or near trip sensitive equipment (Ref: 0-TI-12.10 WBN) or protected train equipment, that could cause a plant transient or Loss of Safety Function." Specifically, the Unit 2C Board was connected to the 2C CCW train which was protected at the time of this event. Furthermore, the Unit 2C board was capable of causing a plant transient regardless of the protected status of the 2C CCW train, and the inadvertent breaker closure resulted in a unit trip. It was noted in the "Prompt Investigation Report – HU and Equipment" for Condition Report (CR) 1379707 that, "The failure to identify the risk associated with a potential fault during the breaker swap would still have resulted in a challenge to the secondary plant with the loss of the 2C unit board even if all CCW pumps were available.

This breaker swap should have been classified as high risk in accordance with Attachment 2 of NPG-SPP-07.3. Because of this failure to properly classify risk in accordance with procedure, the licensee did not develop a high-risk management plan in accordance with NPG-SPP-07.3, Attachment 3, High Risk Management Plan.

Corrective Actions: The licensee took immediate action to postpone similar breaker swap activities until the inadvertent breaker closure was understood and later implemented corrective actions to classify the breaker swaps as high risk. Corrective action has been implemented which modifies NPG-SPP-07.3 to re-screen risk for maintenance activities as plant configuration and conditions change. The licensee has implemented corrective action to conform with Electric Power Research Institute (EPRI) and General Electric (GE) vendor manual for breaker inspection and overhauls.

Corrective Action References: CR 167894, CR 1679456, CR 1679707

Performance Assessment:

Performance Deficiency: Failure to appropriately screen risk for the unit board 2C alternate feeder breaker in accordance with risk management procedure is a performance deficiency (PD). Specifically, the licensee did not follow procedure NPG-SPP-07.3, Work Activity Risk Management Process by failing to characterize this breaker swap as high risk.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Configuration Control attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, a failure to appropriately characterize risk of a maintenance

activity resulted in putting the unit in a vulnerable configuration and subsequently resulted in a reactor trip.

Significance: The inspectors assessed the significance of the finding using Appendix K, "Maintenance Risk Assessment and Risk Management SDP." The inspectors determined that the failure to assess the risk associated with the alternate feeder breaker for the 2C electrical board required additional evaluation. Although the licensee's process to assess and manage the risk associated with breaker maintenance was qualitative, a Region II Senior Reactor Analyst determined that the incremental core damage probability deficit (ICDPD) for the maintenance activity could be estimated using SAPHIRE Version 8.2.5 and Watts Bar SPAR model Version 8.53. The risk deficit was estimated by determining the difference between the normal baseline risk of a plant transient or loss of condenser heat sink and the maintenance activity resulting in either a loss of man feedwater induced plant transient or loss of condenser heat sink. Because remaining condenser function to remove post-trip decay heat loads via the steam dumps was not credited in the analysis for the loss of condenser heat sink case, additional refinement of the modeling approach could be expected to lower risk estimates. The duration of the period where the maintenance activity could have taken place while the 2D circulating water pump was unavailable was then applied and yielded an estimated ICDPD of 8.87E-08. Because ICDPD was less than 1E-07 and the dominant cutset sequences were not associated with large early release contributors, the finding did not require additional evaluation for incremental large early release probability deficit (ILERPD). The estimated risk deficit was determined to be less than the 1E-06 for ICDPD and 1E-07 for ILERPD values described in Flowchart 1 of Appendix K, and therefore, consistent with a finding of GREEN risk significance.

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. Specifically, failure to manage work in accordance with risk management procedures resulted in failure to establish a high-risk management plan for a maintenance activity.

Enforcement:

Violation: 10 CFR 50.65(a)(4) requires, in part, that "before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities."

Procedure NPG-SPP-07.3, Work Activity Risk Management Process, section 3.3, Risk Characterization and Preapproval Determination, requires an initial and a final risk characterization be performed using Attachment 2, Risk Characterization and Operational Impact. Attachment 2 requires that work activities meeting certain criteria be characterized as high risk.

Contrary to the above, prior to performing the Unit 2C Board alternate feeder breaker swap on March 17, 2021, the licensee failed to adequately assess and manage the risk in accordance with Procedure NPG-SPP-07.3 requirements which placed the unit in a vulnerable configuration and subsequently resulted in a reactor trip on March 17, 2021.

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 Surveillance Log Procedures in Mode 6			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000391/2022001-02 Open/Closed	[H.12] - Avoid Complacency	71153
A self-revealed, green finding and associated NCV of Watts Bar Unit 2 TS 3.9.5, "RHR and Coolant Circulation - High Water Level," was identified for the licensee's failure to follow surveillance log procedures which ensure SR 3.9.5.1 is met.			

Description: In the submitted LER 391/2020-003-00, the licensee stated, "On November 7,2020, at 1315 Eastern Standard Time (EST) it was discovered that TS Requirement 3.9.5, "RHR and Coolant Circulation – High Water Level," for Unit 2 was not met prior to Mode 6 entry. 2B RHR pump flow was 2100 GPM contrary to Surveillance Requirement (SR) 3.9.5.1 flow requirement of >/= 2500 GPM." The licensee entered Mode 6 at 0354 on November 6, 2020. Section 6.1 of surveillance log procedures 2-SI-0-2A-06, 0700-1900 Shift and Daily Surveillance Log Mode 6, and 2-SI-0-2B-06, 1900-0700 Shift and Daily Surveillance Log Mode 6, requires that the procedures data sheets are reviewed prior to making any mode change which is more restrictive to ensure compliance with applicable surveillance requirements for that mode.

During Mode 6 operation, SR 3.5.9.1 is completed every shift via surveillance log procedures 2-SI-0-2A-06 and 2-SI-0-2B-06. However, during the two shifts following Mode 6 entry on November 6, 2020, the operators failed to recognize RHR flow was below the acceptance criteria and required TS limits listed in these procedures, thus failing to meet the SR. Section 7.0, Post-Performance Activities, of the surveillance log procedures requires that the licensee ensures acceptance criteria have been met or appropriate corrective action has been taken.

These circumstances resulted in the inoperability of the required RHR loop from Mode 6 entry until compliance was reestablished on November 7, 2020, a period of approximately 35 hours.

Corrective Actions: Upon recognition of the low RHR flow at 1315 November 7, 2020, TS LCO 3.9.5, "One RHR loop shall be OPERABLE and in operation," was entered, and subsequently exited, when flow was increased to the required value of 2500 GPM. The licensee has implemented corrective actions that revise the surveillance log procedures to clarify the TS limits and clearly distinguish the high water level and low water level limits. The licensee has implemented personal accountability actions for the operators involved.

Corrective Action References: CR 1650648

Performance Assessment:

Performance Deficiency: Failure to follow surveillance log procedures which implement TS SR 3.5.9.1 during Mode 6 operation is a Performance Deficiency. Specifically, the licensee failed to follow procedures 2-SI-0-2A-06, 0700-1900 Shift and Daily Surveillance Log Mode 6, and 2-SI-0-2B-06, 1900-0700 Shift and Daily Surveillance Log Mode 6, Section 7.0

by failing to ensure that all acceptance criteria were met or that corrective action has been taken.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, failure to ensure procedural acceptance criteria were met resulted in the inoperability of the required RHR loop.

Significance: The inspectors assessed the significance of the finding using Appendix G, "Shutdown Safety SDP." The inspectors assessed the significance of the finding using Appendix G, Attachment 1 "Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings." Because the mitigating system, RHR, maintains its PRA functionality, the first question under "Exhibit 3 – Mitigating Systems Screening Questions" answers yes and the finding screens to Green.

Cross-Cutting Aspect: H.12 - Avoid Complacency: Individuals recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Individuals implement appropriate error reduction tools. The inspectors determined that the finding has a cross-cutting aspect of "Avoid Complacency" in the human performance area because licensee personnel did not recognize and plan for mistakes and latent issues while expecting successful outcomes. Specifically, on more than one shift the surveillance log procedure was signed off by multiple individuals, despite the acceptance criteria not having been met for the RHR system.

Enforcement:

Violation: Watts Bar Unit 2 TS 3.9.5 SR 3.9.5.1 requires that the licensee "verify one RHR loop is in operation and circulating reactor coolant at a flow rate of 2500 gpm." This SR is required both prior to Mode 6 entry and during Mode 6 operation when water level is greater than or equal to 23 feet above the reactor vessel flange.

Contrary to the above, the licensee failed to ensure the SR was met both prior to Mode 6 entry at 0354 on November 6, 2020, and during Mode 6 operation by failing to ensure acceptance criteria were met in surveillance log procedures 2-SI-0-2A-06, 0700-1900 Shift and Daily Surveillance Log Mode 6, and 2-SI-0-2B-06, 1900-0700 Shift and Daily Surveillance Log Mode 6. This resulted in a condition prohibited by TS until the licensee restored compliance on November 7, 2020.

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

Minor Violation	71153

Minor Violation: Watts Bar Unit 2 Technical Specification (TS) 5.7.1 requires, in part, that procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Revision 2, Appendix A, Section 5 requires, in part, procedures for abnormal, off normal, and alarm conditions. Abnormal operating instruction - 2-AOI-11, "Loss of Condenser Vacuum," requires that reactor power be reduced below 50% before isolating the water box.

Contrary to the above, on March 17, 2021, while at approximately 90% power, the licensee did not properly implement procedures to assess an abnormal condition for loss of condenser vacuum when an operator acted without 2-AOI-11 procedure in hand and isolated the East water box.

Screening: The inspectors determined the performance deficiency was minor. In accordance with Inspection Manual Chapter (IMC) 0612 Appendix B, "Additional Issue Screening Guidance," traditional enforcement does not apply, and the performance deficiency (PD) does not meet any of the More-than-Minor (MTM) criteria. The PD did not meet any of the MTM criteria because, in this instance, the unit was already losing condenser vacuum and the failure to follow procedure did not further escalate the event referenced in LER 391/2021-001-00.

Enforcement: The licensee has taken action to restore compliance. 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.

EXIT MEETINGS AND DEBRIEFS

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

- On April 28, 2022, the inspectors presented the integrated inspection results to Mr. Anthony Williams and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
50001	Calculations	31814-CALC-M-005	Code Reconciliation for Small Bore Piping Modifications DCN 66315	Revision 0
		31814-CALC-M-008	Code Reconciliation for Large Bore Piping Modifications DCN 66313	Revision 0
		31814-CALC-M-009	Code Reconciliation for OSG Removal/RSG Installation DCN 66314	Revision 0
		CDQ0029992016000791	Evaluation of Steam Generator Lower Lateral Support (LLS) for Scaffolding	Revision 0
		EDQ00299920100030	Material Aging Calculation for Rosemount 1154 Series H Transmitter	Revision 4
	Engineering Changes	DCN 66313	Large Bore Piping Modifications	Revision A
		DCN 66314	OSG Removal/ RSG Installation	Revision A
		DCN 66315	Small Bore Piping Modifications	Revision A
		DCN 66476	Watts Bar Unit 2 Replacement Steam Generator (RSG) - SG Vessel Impacts	Revision A
	Miscellaneous	WB2RSG-DS-01	Design Specification for Replacement Steam Generators for TVA Watts Bar Nuclear Power Plant Unit 2	Revision 5
		WCAP-18167-P	Watts Bar Unit 2 Replacement Steam Generator Program NSSS Engineering Report	Revision 0
		WCAP-18191-NP	Watts Bar Unit 2 Heatup and Cooldown Limit Curves for Normal Operation and Supplemental Reactor Vessel Integrity Evaluations	Revision 0
		WCAP-18239-P	Design Report: TVA Watts Bar Unit 2 Replacement Steam Generators	Revision 0
		WCAP-18731-P	TVA Watts Bar Replacement Steam Generators Design Report Unit 1 and Unit 2 Addendum	Revision 0
	Procedures	2-IM-99.060	Unit 2 Transmitter Bench Response Time Testing Using Model ID 100 Time Response Test Set	Revision 4
		2-IM-99.060A	Unit 2 Transmitter Bench Response Time Testing Using AMS Model SG-1 Hydraulic Ramp Signal Generator	Revision 3

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.04	Drawings	1-47W866-1	Heating and Ventilating Air Flow	Revision 36
		2-47W810-1-ISI	Flow Diagram Residual Heat Removal System - Unit 2	Revision 0
		2-47W866-1	Heating and Ventilating Air Flow	Revision 46
	Miscellaneous	SDD-N3-82-4002	System Description for the Standby Diesel Generator System	Revision 26
		WBN-N3-74-4001	Residual Heat Removal System Description	Revision 20
		WBN-SDD-N3-65-4001	WBN System Description for the Emergency Gas Treatment System Units 1 & 2	Revision 13
	Procedures	0-SOI-65.02	System Operating Instruction for the Emergency Gas Treatment System (EGTS)	Revision 8
		0-SOI-82.03	System Operating Procedure for the 1B-B Diesel Generator (DG)	Revision 21
		0-SOI-82.03 ATT 1P	Diesel Generator (DG) 1B-B Power Checklist 82.03-1P	Revision 0
		0-SOI-82.03 ATT 1V	Diesel Generator (DG) 1B-B Valve Checklist 82.03-1V	Revision 15
		1-SOI-74.01-1,2,3V	Residual Heat Removal System - Valve Checklist	Revision 0
		2-SOI-74.01	Residual Heat Removal System	Revision 22
		2-SOI-74.01-1,2,3P	Residual Heat Removal System - Power Checklist	Revision 0
71111.05	Corrective Action Documents Resulting from Inspection	Condition Report 1755647	NRC Identified that 2-BAT-228-2418/05 (Emergency Lighting Battery Pack) appears to not be charging.	02/17/2022
	Fire Plans	WBN Prefire Plans	AUX-0-713-02 Rev. 3, AUX-0-713-03 Rev. 3, AUX-0-713-01 Rev. 1, AUX-0-772-01 Rev. 1, AUX-0-772-02 Rev. 4, AUX-0-772-03 Rev. 5, AUX-0-757-03 Rev. 9, AUX-0-737-01 Rev. 3, AUX-0-737-02 Rev. 3, AUX-0-737-03 Rev. 3,	
71111.12	Miscellaneous	MAI-4.2B	QC Data Sheet 3 - Cutting Pipe Threads/Threaded Joints	Revision 4
	Work Orders	WO	122462571	
71111.13	Corrective Action Documents	Condition Reports	1747381, 1752109, 172112	
	Procedures	0-SI-82-2	8 Hour Diesel Generator AC Power Source Operability Verification	Revision 30
		0-TI-12.16	Diesel Generator Outage T/S or SR Contingency	Revision 15

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Actions	
		1-PI-OPS-1-PE	Protected Equipment	Revision 27
		NPG-SPP-07.3	Work Activity Risk Management Process	Revision 36
		NPG-SPP-07.3	Work Activity Risk Management Process	Revision 36
	Work Orders	WOs	122259099, 122008541	
71111.19	Corrective Action Documents	Condition Reports	1747381, 1749436, 1749567, 1763323, 1764719	
	Procedures	1-SI-63-901-B	Safety Injection Pump (SIP) 1B-B Quarterly Performance Test	Revision 30
		2-SI-3-63	18 Month Channel Calibration of the Steam Generator 4 Auxiliary Feedwater Level Loop 2-LPL-3-172	Revision 10
		2-SI-903-B	Valve Full Stroke Exercising During Plant Operation – Auxiliary Feedwater (Train B), for Valve 2-LCV-3-171	Revision 15
		MMTP-144	Motor Operated Valve Diagnostic Testing	Revision 6
	Work Orders	121878118	2-SI-74-904-B, Position Indication Verification Residual Heat Removal System	Revision 6
		121978505	CUNO filter inspection, Pump Oil Change, Heat exchanger cleaning, Pump coupling lubrication	03/22/2022
		122344993	Perform Static Diagnostic Testing (MOVATS) of the Limitorque motor actuator 2-MVOP-074-0009-B, RHR System Isolation Valve Bypass Valve	03/18/2022
		WOs	122641659, 122643823, 122660908, 122662202	
71111.22	Corrective Action Documents	Condition Reports	1759986	
	Procedures	2-SI-3-902	Turbine Driven Auxiliary Feedwater Pump 2A-S Quarterly Performance Test	Revision 17
		2-SI-30-701	Containment Isolation Valve Local Leak Rate Test Purge Air	Revision 5
		2-SI-63-907	Residual Heat Removal Hot Leg and Cold Leg Injection Check Valve Testing During Refueling Outages	Revision 16
		2-SI-63-917	Testing of Cold Leg Accumulator Check Valves	Revision 2
	Work Orders	Work Orders	122059280, 122059397, 122141930, 122196549, 121879743, 121879791, 121881796,	

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71153	Corrective Action Documents	Condition Reports	1650648,1679707, 1679894	
	Engineering Evaluations	DCN 05834	RHR flow reduction	12/29/1989
	Procedures	2-AOI-11	Loss of Condenser Vacuum	Revision 7
		2-AOI-39	Rapid Load Reduction	Revision 5
		2-SI-0-2A-06 Rev. 0007, 2-SI-0-2B-06 Rev. 0011	Surveillance log procedures Mode 6	
		NPG-SPP-07.3	Work Activity Risk Management Process	Revision 34
	Work Orders	Work Orders	121233102, 121233103, 121233136, 121233137	