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

February 12, 2016

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

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT 05000390, 05000391/2015004 and 07201048/2015002

Dear Mr. Shea:

On December 31, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Nuclear Plant, Units 1 and 2. On January 22, 2015, the NRC inspectors discussed the results of this inspection with Mr. Connors and other members of the Watts Bar staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented four findings of very low safety significance (Green) in this report. All of these findings involved violations of NRC requirements. The inspectors also documented a licensee-identified violation which was determined to be of very low safety significance. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

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

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

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, “Public Inspections, Exemptions, Requests for Withholding,” of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

Docket No.: 50-390, 391 and 72-1048
License No.: NPF-90, 96

Enclosure: NRC Inspection Report 05000390, 05000391/2015004 and 07201048/2015002
w/Attachment: Supplementary Information

cc: Distribution via ListServ

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

Docket No.: 50-390, 391 and 72-1048
License No.: NPF-90, 96

Enclosure: NRC Inspection Report 05000390, 05000391/2015004 and 07201048/2015002
w/Attachment: Supplementary Information

cc: Distribution via ListServ

☐ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ☐ NON-SENSITIVE
ADAMS: ☐ Yes ACCESSION NUMBER: ML16043A214 ☐ SUNSI REVIEW COMPLETE ☐ FORM 665 ATTACHED

OFFICE	RII:DRP	RII:DRP	RII:DRP	RII:DRS	RII:DRS	RII:DRP
SIGNATURE	Via Email/RA/JHN	Via Email/RA/JDH5	Via Email/RA/EJP1	Via Email/RA/PEC	Via Email/RA/JER6	Via Email/RA/CMR2
NAME	J. Nadel	J. Hamman	E. Patterson	P. Cooper	J. Rivera-Ortiz	M. Read
DATE	2/8/2016	2/8/2016	2/5/2016	2/5/2016	2/5/2016	2/5/2016
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
OFFICE	RII:DCP	RII:DRS	RII:DRS	RII:DRS	RII:DRS	RII:DRS
SIGNATURE	Via Email/RA/MCM4	Via Email/RA/JAE1	Via Email/RA/ADN	Via Email/RA/WSP1	Via Email/RA/JRP1	Via Email/RA/RSB2
NAME	M. Magyar	J. Eargle	A. Nielsen	W. Pursley	J. Panfel	R. Baldwin
DATE	2/5/2016	2/5/2016	2/5/2016	2/5/2016	2/9/2016	2/5/2016
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
OFFICE	RII:DRS	RII:DRP	RII:DRP	RII:DRP		
SIGNATURE	Via Email/RA/RPC1	Via Email/RA/CJE	CRK1	AJB3		
NAME	R. Carrion	C. Even	C. Kontz	A. Blamey		
DATE	2/11/2016	2/11/2016	2/11/2016	2/12/2016	2/ /2016	2/ /2016
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPYDOCUMENT NAME: G:\DRPII\RPB6\WATTS BAR\REPORTS\2015\004\IR 2015-004 FINAL.DOCX

Letter to Joseph Shea from Alan Blamey dated February 12, 2016.

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT 05000390, 05000391/2015004, AND 07201048/2015002

Distribution w/encl:
D. Gamberoni, RII
L. Gibson, RII
OE Mail
RIDSNRRDIRS
PUBLIC
RidsNrrPMWattsBar1 Resource
RidsNrrPMWattsBar2 Resource

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-390, 50-391, and 72-1048
License No.:	NPF-90, NPF-96
Report No.:	05000390/2015004, 05000391/2015004, and 07201048/2015002
Licensee:	Tennessee Valley Authority (TVA)
Facility:	Watts Bar Nuclear Plant, Units 1 and 2
Location:	Spring City, TN 37381
Dates:	October 1 through December 31, 2015
Inspectors:	J. Nadel, Senior Resident Inspector J. Hamman, Resident Inspector E. Patterson, Senior Resident Inspector P. Cooper, Reactor Inspector J. Rivera-Ortiz, Senior Reactor Inspector M. Read, Project Engineer M. Magyar, Reactor Inspector J. Eargle, Senior Reactor Inspector A. Nielsen, Senior Health Physicist W. Pursley, Health Physicist J. Panfel, Health Physicist R. Baldwin, Senior Operations Engineer C. Even, Senior Construction Inspector R. Carrion, Senior Reactor Inspector
Approved by:	Alan Blamey, Chief Reactor Projects Branch 6 Division of Reactor Projects

Enclosure

Table of Contents

SUMMARY

IR 05000390/2015-004, 05000391/2015-004, and 07201048/2015002; October 1, 2015 – December 31, 2015; Watts Bar, Units 1 and 2; Problem Identification and Resolution, Refueling and Outage Activities, Radiological Hazard Assessment and Exposure Controls, Inservice Inspection Activities.

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

Four Green non-cited violations were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," (SDP) dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross Cutting Areas," dated December 04, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015.

A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green: A self-revealing non-cited violation (NCV) of Technical Specification (TS) 3.3.1, was identified for the licensee's failure to take the actions of Table 3.3.1-1, Function 5, action J.1 to immediately open the reactor trip breakers (RTBs) when two source range neutron flux channels were inoperable with the RTB closed and the rod control system capable of rod withdrawal. Specifically, the licensee failed to identify both required channels of the source range trip function were bypassed and proceeded to withdraw control rods for testing and reactor startup.

  The performance deficiency was more than minor because it affected the configuration control attribute of the mitigating cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the source range level trip switches were left in bypass, outside of their required configuration, thereby removing a trip function that is required by TS during rod withdrawal. The inspectors determined the finding was of very low safety significance (Green) because the finding did not result in a mismanagement of reactivity by the operators.

  This finding had a cross-cutting aspect in the area of Human Performance, avoid complacency, because the licensee failed to recognize and plan for the possibility of mistakes and latent issues or use appropriate error reduction tools [H.12]. (Section 1R20)

- Green: The NRC identified a NCV of 10 *Code of Federal Regulations* (CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to promptly identify a condition adverse to quality. Specifically, the licensee unacceptably preconditioned the 1A-A charging pump discharge check valve 1-CKV-62-525 and failed to identify this as a condition adverse to quality or take appropriate corrective action.

The inspectors determined that the performance deficiency was more than minor because, if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, unacceptable preconditioning could mask the actual as-found conditions and result in the loss of degradation trending information of component performance. The inspectors determined the finding to be of very low safety significance (Green) because the finding did not result in the loss of operability of 1-CKV-62-525. This finding had a cross-cutting aspect in the area of Human Performance, work management, because the licensee failed to implement a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. Specifically, the licensee's work management process was not able to prevent the unacceptable preconditioning of the 1A-A discharge check valve even after it was identified as a possibility prior to the planned maintenance [H.5]. (Section 4OA2)

Cornerstone: Barrier Integrity

- Green. The inspectors identified a Green NCV of Title 10 of the10 CFR Part 50.55a, "Codes and Standards," involving the licensee's failure to properly apply Subsection IWE of American Society of Mechanical Engineers, Section XI, for conducting general visual examinations of the metal-to-metal pipe plugs of the leak-chase channel test connections, installed inside the access box, that provide a moisture barrier to the basemat containment liner seam welds. Following the inspectors' identification of this issue, the licensee initiated actions to conduct the required inservice inspection (ISI) general visual examinations. Inspection of the access boxes and leak-chase channels revealed the presence of standing water as well as general corrosion in both locations. The licensee took actions to remove the water and evaluate the condition of the applicable structure, system, and components to verify that containment integrity had been maintained, and would continue to be maintained through the expected life of the plant. The licensee updated the ISI plan such that the required inspections will be performed in the future. The inspectors determined that the licensee had taken adequate immediate corrective actions to address the deficiencies identified, and to ensure the leak-tight integrity of the containment. The issue was entered into the licensee's corrective action program (CAP) as Condition Report 1092415.

  This performance deficiency was of more than minor significance because the failure to conduct required visual examinations and identify the degraded moisture barriers which allowed the intrusion of water into the liner leak-chase channel, if left uncorrected, would have resulted in more significant corrosion degradation of the containment liner or associated liner welds. The finding was associated with the design control attribute of the Barrier Integrity Cornerstone and affected the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, visual examinations of the containment metal liner provide assurance that the liner remains capable of performing its intended safety function. The inspectors used Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," and determined that the finding was of low safety significance (Green) because it did not represent an actual open pathway in the physical integrity of the reactor containment. (Section 1R08)

Cornerstone: Ocupational Radiation Safety

- Green. A self-revealing NCV of TS 5.7.1, "Procedures, Programs and Manuals," was identified when the unit one core barrel (CB) was raised above the height limit specified in licensee procedure1-MI-68.003, "Removal and Replacement of the Unit 1 Reactor Vessel Lower Internals," Revision 0003. Specifically, step 6.11[20] states in part, "…slowly raise the lower internals package UNTIL the lower internals is at or above EL. 759'10" as indicated by the break of the laser indicator on the wall target." On October 5, 2015, while moving the CB from the storage stand to the reactor vessel, the CB was inadvertently lifted approximately three feet higher than the 759'10" elevation and required radiation protection (RP) intervention to stop the lift when dose rates in and around containment exceeded anticipated levels. The licensee entered this issue into the CAP as CR 1090220. Corrective actions included "stand-downs" with each crew to review expectations for critical steps, increased field oversight, and revision of the lift procedure to clarify the steps regarding use of the laser indicator.

  This finding was determined to be greater than minor because it was associated with the Occupational Radiation Safety Cornerstone attribute of Human Performance, Program and Processes (procedures for monitoring and RP controls) and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. The finding was evaluated using the Occupational Radiation Safety Significance Determination Process. The finding was not related to As Low As Reasonably Achievable planning, nor did it involve an overexposure or substantial potential for overexposure, and the ability to assess dose was not compromised. Therefore, the inspectors determined the finding to be of very low safety significance (Green). This finding involved the cross-cutting aspect of Human Performance, Work Management [H.5] because distractions at the work location contributed to the failure to recognize that the CB had been raised above the procedural limit. (2RS1)

B. Licensee-Identified Violations

Violations of very low safety or security significance that were identified by the licensee have been reviewed by the NRC. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and corrective action tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1 started the reporting period at 100 percent rated thermal power (RTP) and remained there throughout the inspection period except for one planned refueling outage and one maintenance outage. The unit was shut down for a planned refueling outage on September 20, 2015 and returned to RTP on October 21, 2015. The unit experienced a dropped rod and reduced power to 75% on November 6, 2015. The unit was shutdown for a maintenance outage to investigate Reactor Coolant System (RCS) leakage on November 6, 2015 and returned to RTP on November 13, 2015.

Unit 2 received its initial operating license on October 22, 2015. The unit entered Mode 6 on December 4, 2015 and Mode 5 on December 10, 2015. The unit remained in Mode 5 for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

Seasonal Readiness Reviews for Cold Weather

a. Inspection Scope

The inspectors reviewed licensee actions taken in preparation for low temperature weather conditions to limit the risk of freeze-related initiating events and to adequately protect mitigating systems from its effects. The inspectors reviewed licensee procedure 1-PI-OPS-1-FP, Freeze Protection, including associated checklist 1, Freeze Protection. Inspectors walked down the intake pumping station, Unit 1 and Unit 2 main steam valve vault rooms, Unit 1 and Unit 2 refueling water storage tanks, and external portions of main feed and main steam piping to evaluate implementation of plant freeze protection, including the material condition of insulation, heat trace elements, and temporary heated enclosures. Corrective actions for items identified in relevant condition reports (CRs) and work orders (WOs) were assessed for effectiveness and timeliness. Documents reviewed are listed in the Attachment. This activity constituted one Adverse Weather inspection sample, as defined in IP 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

Partial System Walkdowns

a. Inspection Scope

The inspectors conducted the equipment alignment partial walkdowns, listed below, to evaluate the operability of selected redundant trains or backup systems with the other train or system inoperable or out of service (OOS). This also included that redundant trains were returned to service properly. The inspectors reviewed the functional system descriptions, the Updated Final Safety Analysis Report (UFSAR), system operating procedures, and Technical Specifications (TS) to determine correct system lineups for the current plant conditions. The inspectors performed walkdowns of the systems to verify that critical components were properly aligned and to identify any discrepancies which could affect operability of the redundant train or backup system. Documents reviewed are listed in the Attachment. This activity constituted three inspection samples, as defined in IP 71111.04.

- 1B-B emergency diesel generator (EDG) while the 1A-A EDG was OOS for maintenance.
- 1A-A centrifugal charging pump (CCP) while the 1B-B CCP was inoperable due to an emergent room cooler failure
- 2A-A CCP, 2A-A and 2B-B residual heat removal pump, 1A-A EDG, 2A-A EDG, A train emergency raw cooling water, and the 2A-A component cooling water pump as part of defense in depth for Unit 2 at reduced inventory

b. Findings

No findings were identified.

.2 Complete Walkdown

a. Inspection Scope

The inspectors performed a complete system walk down of the Auxiliary Control Air System (ACAS) and support systems to verify proper equipment alignment, to identify any discrepancies that could impact the function of the system and increase risk, and to verify that the licensee properly identified and resolved equipment alignment problems that could cause events or impact the functional capability of the system.

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

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

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

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

Fire Protection Tours

a. Inspection Scope

The inspectors conducted tours of the areas important to reactor safety, listed below, to verify the licensee's implementation of fire protection requirements as described in: the Fire Protection Program, Nuclear Power Group Standard Programs and Processes (NPG-SPP)-18.4.6, Control of Fire Protection Impairments; NPG-SPP-18.4.7, Control of Transient Combustibles; and NPG-SPP-18.4.8, Control of Ignition Sources (Hot Work). The inspectors evaluated, as appropriate, conditions related to: 1) licensee control of transient combustibles and ignition sources; 2) the material condition, operational status, and operational lineup of fire protection systems, equipment, and features; and 3) the fire barriers used to prevent fire damage or fire propagation. Documents reviewed are listed in the Attachment. This activity constituted nine inspection samples, as defined in IP 71111.05.

- Control building elevation 729 cable spreading room
- Control building elevation 692 mechanical equipment rooms
- Control building elevation 692 24V and 48V battery rooms
- Control building elevation 692 24V and 48V board and charging rooms
- Control building elevation 692 computer room
- Control building elevation 692 250V battery board room 1
- Control building elevation 708 Unit 1 auxiliary instrument room
- Control building elevation 708 Unit 2 auxiliary instrument room
- Auxiliary building elevation 757 refueling floor

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

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

- Auxiliary Building

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

a. Inspection Scope

Non-Destructive Examination Activities and Welding Activities

From October 12–16, 2015, the inspectors conducted an onsite review of the implementation of the licensee's inservice inspection (ISI) program for monitoring degradation of the RCS boundary, risk-significant piping and component boundaries, and containment boundaries in Unit 1.

The inspectors either directly observed or reviewed the following non-destructive examinations (NDEs) mandated by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code of Record: 2001 Edition with 2003 Addenda), to evaluate compliance with the ASME Code, Section XI and Section V requirements, and if any indications or defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement. The inspectors also reviewed the qualifications of the NDE technicians performing the examinations to determine whether they were current, and in compliance with the ASME Code requirements.

- Ultrasonic Examination (UT), Reactor Coolant Pump Stud RCP2MFSTUD-01-24, Class 1 (reviewed)
- UT, Reactor Vessel Closure Head Bolting RVSTUD-01 to -54, Class 1 (reviewed)

- UT, RCS Pressurizer Vessel Nozzle-Head WP-10, Class 1 (reviewed)
- Visual Examination, VT-3, Upper CRDM Support Reactor Vessel, Class 1 (reviewed)

The inspectors either directly observed or reviewed the following welding activities, qualification records, and associated documents in order to evaluate compliance with procedures and the ASME Code, Section XI and Section IX requirements. Specifically, the inspectors reviewed the WO, repair and replacement plan, weld data sheets, welding procedures, procedure qualification records, welder performance qualification records, and NDE reports.

- 1-067B-TI45-5, 3” Butt Weld for valve addition 1-TTV-67-687A, ASME Class 3 (reviewed)
- 1-026I-T078-11A, Replace 5/8” Seal Weld on 1-CKV-26-1296, ASME Class 2 (reviewed)

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

<u>Pressurized Water Reactor Vessel Upper Head Penetration Inspection Activities</u>

The inspectors verified that for the Unit 1 vessel head, a bare metal visual examination was required during this outage, in accordance with the requirements of ASME Code Case N-729-1 and 10 CFR 50.55a(g)(6)(ii)(D). The inspectors reviewed the calculation of effective degradation years, the previous examination history, and reviewed the results of the VT-2 examination performed under the vessel head insulation, to verify that the examinations were performed in accordance with the requirements of ASME Code, Section XI, Article IWA-2212 requirements, and the frequency was consistent with the code case.

The licensee did not identify any relevant indications that were accepted for continued service. Additionally, the licensee did not perform any welding repairs to the vessel head penetrations since the beginning of the last Unit 1 refueling outage; therefore, no NRC review was completed for these inspection procedure attributes.

<u>Boric Acid Corrosion Control Inspection Activities</u>

The inspectors reviewed the licensee’s boric acid corrosion control (BACC) program activities to determine if the activities were implemented in accordance with the commitments made in response to NRC Generic Letter 88-05, “Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants,” and applicable industry guidance documents. Specifically, the inspectors performed an onsite records review of procedures, and the results of the licensee’s containment walkdown inspections performed during the current refueling outage. The inspectors also interviewed the BACC program owner, conducted an independent walkdown of containment to evaluate compliance with licensee’s BACC program requirements and to verify that degraded or non-conforming conditions, such as boric acid leaks, were properly identified and corrected in accordance with the licensee's BACC and CAP.

The inspectors reviewed the following engineering evaluation, completed for evidence of boric acid leakage, to determine if the licensee properly applied applicable corrosion rates to the affected components, and properly assessed the effects of corrosion induced wastage on structural or pressure boundary integrity, in accordance with the licensee procedures.

- WO 115307730, RWPP "B" Inlet Line Leaking on Pump

The inspectors reviewed the following CR and associated corrective actions related to evidence of boric acid leakage to evaluate if the corrective actions completed were consistent with the requirements of the ASME Code and 10 CFR Part 50, Appendix B, Criterion XVI.

- CR 1032404, Active Borated Water Leak

<u>Steam Generator Tube Inspection Activities</u>

The inspectors verified that for the Unit 1 steam generator tubes, no inspection activities were required this refueling outage, in accordance with the requirements of the ASME Code, the licensee's TSs, and Nuclear Energy Institute 97-06, "Steam Generator Program Guidelines."

<u>Identification and Resolution of Problems</u>

The inspectors reviewed the following samples of ISI-related issues entered into the CAP to determine if the licensee had appropriately described the scope of the problem, and had initiated corrective actions.

- Reactor Coolant Pump Main Flange Bolting – Pump #1
- Reactor Coolant Pump Main Flange Bolting – Pump #3
- Reactor Coolant Pump Main Flange Bolting – Pump #4

The review also included the licensee's consideration and assessment of operating experience events applicable to the plant. The inspectors performed this review to ensure compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements.

These inspections constitute one Inservice Inspection Activities inspection sample as defined in IP 71111.08.

b. Findings

Introduction: The NRC identified a Green non-cited violation (NCV) of 10 CFR Part 50.55a, "Codes and Standards," for the licensee's failure to properly apply Subsection IWE of ASME, Section XI. Specifically, the licensee failed to conduct general visual examinations of the metal-to-metal pipe plugs of the leak-chase channel test connections that provided a moisture barrier to the basemat containment liner seam welds.

Description: The basemat containment liner plate seam welds, which are part of the pressure-retaining boundary, are embedded in approximately 3 feet of concrete during construction, and are covered by a leak-chase channel system that incorporates pressurizing test connections. This system allows for pressure testing of the seam welds for leak-tightness during construction and inservice. The leak-chase channel system forms a metal-to-metal interface with the basemat containment liner. The test connection end is located within an access box that is located at the containment floor level. This test connection, as a result, provides a pathway for potential intrusion of moisture that could cause corrosion degradation of inaccessible embedded areas of the basemat containment liner. Within the access box, the cover plates, plugs, and accessible components of the leak-chase system are intended to prevent intrusion of moisture, thereby protecting the liner from potential corrosion degradation that could affect leak-tightness.

The containment ISI program is required by 10 CFR 50.55a to be implemented in accordance with ASME Section XI, Subsection IWE, "Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Plants." Subsection IWE, Table IWE-2500-1, Category E-A, "Containment Surfaces," Item E1.30, "Moisture Barriers," requires a general visual examination of 100 percent of moisture barriers. The reference to moisture barriers is further defined in Note (3) of this table, which states, in part; "Examination shall include moisture barrier materials intended to prevent intrusion of moisture against inaccessible areas of the pressure retaining metal containment shell or liner at concrete-to-metal interfaces and at metal-to-metal interfaces which are not seal welded." Section XI requires special consideration of areas susceptible to accelerated corrosion degradation, and barriers intended to prevent intrusion of moisture and water accumulation against inaccessible areas of the containment pressure-retaining metallic shell or liner. The containment floor seam weld leak-chase channel system is one such area subject to accelerated degradation and aging if moisture intrusion and water accumulation is allowed on the embedded shell, and liner within it. Therefore, the leak-chase channel system is subject to the ISI requirements of 10 CFR 50.55a.

During the construction of Watts Bar Unit 2, the licensee discovered moisture within the leak-chase channels of Unit 2, which was subsequently entered into the CAP as CR 1043737. While reviewing the corrective actions associated with this CR, the inspectors questioned a note on a set of plant drawings indicating the location of four additional leak-chase channels located within the Unit 2 keyway. The inspectors, through additional review and interviewing plant personnel, discovered that these leak-chase channels were not scheduled for inspection under any Unit 2 programs.

Based on this information, the inspectors reviewed plant drawings for Unit 1 and discovered that the four leak-chase channels, similar to those on Unit 2, were also in the Unit 1 keyway. Further review revealed that the four leak-chase channels located within the Unit 1 keyway had not been previously inspected, and were not identified in the Unit 1 ISI program. Because neither the cover plate nor the tube cap were seal welded, and leakage past these components would allow the intrusion of water to the inaccessible liner seam welds, each represented a moisture barrier and was required to be inspected in accordance with Subsection IWE of ASME Section XI. Subsequent examinations revealed that water intrusion was allowed into these areas and had caused corrosion degradation. The issue was entered into the licensee's corrective action program (CAP) as Condition Report 1092415.

Analysis: The licensee's failure to conduct a general visual examination of 100 percent of the moisture barriers intended to prevent intrusion of moisture against inaccessible areas of the containment liner in accordance with Subsection IWE of ASME Section XI was a performance deficiency (PD). The inspectors determined that this finding was of more than minor significance because if left uncorrected, it could have resulted in the failure to identify continued corrosion degradation of the containment liner and associated liner welds. The inspectors used Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," Appendix A, "The Significance Determination Process for Findings at-Power" and determined that the finding was of low safety significance (Green) because it did not represent an actual open pathway in the physical integrity of the reactor containment.

The inspectors determined no cross cutting aspect was associated with this finding because the omission of the leak-chase channels from the inspection plan was performed during the scoping of the ISI program in 2008 and thus, the finding was not reflective of current licensee performance.

Enforcement: Title 10 CFR Part 50.55a, "Codes and Standards," states, in part, that the examination of metal liners in concrete containments shall satisfy the requirements of ASME Section XI, Subsection IWE. ASME Section XI, Subsection IWE requires a general visual examination of 100 percent of moisture barriers that shall include moisture barrier materials intended to prevent intrusion of moisture against inaccessible areas of the pressure retaining metal containment shell or liner at concrete-to-metal interfaces and at metal-to-metal interfaces which are not seal welded.

Contrary to the above, since the initial 10 CFR 50.55a, Subsection IWE requirements were established (in 1996) until present, the licensee failed to perform visual examinations of metal liners in concrete containments that satisfy the requirements of ASME Section XI, Subsection IWE. Specifically, the metal-to-metal pipe plugs of the leak-chase channel test connections that provide a moisture barrier to the basemat containment liner seam welds were not inspected. Subsequent examinations revealed that water intrusion was allowed into these areas and had caused corrosion degradation.

The licensee removed the water, evaluated the condition, and updated the ISI Program to included future inspections of this area. Because this finding is of very low safety significance, and has been entered into the licensee's CAP as CR 1020880, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000390/2015004-01, Failure to Perform ISI General Visual Examinations of Containment Moisture Barrier Associated with Containment Liner Leak-chase Test Connection Threaded Pipe Plugs.

1R11 Licensed Operator Requalification and Performance (71111.11)

.1 Licensed Operator Requalification Review

a. Inspection Scope

On November 17, 2015, the inspectors observed the simulator evaluation for Operations Crew 4 per 3-OT-SRE-1001, Annual Operating Examination Scenario, Rev. 11.

The inspectors specifically evaluated the following attributes related to the operating crews' performance:

- Clarity and formality of communication
- Ability to take timely action to safely control the unit
- Prioritization, interpretation, and verification of alarms
- Correct use and implementation of abnormal operating instructions and emergency operating instructions
- Timely and appropriate Emergency Action Level declarations per emergency plan implementing procedures
- Control board operation and manipulation, including high-risk operator actions
- Command and Control provided by the unit supervisor and shift manager

The inspectors also attended the critique to assess the effectiveness of the licensee evaluators, and to verify that licensee-identified issues were comparable to issues identified by the inspector. Documents reviewed are listed in the Attachment. This activity constituted one Observation of Requalification Activity inspection sample, as defined in IP 71111.11.

b. Findings

No findings were identified

.2 Observation of Operator Performance

a. Inspection Scope

Inspectors observed and assessed licensed operator performance in the plant and main control room, particularly during periods of heightened activity or risk and where the activities could affect plant safety. Inspectors reviewed various licensee policies and procedures such as procedures OPDP-1, Conduct of Operations; NPG-SPP-10.0, Plant Operations; and GO-4, Normal Power Operation.

Inspectors utilized activities such as post maintenance testing, surveillance testing and refueling, and other outage activities to focus on the following conduct of operations as appropriate: This activity constituted one Observation of Operator Performance inspection sample.

- Operator compliance and use of procedures
- Control board manipulations
- Communication between crew members
- Use and interpretation of plant instruments, indications and alarms
- Use of human error prevention techniques
- Documentation of activities, including initials and sign-offs in procedures
- Supervision of activities, including risk and reactivity management
- Pre-job briefs

b. Findings

No findings were identified

.3 Annual Review of Licensee Requalification Examination Results

a. Inspection Scope

On December 18, 2015, the licensee completed the comprehensive biennial requalification written examinations and the annual requalification operating examinations required to be administered to all licensed operators in accordance with Title 10 of the Code of Federal Regulations 55.59(a)(2), “Requalification Requirements,” of the NRC’s “Operator’s Licenses.” The inspectors performed an in-office review of the overall pass/fail results of the individual operating examinations, written examinations, and the crew simulator operating examinations in accordance with Inspection Procedure (IP) 71111.11, “Licensed Operator Requalification Program.” These results were compared to the thresholds established in Section 3.02, “Requalification Examination Results,” of IP 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed the performance-based problems listed below. A review was performed to assess the effectiveness of maintenance efforts that apply to scoped structures, systems, or components (SSCs) and to verify that the licensee was following the requirements of TI-119, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting - 10 CFR 50.65, and NPG-SPP-03.4, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting - 10 CFR 50.65. Reviews focused, as appropriate, on: 1) appropriate work practices; 2) identification and resolution of common cause failures; 3) scoping in accordance with 10 CFR 50.65; 4) characterizing reliability issues for performance monitoring; 5) tracking unavailability for performance monitoring; 6) balancing reliability and unavailability; 7) trending key parameters for condition monitoring; 8) system classification and reclassification in accordance with 10 CFR 50.65(a)(1) or (a)(2); 9) appropriateness of performance criteria in accordance with 10 CFR 50.65(a)(2); and 10) appropriateness and adequacy of 10 CFR 50.65 (a)(1) goals, monitoring and corrective actions. Documents reviewed are listed in the Attachment. This activity constituted two Maintenance Effectiveness inspection samples, as defined in IP 71111.12.

- CR 1003406, 0-CKV-040-0606 check valve not seating properly
- CR 1091918, 1B-B EDG inoperable due to megawatt load swings during testing

b. Findings

No findings were identified

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

a. Inspection Scope

The inspectors evaluated, as appropriate, for the work activities listed below: 1) the effectiveness of the risk assessments performed before maintenance activities were conducted; 2) the management of risk; 3) that, upon identification of an unforeseen situation, necessary steps were taken to plan and control the resulting emergent work activities; and 4) that maintenance risk assessments and emergent work problems were adequately identified and resolved. The inspectors verified that the licensee was complying with the requirements of 10 CFR 50.65 (a)(4); NPG-SPP-07.0, Work Control and Outage Management; NPG-SPP-07.1, On Line Work Management; and TI-124, Equipment to Plant Risk Matrix. Documents reviewed are listed in the Attachment. This activity constituted five Maintenance Risk Assessment inspection samples, as defined in IP 71111.13.

- Risk assessment for 10/13/15 during Unit 1 refuleing outage with RCS depressurized and the unit in mode 5

- Risk assessment for work week 10/26 with high risk crane work in the switchyard
- Risk assessment for work week 12/01 with Unit 2 initial fuel load
- Risk assessment for 12/07 with Unit 2 core alterations in progress and one boration flow path unavailable
- Risk assessment for 12/31 with Unit 2 at reduced inventory

b. Findings

No findings were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed the operability evaluations affecting risk-significant mitigating systems listed below, to assess, as appropriate: 1) the technical adequacy of the evaluations; 2) whether continued system operability was warranted; 3) whether the compensatory measures, if involved, were in place, would work as intended, and were appropriately controlled; 4) where continued operability was considered unjustified, the impact on TS Limiting Conditions for Operation (LCO) and the risk significance in accordance with the significant determination process (SDP). The inspectors verified that the operability evaluations were performed in accordance with NPG-SPP-03.1, Corrective Action Program. Documents reviewed are listed in the Attachment. This activity constituted six Operability Evaluation inspection samples, as defined in IP 71111.15.

- CR 1086155, 1-FCV-70-134 failed to meet acceptance criteria of 1-SI-70-701
- Operability of select equipment required to transition from Mode 4 to Mode 3 after forced outage started November 6, 2015
- Operability of select equipment required to transition from Mode 3 to Mode 2 and Mode 1, after forced outage started November 6, 2015
- CR 977101, Operator Burden Review: 2B1 DG Start Air Compressor not maintaining normal pressure, dropped below 200 psig
- CR 786747, Review of compliance with TSSR 3.6.9.4
- CR 1095099, Unit 1 turbine driven auxiliary feedwater pump failed to reach required RPM during performance of 1-SI-3-923-S

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

The inspectors reviewed the permanent plant modifications listed below against the requirements of NPG-SPP-09.3, Plant Modifications and Engineering Change Control, and NPG-SPP-09.4, 10 CFR 50.59 Evaluation of Changes, Tests, and Experiments, and verified that the modification did not affect system operability or availability as described by the TS or the UFSAR. In addition, the inspectors determined whether: 1) the installation of the permanent modification was in accordance with the work package; 2) adequate configuration control was in place; 3) procedures and drawings were updated; and 4) post-installation tests verified operability of the affected systems. Documents reviewed are listed in the Attachment. This activity constituted three Plant Modifications inspection samples, as defined in IP 71111.18.

- Design Change Notice (DCN) 65832, Operation with less than three upper containment coolers.
- SCN 65891-B, Control Rod Drive Mechanism (CRDM) cooler vent plug modification to correct RCS leakage
- DCNs 60060, 61422, Installation of Auxiliary Feedwater Storage Tank

b. Findings

Introduction: The inspectors identified an unresolved item (URI) associated with the 50.59 screening performed for the installation of the auxiliary feedwater storage tank (AFWST). Additional inspection is required to determine if the plant modification which installed the tank would have required NRC permission in the form of a license amendment prior to the change.

Description: The AFWST is a 500,000 gallon source of clean water for the auxiliary feedwater (AFW) pumps. It was installed as part of the licensee's post-Fukushima (FLEX) modifications to meet the mitigating strategies order (EA-12-049). The new tank was needed because the licensee determined they could not credit their existing condensate storage tanks (CSTs) for FLEX strategies due to seismic requirements necessary to survive the extended loss of AC power (ELAP) event.

The AFWST was connected to the existing condensate system in the AFW supply piping upstream from the AFW pumps and downstream from the CSTs. The modification was evaluated in two separate DCNs, each with its own 50.59 applicability screening. DCN 60060 evaluated the installation of the tank and DCN 61422 evaluated the piping connections to the condensate system. The piping connections included new check valves in the CST piping to prevent AFWST inventory loss in the event the CSTs are damaged in the ELAP event. There were also two air-operated supply valves on AFWST outlet piping which automatically open on low pressure in the downstream condensate piping and also fail open on a loss of power or air.

Inspectors noted a number of deficiencies in the 50.59 screening for DCN 61422. Inspectors determined that several potentially adverse impacts were introduced by the modification and were not adequately considered in the 50.59 screening. The licensee re-performed the screening and concluded that the modification would require a 50.59 evaluation due to adverse impacts brought up by the inspectors.

Because more information is necessary to properly evaluate the 50.59 evaluation that was completed late in the quarter, future inspection is required to determine if a more than minor performance deficiency or violation exists associated with this issue. Specifically, the inspectors need to determine if prior NRC approval was required for the installation of the AFWST. This is identified as URI 05000390/2015004-02, AFWST Permanent Plant Modification.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the post-maintenance test (PMT) procedures and/or test activities, (listed below), as appropriate, for selected risk-significant mitigating systems to assess whether: 1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; 2) testing was adequate for the maintenance performed; 3) acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; 4) test instrumentation had current calibrations, range, and accuracy consistent with the application; 5) tests were performed as written with applicable prerequisites satisfied; 6) jumpers installed or leads lifted were properly controlled; 7) test equipment was removed following testing; and 8) equipment was returned to the status required to perform its safety function. The inspectors verified that these activities were performed in accordance with NPG-SPP-06.9, Testing Programs; NPG-SPP-06.3, Pre-/Post-Maintenance Testing; and NPG-SPP-07.1, On Line Work Management. Documents reviewed are listed in the Attachment. This activity constituted eight Post Maintenance Testing inspection samples, as defined in IP 71111.19.

- WO 116304713, PMT following work to 1-FAN-030-0004E, Containment Purge Air Exhaust Fan 1B
- WO 115967788, PMT following replacement of 1-PCV-068-0334-B, Pressurizer PORV
- WO 117379392, PMT following rebuild of 2-CKV-063-0549-B, Safety Injection Loop 4 Hot Leg Injection Check Valve
- WO 1170774707, PMT following replacement of 1-FCV-070-0027-B, CCS Pump 1A/1B to C-S discharge cross-tie
- WO 116207101, PMT following cooling coil replacement for the 1B CCP room cooler
- WO 117209454, PMT following temperature control valve replacement on the B main control room chiller

- WO 116036810, PMT for 1-FCV-63-25 performed during 1-SI-63-915-B, Safety Injection System - Valve Position Indication Verification and Full Stroke Testing (Train B)
- WO 116036678, PMT for 1-FCV-63-26 performed during 1-SI-63-915-A, Safety Injection System - Valve Position Indication Verification and Full Stroke Testing (Train A)

b. Findings

No findings were identified.

1R20 Refueling and Outage Activities (71111.20)

.1 Unit 1 Refueling Outage Cycle 13

a. Inspection Scope

From October 1 through October 26, 2015, the inspectors examined the refueling outage activities to verify that they were conducted in accordance with TS, applicable plant procedures, and the licensee's outage risk assessment and management plans. The outage began during the previous inspection period and inspector activities during that period are not covered in this report. The inspectors evaluated following outage activities:

- outage planning
- portions of the refueling, plant heatup, and reactor startup
- reactor coolant system instrumentation and electrical power configuration
- reactivity and inventory control
- decay heat removal and spent fuel pool cooling system operation
- containment closure

The inspectors verified that the licensee:

- considered risk in developing the outage schedule
- controlled plant configuration in accordance with administrative risk reduction methodologies
- developed work schedules to manage fatigue
- developed mitigation strategies for loss of key safety functions
- adhered to operating license and technical specification requirements

Inspectors verified that safety-related and risk-significant SSCs not accessible during power operations were maintained in an operable condition. The inspectors also reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with outage activities.

The inspectors monitored licensee controls over the outage activities. In addition, the inspectors reviewed the licensee's corrective action program to ensure that the licensee was identifying equipment alignment problems and that they were properly addressed for resolution. Documents reviewed are listed in the attachment. This activity completes one Refueling Outage sample in accordance with Inspection Procedure 71111.20.

b. Findings

Introduction: A self-revealing Green NCV of Technical Specification (TS) 3.3.1, was identified for the licensee's failure to take the actions of Table 3.3.1-1, Function 5, action J.1 to immediately open the reactor trip breakers (RTBs) when two source range (SR) neutron flux channels were inoperable with the RTB closed and the rod control system capable of rod withdrawal. Specifically, the licensee failed to identify both required channels of the source range trip function were bypassed and proceeded to withdraw control rods for testing and reactor startup.

Discussion: The source range neutron flux trip function provides protection from control rod withdrawal, boron dilution, and rod ejection events while subcritical. TS 3.3.1, Table 3.3.1-1, Function 5 requires that both source range neutron flux channels' trip functions be operable if the control rod drive system is capable of rod withdrawal in modes 5, 4, 3, and 2.

Unit 1 was shut down for a refueling outage on September 20, 2015. On October 7, 2015, prior to core reload, both source range channels (131 and 132) were placed in bypass in accordance with Power Escalation Test Procedure 1-PET-105, Refueling and Core Alterations, Revision 3. The source range level trips are placed in the bypass position under this procedure to avoid source range trips and alarms during core alterations. Core reload was completed on October 9, 2015 and the source range level trip switches should have been placed back in the normal position. However, the switches were not returned to the normal position because Revision 1 of 1-PET-105, dated July 19, 2013, had previously omitted the step to return the bypass switches to normal.

On October 19, 2015, with the plant in Hot Standby (Mode 3), the RTBs were closed to allow control rod testing. This action resulted a violation of TS 3.3.1, Table 3.3.1-1 Function 5, because two source range level trip channels were inoperable with the RTBs closed and the rod control system capable of rod withdrawal. Under these conditions, TS 3.3.1 Required Actions A.1 and J.1 required that the operators take the immediate action to open the RTBs. This action was not performed because the operators were not aware of the position of the SR level trip switches at the time the RTBs were closed. However, this condition was self-revealing because there were two lit annunciators on permissive panel 1-NI-92-131-D and 1-NI-92-132-E, "Source Range Trip Bypassed" on the main control board. The plant continued into Mode 2 (startup) and Mode 1 (power operation). On October 22, 2015, while in Mode 1, the operating staff discovered that the source range level trip switches were in the bypass position. At the time of discovery the reactor was at 27 percent power and there was no longer a TS requirement for the source range high flux trip function. The source range level trip switches for both channels were taken to the normal position shortly after discovery. This issue was reported by TVA under the requirements of 10 CFR 50.73 on December 21, 2015 in Licensee Event Report (LER) 2015-006.

Analysis: The failure to maintain two operable source range neutron flux channels during plant startup as required by technical specification requirements was a performance deficiency. The performance deficiency was more than minor because it affected the configuration control attribute of the mitigating cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically the source range level trip switches were left in bypass, outside of their required configuration, thereby removing a trip function that is required by TS during rod withdrawal. The inspectors performed an initial screening of the finding in accordance with NRC Manual Chapter IMC 0609, Appendix A, "The Significance Determination Process for (SDP) for Findings At-Power”. Using IMC 0609 Appendix A, Exhibit 2 – Mitigating Systems Screening Questions, the inspectors determined that the finding screened as very low safety significance (Green) because the finding did not result in a mismanagement of reactivity by the operators. This finding had a cross-cutting aspect in the area of human performance, avoid complacency, because the licensee failed recognize and plan for the possibility of mistakes and latent issues or use appropriate error reduction tools [H.12].

Enforcement: Watts Bar Unit 1 TS 3.3.1, Table 3.3.1-1, Function 5 requires, in part, that two source range neutron flux channels be operable in mode 3 with RTBs closed and the rods capable of withdrawal. With two source range neutron flux channels inoperable, TS 3.3.1 condition J, required action J.1 requires that the RTBs be opened immediately. Contrary to the above, from October 19, 2015 when Watts Bar Unit 1 operators closed the RTBs in mode 3, until October 21, 2015 when mode 2 was entered and reactor power was increased above the P-6 permissive, two source range neutron flux channels were inoperable and the required action of TS LCO 3.3.1 J.1 to open RTBs immediately was not performed. Because this finding is of very low safety significance (Green) and was entered into TVA’s CAP as CR 1096405, this issue is being treated as an NCV consistent with Section 2.3.2.a of the Enforcement Policy. NCV 05000390/2015004-03: Failure to Comply with Source Range Neutron Flux Channel Technical Specification Requirements.

.2 Unit 1 Forced Outage (November 6 – November 13)

a. Inspection Scope

Following a planned shutdown of Unit 1 on November 6, 2015, due to elevated RCS unidentified leakage, the licensee maintained the unit in Mode 5 until conditions to support restart were established on November 12, 2015. RTP was reached on November 13, 2015. The inspectors observed portions of the plant startup including reactor criticality and power ascension. The inspectors verified that mode changes were performed in accordance with plant TS. This inspection satisfied one inspection sample for Outage Activities, as defined in IP 71111.20.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors witnessed the surveillance tests and/or reviewed test data of selected risk-significant structures, systems, and components (SSC) listed below, to assess, as appropriate, whether the SSCs met the requirements of the TS; the UFSAR; NPG-SPP-06.9, Testing Programs; NPG-SPP-06.9.2, Surveillance Test Program; and NPG-SPP-09.1, ASME Section XI. The inspectors also determined whether the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions. Documents reviewed are listed in the Attachment. This activity constituted nine Surveillance Testing inspection samples; three in-service; three routine; one ice condenser; and two containment isolation valves, as defined in IP 71111.22.

In-Service Test:

- WO 116036810, 1-SI-63-915-B, Safety injection System - Valve Position Indication Verification and Full-Stroke Exercising (Train B)
- WO 116153018, 1-SI-63-906, Safety Injection Full-Flow Testing During Refueling Outages
- WO 116036678, 1-SI-63-915-A, Safety injection System - Valve Position Indication Verification and Full-Stroke Exercising (Train B)

Other Surveillances

- WO 116153209, 0-SI-82-4, 18 Month Loss of Offsite Power with Safety Injection - DG 1B-B
- WO 116153016, 1-SI-63-905, Boron Injection Flow Testing during Refueling Outage
- WO 116620131, 0-SI-65-6-A, Emergency Gas Treatment System (EGTS) Train A 10-Hour Operation

Ice Condenser:

- WO 116601589, 1-SI-61-901-A, Valve Full Stroke Exercising During Plant Operation Ice Condenser System (Train A)

Containment Isolation Valve

- WO 116153241, 1-SI-0-705, Elevation 757 Air Lock Overall Leakage Test
- WO 116153030, 1-SI-70-701, Containment isolation valve local leak rate test component cooling penetration X-50A

b. Findings

Introduction: The inspectors identified an unresolved item (URI) associated with the requirements of Watts Bar Unit 1 technical specification (TS) 3.6.15, Shield Building. Additional inspection is required to determine if the requirements of 3.6.15.B applied during a specific testing alignment.

Description: On September 10, 2015, the licensee conducted 0-SI-65-6-A, Emergency Gas Treatment System (EGTS) Train A 10-Hour Operation. During the 10-hour time period of the test when the EGTS was in service, the auxiliary gas building treatment system was also in service for a Unit 2 construction test. This unique ventilation combination is not normally experienced during the 0-SI-65-6-A surveillance. As a result, shield building annulus differential pressure fell below the limit established by TS surveillance requirement (TSSR) 3.6.15.1 limits for the entire duration of the 10-hr EGTS surveillance. TS limiting condition for operation (LCO) 3.6.15.B requires annulus pressure be restored when it is outside of limits with a required completion time of 8-hrs. The licensee considered the note associated with TS LCO 3.6.15.B, which states that the annulus pressure requirement is not applicable during ventilating operations, required annulus entries, or auxiliary building isolations not exceeding one hour in duration. The licensee considered the alignment they were in at the time to be ventilating operations and thus the requirements of TS LCO 3.6.15.B did not apply. The licensee further considered that the note, as written, allowed grace from the annulus pressure requirement for ventilating operations for an unlimited amount of time.

The inspectors were concerned about a possible allowance in the TS to have grace from annulus pressure requirements for longer than the allowed LCO required action completion time. Furthermore, a basis for the note and what can be considered "ventilating operations" was not immediately apparent.

Because more information is necessary to evaluate the proper applicability of TS LCO 3.6.15.B and the associated note, future inspection is required to determine if a more than minor performance deficiency or violation exists associated with this issue. Specifically, the inspectors need to determine if a TS compliance issue exists. This is identified as URI 0500390/2015004-04, Shield Building Operability Requirements.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope

The inspectors observed a hostile action based emergency planing (EP) Radioalogical Emegecny Plan (REP) training drill that contributed to the licensee's Drill/Exercise Performance and Emergency Response Organization performance indicator measures on November 18, 2015.

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

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstones: Occupational Radiation Safety and Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

Hazard Assessment and Instructions to workers: During facility tours, the inspectors directly observed labeling of radioactive material and postings for radiation areas, high radiation areas, and airborne radioactivity areas established within the radiologically controlled area (RCA) of the Unit 1 (U1) containment building, auxiliary building, and radioactive waste processing and storage locations. The inspectors independently measured radiation dose rates or directly observed conduct of licensee radiation surveys for selected RCA areas. The inspectors reviewed survey records for several plant areas including surveys for alpha emitters, airborne radioactivity, gamma surveys with a range of dose rate gradients, and pre-job surveys for upcoming tasks. The inspectors also discussed changes to plant operations that could contribute to changing radiological conditions since the last inspection. For selected outage jobs, the inspectors attended pre-job briefings and reviewed radiation work permit (RWP) details to assess communication of radiological control requirements and current radiological conditions to workers.

Hazard Control and Work Practices: The inspectors evaluated access barrier effectiveness for selected Locked High Radiation Area (LHRA) locations and discussed changes to procedural guidance for LHRA and Very High Radiation Area controls with radiation protection (RP) supervisors. The inspectors observed and evaluated controls for the storage of irradiated material within the spent fuel pool (SFP). Established radiological controls (including airborne controls) were evaluated for selected U1 Refueling Outage 13 (U1R13) tasks including core barrel (CB) movement, reactor coolant pump (RCP) work, and mechanical stress improvement process (MSIP) activities. In addition, the inspectors reviewed licensee controls for areas where dose rates could change significantly as a result of plant shutdown and refueling operations.

Through direct observations and interviews with licensee staff, the inspectors evaluated occupational workers' adherence to selected RWPs and RP technician proficiency in providing job coverage. Electronic dosimeter (ED) alarm set points and worker stay times were evaluated against area radiation survey results for selected U1R13 outage jobs including the CB move and MSIP work. The inspectors discussed the use of personnel dosimetry (extremity dosimetry and multibadging in high dose rate gradients) with RP staff. The inspectors also evaluated worker response to dose and dose rate alarms during selected work activities.

Control of Radioactive Material: The inspectors observed surveys of material and personnel being released from the RCA using small article monitor (SAM), personnel contamination monitor (PCM), and portal monitor instruments. As part of Inspection Procedure (IP) 71124.05, the inspectors reviewed the last two calibration records for selected release point survey instruments and discussed equipment sensitivity, alarm setpoints, and release program guidance with licensee staff. The inspectors reviewed records of leak tests on selected sealed sources and discussed nationally tracked source transactions with licensee staff.

Problem Identification and Resolution: The inspectors reviewed CAP documents associated with radiological hazard assessment and exposure control. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with licensee procedures. The inspectors also reviewed recent self-assessment results.

The inspectors evaluated radiation protection activities against the requirements and guidance of Final Safety Analysis Report (FSAR) Section 12; TS Section 5.11; 10 CFR Parts 19 and 20; Regulatory Guide (RG) 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants"; and approved licensee procedures. Licensee programs for monitoring materials and personnel released from the RCA were evaluated against 10 CFR Part 20 and IE Circular 81-07, "Control of Radioactively Contaminated Material". Documents reviewed are listed in the Attachment. This inspection satisfied one inspection sample for Radiological Hazard Assessment and Exposure Controls, as defined in IP 71124.01.

b. Findings

Introduction: A self-revealing, Green NCV of TS 5.7.1, "Procedures, Programs and Manuals," was identified when the Unit 1 CB was raised higher than allowed by procedure. This resulted in dose rates higher than anticipated and required RP intervention to terminate the lift.

Description On October 5, 2015, the licensee initiated CB movement from the underwater storage stand back to the reactor vessel. This evolution required lifting the CB off the stand and partially out of the water (approximately 10 feet) to ensure clearance of underwater obstructions prior to the lateral transfer to the reactor vessel. Licensee procedure 1-MI-68.003, "Removal and Replacement of the Unit 1 Reactor Vessel Lower Internals," Rev 0003 states, "…slowly raise the lower internals package UNTIL the lower internals is at or above EL. 759'10" as indicated by the break of the laser indicator on the wall target." A laser was installed to provide visual indication that the CB was at the correct height at which time vertical lifting would be halted and the CB could begin the move to the reactor vessel where it would be lowered back underwater. In addition, an underwater camera was installed at the storage stand to provide a second confirmation that the CB was clear of any underwater obstructions.

Due to the CB being highly activated, RP had anticipated elevated dose rates around the cavity, in the crane operator cab, and possibly into the auxiliary building through open hatches in containment. Prior to the lift, all workers (except the two crane operators) were removed from containment and RP technicians were positioned to monitor radiological conditions and restrict access to these areas until the lift was complete. The crane operators and RP technicians were monitored with teledosimetry and had headset communications. The crane cab was shielded to reduce dose rates and the cab itself had been re-oriented to allow emergency egress behind a concrete shield wall.

The lift director, who controlled the actions of the crane operators, understood that the laser would be broken twice during the lift. The first break would come when the lift rig broke the beam, and the second break would come when the core barrel itself broke the beam, thus indicating it had reached its required height. During the actual lift, the lift director was watching multiple camera feeds, including a video of the laser height indicator and the underwater camera showing the bottom of the core barrel. While observing the underwater camera, the lift director missed the first break in the laser beam and assumed the second break was the lift rig, when it was actually indicating that the CB had reached the procedural limit of 759' 10". As a result, the CB was lifted approximately three feet above this elevation, thereby exposing one to two feet of the thermal shields which are more highly activated than other parts of the CB.

RP technicians monitoring the lift noticed the increasing dose rates and communicated with the lift director to lower the core barrel. After it was lowered to the correct height and dose rates had stabilized, the move continued and the core barrel was placed in the reactor vessel. The maximum dose rates observed during the lift were: 41 R/hr at the personnel hatch (highest measured rate during evolution), 2.2 R/hr immediately outside the equipment hatch, and 10 R/hr in the crane cab. These dose rates existed for approximately one minute. The highest doses were received by the two crane operators who received 190 mrem and 193 mrem (as measured on EDs). The ED dose alarm set point for both crane operators was 200 mrem.

Analysis: The inspectors determined that the licensee's failure to stop raising the CB when the procedural limit of 1-MI-68.003, "Removal and Replacement of the Unit 1 Reactor Vessel Lower Internals," Rev 0003, was reached was a performance deficiency. The finding was determined to be greater than minor because it was associated with the Occupational Radiation Safety Cornerstone attribute of Human Performance, Program and Processes (Procedures for Monitoring and RP Controls) and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. Specifically, the failure to properly handle highly activated components could lead to unintended exposure to workers. The finding was evaluated using the Occupational Radiation Safety Significance Determination Process. The finding was not related to As Low As Reasonably Achievable planning, nor did it involve an overexposure or substantial potential for overexposure, and the ability to assess dose was not compromised. Therefore, the inspectors determined the finding to be of very low safety significance (Green). The finding involved the cross-cutting aspect of Human Performance, Work Management [H.5] because distractions at the work location contributed to the failure to recognize that the CB had reached its height limit.

Enforcement: Technical Specification 5.7.1, "Procedures, Programs and Manuals," requires written procedures as recommended by Regulatory Guide (RG) 1.33. Regulatory Guide 1.33 recommends procedures for control of maintenance activities to minimize radiation exposures. Licensee procedure 1-MI-68.003, "Removal and Replacement of the Unit 1 Reactor Vessel Lower Internals," Rev 0003 states, "…slowly raise the lower internals package UNTIL the lower internals is at or above EL. 759'10" as indicated by the break of the laser indicator on the wall target." Contrary to the above, on October 5, 2015, the licensee raised the CB beyond the 759'10" elevation as indicated by the break of the laser indicator on the wall target. Immediate corrective actions included lowering the CB below the 759' 10" elevation to reduce dose rates in containment and evaluating the radiological conditions prior to completing the CB move to the reactor vessel. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's CAP as Non-Conformance Report (NCR) 1090220: NCV 05000390/2015004-05, Core Barrel Lift Error Resulted in Unintended High Dose Rates.

2RS2 Occupational As Low As Reasonably Achievable (ALARA) Planning and Controls (71124.02)

a. Inspection Scope

Work Planning and Exposure Tracking: The inspectors reviewed work activities and their collective exposure estimates for U1R13. The inspectors reviewed ALARA planning packages for the following high collective exposure tasks: scaffolding, reactor assembly/ disassembly, MSIP, in-service inspection activities, and installation of hydra-nuts on the number 2 RCP. For the selected tasks, the inspectors reviewed established dose goals and discussed assumptions regarding the bases for the current estimates with responsible ALARA planners. The inspectors evaluated the incorporation of exposure reduction initiatives and operating experience. Adjustments made to planned doses were also reviewed along with the basis of those adjustments.

Post-job reviews from both the current and previous refueling outage were assessed. Where applicable, the inspectors discussed changes to established estimates with ALARA planners and evaluated them against work scope changes or unanticipated elevated dose rates

Source Term Reduction and Control: The inspectors reviewed the collective exposure three-year rolling average from 2012-2014 and reviewed historical collective exposure trends. The inspectors evaluated historical dose rate trends and compared them to current data. Ongoing source term/dose reduction initiatives such as zinc injection, cobalt reduction, the implementation of a valve locator database, and elevated primary pH were reviewed and discussed with RP staff.

Radiation Worker Performance: In conjunction with IP 71124.01, radiation worker performance was evaluated during several tasks both within containment and the auxiliary building. The inspectors specifically evaluated both the use of ALARA briefings and remote technologies, including teledosimetry and remote visual monitoring, to reduce dose.

Problem Identification and Resolution: The inspectors reviewed and discussed selected CAP documents associated with ALARA program implementation. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with licensee procedures. The inspectors also reviewed recent self-assessment results.

ALARA program activities were evaluated against the requirements of FSAR Section 12, TS Sections 5.7 and 5.11, 10 CFR Part 20, and approved licensee procedure. Documents reviewed are listed in the Attachment. This activity constituted one Occupational As Low As Reasonably Achievable (ALARA) Planning and Controls inspection sample, as defined in IP 71124.02

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

a. Inspection Scope

Engineering Controls: The inspectors reviewed the use of temporary and permanent engineering controls to mitigate airborne radioactivity during U1R13. The inspectors observed the use of temporary ventilation systems for controlling airborne radioactive material and reviewed records of testing. Use of containment purge to reduce airborne levels in general areas was reviewed and discussed with licensee staff. The inspectors evaluated the effectiveness of continuous air monitors and air samplers placed in work area "breathing zones" to provide indication of increasing airborne levels.

Respiratory Protection Equipment: The inspectors reviewed the use of respiratory protection devices to limit the intake of radioactive material. This included review of devices used for routine tasks and devices stored for use in emergency situations. The inspectors reviewed ALARA evaluations for the use of respiratory protection devices during rebuild of the U1 letdown orifice valve and a leak rate test on the U1 fit flange. Selected self-contained breathing apparatus (SCBA) units and negative pressure respirators (NPR)s staged for routine and emergency use in the main control room and other locations were inspected for material condition, SCBA bottle air pressure, number of units, and number of spare masks and air bottles available. The inspectors reviewed maintenance records for selected SCBA units for the past two years and evaluated SCBA and NPR compliance with National Institute for Occupational Safety and Health certification requirements. The inspectors also reviewed records of air quality testing for supplied-air devices and SCBA bottles.

The inspectors discussed issuance of respiratory protection devices to workers, including the verification of training and medical qualifications with RP staff. The inspectors discussed training for various types of respiratory protection devices with RP staff, observed donning of SCBA by a qualified worker, and interviewed radworkers and control room operators on use of the devices including SCBA bottle change-out and use of corrective lens inserts. Respirator qualification records and medical fitness records were reviewed for several main control room operators and emergency responder personnel in the Maintenance and RP departments. In addition, qualifications for individuals responsible for testing and repairing SCBA vital components were evaluated through review of training records.

Problem Identification and Resolution: Nuclear Condition Reports associated with airborne radioactivity mitigation and respiratory protection were reviewed and assessed. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with licensee procedures. The inspectors also reviewed recent self-assessment results.

Licensee activities associated with the use of engineering controls and respiratory protection equipment were reviewed against 10 CFR Part 20; FSAR Chapter 12; the guidance in RG 8.15, "Acceptable Programs for Respiratory Protection"; and applicable licensee procedures. Documents reviewed are listed in the report Attachment. This activity constituted one In-Plant Airborne Radioactivity Control and Mitigation inspection sample, as defined in IP 71124.03.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

a. Inspection Scope

External Dosimetry: The inspectors reviewed the licensee's National Voluntary Laboratory Accreditation Program (NVLAP) certification data for accreditation for 2015 for Ionizing Radiation Dosimetry. The inspectors reviewed program procedures for processing EDs and onsite storage of optically stimulated luminescent dosimeters (OSLDs). Comparisons between ED and OSLD results, including correction factors, were discussed. The inspectors also reviewed dosimetry occurrence reports regarding both valid and invalid alarming dosimeters.

Internal Dosimetry: Inspectors reviewed and discussed the *in vivo* bioassay program with the licensee. Inspectors reviewed procedures that addressed methods for determining internal or external contamination, releasing contaminated individuals, the assignment of dose, and the frequency of measurements depending on the nuclides. Inspectors reviewed and evaluated whole body counter (WBC) sensitivity, count time and libraries. The inspectors discussed assessment and disposition of unexpected dosimetry results. The inspectors evaluated the licensee's program for *in vitro* monitoring. There were no internal dose assessments for internal exposure greater than 10 millirem committed effective dose equivalent to review.

Special Dosimetric Situations: The inspectors reviewed records for one declared pregnant worker (DPW) and discussed guidance for monitoring and instructing DPWs. Inspectors reviewed the licensee's practices for monitoring external dose in areas of expected dose rate gradients, including the use of multi-badging and extremity dosimetry. The inspectors evaluated the licensee's neutron dosimetry program including instrumentation which was evaluated under IP 71124.05.

Problem Identification and Resolution: The inspectors reviewed and discussed licensee CAP documents associated with occupational dose assessment. Inspectors evaluated the licensee's ability to identify and resolve the identified issues in accordance with licensee procedures. The inspectors also reviewed recent self-assessment results.

Occupational dose assessment activities were evaluated against the requirements of FSAR Section 12; TS Section 5.7; 10 CFR Parts 19 and 20; and approved licensee procedures. Documents reviewed are listed in the Attachment. This activity constituted one Occupational Dose Assessment inspection sample, as defined in IP 71124.04.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation(71124.05)

a. Inspection Scope

Radiation Monitoring Instrumentation: During tours of the auxiliary building, spent fuel pool areas, and RCA exit point, the inspectors observed installed radiation detection equipment including the following instrument types: area radiation monitors (ARM)s, airborne monitors, liquid and gaseous effluent monitors, PCMs, SAMs, and portal monitors. The inspectors observed the physical location of the components, noted the material condition, and compared sensitivity ranges with FSAR requirements.

In addition to equipment walkdowns, the inspectors observed source checks and alarm setpoint testing of various portable and fixed detection instruments, including ion chambers, telepoles, PCMs, SAMs, and portal monitors. For the portable instruments, the inspectors observed the use of a high-range check source and reviewed records of periodic output value testing for a calibration source. The inspectors reviewed recent calibration records and evaluated alarm setpoint values for selected ARMs, PCMs, portal monitors, SAMs, effluent monitors, and a WBC. This included a sampling of instruments used for post-accident monitoring such as containment high-range ARMs and effluent monitor high-range noble gas and iodine channels. Radioactive sources used to calibrate selected ARMs and effluent monitors were evaluated for traceability to national standards. Calibration stickers on portable survey instruments and air samplers were noted during inspection of storage areas for ready-to-use equipment. The most recent 10 CFR Part 61 analysis for the dry active waste stream was reviewed to determine if calibration and check sources are representative of the plant source term. The inspectors also reviewed countroom quality assurance records for gamma ray spectrometry equipment and liquid scintillation detectors.

Problem Identification and Resolution: Selected licensee CAP documents associated with instrumentation were reviewed and assessed. The inspectors evaluated the licensee's ability to identify and resolve the identified issues in accordance with licensee procedures. The inspectors also reviewed recent self-assessment results.

Operability and reliability of selected radiation detection instruments were reviewed against details documented in the following: 10 CFR Part 20; NUREG-0737, "Clarification of Three Mile Island Action Plan Requirements"; TS Section 3; FSAR Chapters 11 and 12; and applicable licensee procedures. Documents reviewed are listed in the report Attachment. This activity constituted one Radiation Monitoring Instrumentation inspection sample, as defined in IP 71124.05.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES (OA)

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Security

4OA1 Performance Indicator (PI) Verification (71151)

a. Inspection Scope

Occupational Radiation Safety Cornerstone: The inspectors reviewed recent Occupational Exposure Control Effectiveness PI results for the Occupational Radiation Safety Cornerstone and reviewed PI records generated from May 2014 through September 2015. For the assessment period, the inspectors reviewed ED alarm logs and selected NCRs related to controls for exposure significant areas. Documents reviewed are listed in the report Attachment.

Public Radiation Safety Cornerstone: The inspectors reviewed recent Radiological Control Effluent Release Occurrences PI results for the Public Radiation Safety Cornerstone and reviewed PI records generated between May 2014 through September 2015. For the assessment period, the inspectors reviewed cumulative and projected doses to the public contained in liquid and gaseous release permits and NCRs related to Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual issues. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152)

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

a. Inspection Scope

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

b. Findings

No findings were identified.

.2 Semiannual Trend Review

a. Inspection Scope

As required by Inspection Procedure 71152, the inspectors performed a review of the licensee's CAP and other associated programs and documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues but also included licensee trending efforts and licensee human performance results. The inspectors' review nominally considered the six-month period of July through December 2015, although some examples expanded beyond those dates when the scope of the trend warranted. Inspectors reviewed licensee trend reports for the period in order to determine the existence of any adverse trends that the licensee may not have previously identified. The inspectors' review also included the licensee's integrated trend reports. The inspectors verified that adverse or negative trends identified in the licensee's PERs, periodic reports, and trending efforts were entered into the CAP. This inspection satisfied one inspection sample for Semiannual Trend Review.

b. Findings and Observations

No findings were identified. In general, the licensee had identified trends and appropriately addressed them in their CAP. The inspectors observed that the licensee had performed a detailed review. The licensee routinely reviewed cause codes and utilized key words and system links to identify potential trends in their data. The majority of licensee-identified trends were identified by the quality assurance (QA) organization over this time period. Inspectors had observed and commented on the same trends that the licensee was identifying, particularly the negative trends in procedure use and adherence, emergency drill performance, and fatigue rule. The inspectors also noted that the licensee's QA organization identified a finding that indicated Watts Bar personnel were not implementing the requirements associated with performance of fatigue rule assessments for post-events in accordance with procedures NPG-SPP-14.1 and NPG-SPP-03.21. This was documented in their CAP under CR 1080513 and included a root cause analysis (RCA). The inspectors reviewed the RCA and noted it contained five corrective actions, including an action identified as a corrective action to prevent recurrence (CAPR). The CAPR is to establish governance and oversight for fatigue management within existing procedures. The inspectors also reviewed CR 1068067, which identified that Watts Bar Nuclear (WBN) management had not provided adequate oversight of the nuclear fatigue rule. This has led to multiple procedure non-compliances and two 10 CFR 26.205 non-compliances since April of 2015. The inspectors reviewed the apparent cause evaluation (ACE) and actions associated with CR 1068067. Corrective actions included executing a read and sign for each departmental superintendent, first line supervisor, nuclear fatigue rule administrators, and all department employees. This read and sign documents that the signee is aware of the requirements found in the Watts Bar nuclear fatigue rule program and that the first offense of violating the requirements will result in formal documentation in the employee's personnel history file.

During refueling outage 13, the inspectors identified three procedure errors that were the result of the licensee's procedure revision process. The errors in two of the procedures resulted in steps that could not be performed in a logical sequence, and the error in the third procedure resulted in a restoration step for a switch being removed. The removal of the step resulted in the switch being left in an incorrect position until identified by control room operators. The licensee documented these procedure errors in CRs 1085104, 1086631, and 1096405. The inspectors identified these procedure errors to the licensee as a trend, and the licensee created CR 1098888 to document the NRC-identified trend. The inspectors also compared the licensee trend process results with the results of the inspectors' daily screening. No new adverse trends were identified this period by the inspectors that had not already been identified by the licensee.

.3 Annual Sample: Review of CR 1089456: Unacceptable Preconditioning of 1-CKV-62-525

a. Inspection Scope

The inspectors conducted a review of the implementation of corrective actions from CR 1089456 which was written due to an unacceptable preconditioning event that occurred associated with 1-CKV-62-525, the 1A-A charging pump discharge check valve. The inspectors reviewed the CR to ensure that the licensee planned and/or implemented corrective actions commensurate with the safety significance of the issue.

b. Findings

Introduction: The NRC identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to promptly identify a condition adverse to quality. Specifically, the licensee unacceptably preconditioned the 1A-A charging pump discharge check valve 1-CKV-62-525 and failed to identify this as a condition adverse to quality or take appropriate corrective action.

Description: On October 3, 2015, the licensee inservice testing (IST) program manager documented CR 1089456 regarding the unacceptable preconditioning of an IST as-found seat leakage test of the 1A-A charging pump discharge check valve, 1-CKV-62-525. An administrative scheduling error resulted in the scheduled IST seat leakage test being moved to a point in the U1RFO13 outage after a work order to replace the valve internals had already been worked under a planned maintenance activity. This scheduling error was identified before the maintenance occurred but, due to miscommunications in the licensee's work management process, the maintenance still occurred prior to the planned test. The licensee performed the required IST seat leakage test after the valve internals had been replaced and it passed the acceptance criteria. The inspectors reviewed the CR and noted that it had been screened as an E level CR in accordance with procedure NPG-SPP-22.302, Corrective Action Program Screening, Revision 7. NPG-SPP-22.302, Section 3.2.4.R.1.b, and Attachment 3, Event Classification Matrix, define E level CRs as non-CAP issues that are not considered conditions adverse to quality and thus do not require corrective action. Several days later, the licensee closed the CR to trend with no actions taken.

The inspectors determined that the condition was representative of unacceptable preconditioning as defined in Inspection Manual Technical Guidance Part 9900, “Maintenance–Preconditioning of Structures, Systems, and Components [SSCs] Before Determining Operability” and was a condition adverse to quality. The licensee performed an engineering evaluation of the preconditioning and documented a new CR to identify that a condition adverse to quality had occurred.

Analysis: The licensee’s failure to promptly identify a condition adverse to quality in accordance with NPG-SPP-22.302, Corrective Action Program Screening was a performance deficiency. Specifically, the licensee screened the CR associated with the unacceptable preconditioning of the 1A-A charging pump discharge check valve 1-CKV-62-525 as an E level CR. The inspectors determined that the performance deficiency was more than minor because, if left uncorrected, it had the potential to lead to a more significant safety concern. Specifically, the failure to identify and correct unacceptable preconditioning could mask the actual as-found equipment conditions and result in the loss of degradation trending and information of component performance. The inspectors used IMC 0609, Attachment 4, “Initial Characterization of Findings,” issued June 19, 2012, for Mitigating Systems, and IMC 0609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” issued June 19, 2012, and determined the finding to be of very low safety significance (Green) because the finding did not result in the loss of operability of 1-CKV-62-525. The finding had a cross cutting aspect in the Work Management component of the Human Performance area as defined in NRC’s IMC 0310, because the licensee failed to implement a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. Specifically, the licensee’s work management process was not able to prevent the unacceptable preconditioning of the 1A-A discharge check valve even after it was identified as a possibility prior to the planned maintenance [H.5].

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Action,” requires, in part, that “measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.” Contrary to the above, since October 3, 2015, a condition adverse to quality was not promptly identified. Specifically, the licensee failed to identify a condition adverse to quality associated with the unacceptable preconditioning of the 1A-A charging pump discharge check valve 1-CKV-62-525 and enter it into their CAP. This violation is being treated as an NCV consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee’s CAP as CR 1100876. This violation is identified as NCV 05000390/2015004-06, Failure to Identify a Condition Adverse to Quality for Unacceptable Preconditioning of the 1A-A Charging Pump Discharge Check Valve.

4OA3 Event Follow-up

.1 (Closed) LER 05000390/2015-005-00, Failure to Enter Technical Specification 3.6.12, Ice Condenser Doors, Condition B and Perform Required Actions

a. Inspection Scope

On September 16, 2016, WBN maintenance personnel found a scaffold blocking four intermediate deck doors in the WBN Unit 1 upper ice condenser, which made the doors inoperable since the scaffolding would have prevented them from opening. The licensee identified this condition and took immediate actions to enter TS LCO 3.6.12 Condition B, requiring that maximum ice bed temperature is verified to be less than 27 degrees F once per four hours (Action B1) and to restore the doors to operable status in 14 days (Action B2). The scaffold was removed on September 17, 2014. This violation was entered into the WBN CAP under CR 1082469. Inspectors reviewed the event, CR 1082469, the root cause evaluation, and licensee corrective actions.

b. Findings

The enforcement aspects of this finding are discussed in Section 4OA7.

.2 (Discussed) LER 05000390/2015-006, Source Range Level Trip Channels (N-31 and N32) Inoperable During Plant Startup

a. Inspection Scope

On October 19, 2015, with the plant in Hot Standby (Mode 3), the RTBs were closed to allow control rod testing. This action resulted in a violation of TS 3.3.1, Table 3.3.1-1 Function 5, because two source range level trip channels were bypassed and, therefore inoperable, with the RTBs closed and the rod control system capable of rod withdrawal. Under these conditions, TS 3.3.1 Required Actions A.1 and J.1 required that the operators take the immediate action to open the RTBs. This action was not performed because the operators were not aware of the position of the source range level trip switches at the time the RTBs were closed. On October 22, 2015, while in Mode 1, the operating staff discovered that the source range level trip switches were in the bypass position. At the time of discovery the reactor was at 27 percent power and there was no longer a TS requirement for the source range high flux trip function. The source range level trip switches for both channels were taken to the normal position shortly after discovery. Inspectors reviewed the event, CR 1096405, the root cause evaluation, and licensee corrective actions taken. Inspectors noted that some corrective actions were not scheduled for completion until later in 2016.

b. Findings

Findings associated with this LER are discussed in Section 1R20.

4OA5 Other Activities

.1 (Closed) Unresolved Item 05000390/2015002-05, Review of 50.59 Evaluation for the Emergency Diesel Generator Heat Exchanger

a. Inspection Scope

An unresolved item (URI), previously documented in the NRC Integrated Inspection Report 05000390/2015002 (ADAMS Accession Number ML15216A500), was opened regarding the licensee's 10 CFR 50.59 evaluation for a modification to the operational configuration of the inlet motor operated valves, for the emergency diesel generator (EDG) heat exchanger. Additional inspection was required to determine if the licensee's 10 CFR 50.59 evaluation properly addressed whether the modification resulted in more than a minimal increase in the likelihood of occurrence of a malfunction of a structures, systems, or components important to safety previously evaluated in the UFSAR.

The inspectors reviewed the results of the licensee's 10 CFR 50.59 evaluation related to the impact of the modification on the failure probability of the EDG. The inspectors also reviewed specific inputs, operator actions, assumptions, calculations, and evaluation methodology. Based on the additional review, the inspectors did not identify any performance deficiencies and obtained reasonable assurance that the increase in risk of the EDG did not meet the "minimal increase" threshold established in 10 CFR 50.59 and the guidance endorsed in Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments."

b. Findings

No findings were identified.

.2 Onsite Fabrication of Components and Construction of an Independent Spent Fuel Storage Installation (60853)

a. Inspection Scope

The inspectors conducted a review of licensee and vendor activities in preparation for the concrete placement for the independent spent fuel storage installation pad (ISFSI) upon which the HI-STORM (Holtec International Storage Module) Flood and Wind System will be sited to house spent fuel generated by the licensee. The inspectors walked down the construction area of the ISFSI pad and examined the rebar installation, and verified that the rebar size, spacing, splice length, and concrete coverage on the top, side, and bottom complied to licensee-approved drawings, specifications, procedures, and other associated documents, and that compliance to applicable codes, the Certificate of Compliance , and TS was met. The inspectors also evaluated the concrete formwork installation for depth, straightness, and horizontal bracing, and verified the overall dimensions and orientation for compliance to the licensee-approved drawings. The inspectors interviewed licensee and contract personnel to verify knowledge of the planned work.

The inspectors also observed the actual concrete placement and vibration for Pour C of the ISFSI slab, and observed tests for concrete slump and air content, temperature measurements, and the collection/preparation of cylinder samples for compression tests, to verify that the work was implemented according to approved specifications and procedures. Later, when the 7-day and 28-day compression tests were completed by the independent laboratory, the inspectors reviewed the results to verify that the the concrete was acceptable. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA6 Meetings, including Exit

On January 22, 2015, the resident inspectors presented the quarterly inspection results to members of the licensee staff. The inspectors confirmed that none of the report input discussed was considered proprietary.

4OA7 Licensee-Identified Violations

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

Watts Bar Nuclear Plant TS 3.6.12 states that the ice condenser inlet doors, intermediate deck doors, and top deck doors shall be operable and closed. TS 3.6.12 Condition B requires that maximum ice bed temperature is verified to be less than 27 degrees F once per four hours (Action B1) when one or more doors is inoperable. Contrary to the above, four intermediate deck doors were inoperable from September 8, 2015 until September 17, 2015 and required action B1 of TS 3.6.12 Condition B was not performed. WBN maintenance personnel erected scaffolding on September 8, 2015 which blocked four intermediate deck doors in the Unit 1 upper ice condenser, which made the doors inoperable since the scaffolding would have prevented them from opening. The TS implications of the scaffold were not immediately recognized and therefore the required TS action B1 was not performed. The licensee identified this condition on September 16, 2015 and took immediate actions to enter TS LCO 3.6.12, Condition B, requiring that maximum ice bed temperature is verified to be less than 27 degrees F once per four hours (Action B1) and to restore the doors to operable status in 14 days (Action B2). The scaffold was removed on September 17, 2015; therefore, the 14-day completion time of TS 3.6.12 was not exceeded. A review of ice bed temperatures between September 8, 2015 and September 17, 2015 showed that ice bed temperatures never exceeded 27 degrees F as required by TS 3.6.12 Action B1. Using IMC 0609, Appendix A, Exhibit 2 (Mitigating Systems); this finding was determined to be of very low safety significance (Green) because it did not result in an actual loss of function of at least a single train of equipment for greater than its technical specification allowed outage time. This violation was entered into the WBN CAP under CR 1082469.

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

G. Arent, General Manager,WBN Site Licensing
L. Belvin, Quality Assurance Manager
M. Bottorff, Operations Superintendent
M. Casner, Director, Engineering
S. Connors, Plant Manager
T. Detchemende, Emergency Preparedness Manager
S. Fisher, Senior Manager, Nuclear Site Security
W. Hooks, Radiation Protection Manager
J. James, Director, Maintenance
J. O'Dell, Site Licensing Supervisor
J. Reidy, Director, Operations
G. Riste, Licensing
T. Sears, Heat Exchanger Monitoring
P. Stephens, Senior Manager, Chemistry
R. Stroud, Site Licensing
M. Taggart, Director, Work Management
K. Walsh, Site Vice President

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000390/2015004-01	NCV	Failure to Perform ISI General Visual Examination of Containment Moisture Barrier Associated with Containment Liner Leak-chase Test Connection Threaded Pipe Plugs (Section 1R08)
05000390/2015004-03	NCV	Failure to Comply with Source Range Neutron Flux Channel Technical Specification Requiprements (Section 1R20)
05000390/2015004-05	NCV	Core Barrel Lift Error Resulted in Unintended high Dose Rates (Section 2RS1)
05000390/2015004-06	NCV	Failure to Identify a Condition Adverse to Quality for Unacceptable Preconditioning of the 1A-A Charging Pump Discharge Check Valve (Section 4OA2.3)

Opened

050003902015004-02	URI	AFWST Permanent Plant Modification (Section 1R18)
05000390/2015004-04	URI	Shield Building Operability Requirements (Section 1R22)

Closed

05000390/2015-005-00	LER	Failure to Enter Technical Specification 3.6.12, Ice Condenser Doors, Condition B and Perform Required Actions. (Section 4OA3.1)
05000390/2015002-05	URI	Review of 50.59 Evaluation for the Emergency Diesel Generator Heat Exchanger (Section 4OA5)

Discussed

05000390/2015-006	LER	Source Range Level Trip Channels (N-31 and N32) Inoperable During Plant Startup. (Section 4OA3.2)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection
0-PI-OPS-1-FP, Freeze Protection, Rev. 0008
CR 102007
CR 942858
CR 1041567
WO 117223872

Section 1R04: Equipment Alignment

Procedures
0-SOI-82.02, Diesel Generator (DG) 1B-B, Rev. 006
0-SOI-82.02 ATT 1P, Diesel Generator (DG) 1B-B Power Checklist 82.02-1P, Rev. 0000
0-SOI-82.02 ATT 1V, Diesel Generator (DG) 1B-B Valve Checklist 82.02-1V, Rev. 0000
0-PI-OPS-17.0, 18 Month Locked Valve Verification, Rev. 0070
1-SOI-62.01 ATT 1V, CVCS Charging and Letdown Valve Checklist 1-62-01-1V, Rev. 0000
WBN-SDD-N3-32-4002, Compressed Air System, Rev. 0011
Drawings 1-47W848-1, 1-47W848-10
0-SOI-32.02, Auxiliary Air System, Rev. 0001
0-SOI-32.02, ATT 1P, Rev. 0000; ATT 1V, Rev. 0001; ATT 2V, Rev. 0001
TI-100.007, Augmented Inservice Testing Program, Rev. 0032
TI-100.008, Inservice and Augmented Inservice Testing and System Pressure Test Program Implementation Matrix, Rev. 0044
TI-100.011, Inservice Testing Bases Document, Rev. 0034
WO 116152961
2-PI-OPS-1-PE, Protected Equipment, Rev. 0000
CRs 1120428, 1120431, 1120412

Drawings
1-47W809-1, Flow diagram chemical and volume control system, Rev. 67

Section 1R05: Fire Protection
Preventive Maintenance Instruction, 0-FPS-510-001-A, Portable Fire Extinguisher Inspection, Rev. 10, Attachment 1
Transient Combustible Evaluation A15-00059 dated 9/3/15
WBN Prefire Plan, CON-0-729-01, Rev. 2; WBN Prefire Plan, CON-0-692-01, Rev. 2; WBN Prefire Plan, CON-0-708-01, Rev. 3
Fire Protection Report, Part VI, Fire Hazard Analysis, Rev. 10

Section 1R06: Flood Protection Measures
Watts Bar Unit 1 Individual Plant Examination, Appendix E.1, Watts Bar Internal Flood Analysis, Rev. 0
Design Criteria WB-DC-40-31.51, Evaluating the Effects of Flooding Due to Moderate Energy Pipe Failures Inside and Outside Containment, Rev. 5
Calculation WBNOSG4099, Moderate Energy Line Break Flooding Study, Rev. 16
WOs 115569228, 115569230

Section 1R11: Licensed Operator Requalification Program
3-OT-SRE-1001, Annual Operating Examination Scenario, Rev. 11

Section 1R12: Maintenance Effectiveness
Cause Determination and Evaluation (CDE) 1361
CR 1003406
WO 116664830
CR 1091918
CDE 1398

Section 1R13: Maintenance Risk Assessments and Emergent Work Control
NPG Pre-Job Briefing Checklist dated 10.29/15
Daily Risk Report dated 10/29/15
Risk Management Plan, NPG-SPP-07.3-2 dated 7/16/12
Operator/s Risk Report dated 10/21/15
NPG-SPP-07.2.11, Shutdown Risk Management, Rev. 0008
WBN Defense in Depth Assessments dated 12/7/15 and 12/31/15

Section 1R15: Operabiltiy Determinations and Functionality Assessments
NEDP-14, Containment Leak Rate Programs, Rev. 0012, Appendix E
1-FCV-70-134 Leakage Evaluation
1-SI-70-701, Containment Isolation Valve Local Leak Rate Test Component Cooling, Rev. 0012
CR 1095099
CR 1095121
1-SI-3-923-S, Auxiliary Feedwater Pump 1A-S Comprehensive Pump Test, Rev. 0014
Unit 1 Mode Change Checklist for Mode 4 to 3, 11/09/15
Unit 1 Mode Change Checklist for Mode 3 to 2, 1, 11/10/15
Unit 1 Mode Change Checklist for Mode 3 to 2, 1, 11/11/15
CR 977101

Section 1R18: Plant Modifications
WBN-OSG4-130, Calculation Sheet, Rev. 2
DCN 65832-A
Updated Final Safety Analysis Report (UFSAR), Section 9.4
UFSAR, Tables 9.2-2 and 9.3-3

Section 1R19: Post Maintenance Testing
WO 116304713 and Task Summaries
WO 116304713, Attachment A, Rev. 0
Weld data sheets
Detailed welding procedure specification (DWPS) GT11-0-4-N, ASME/ANSI – GWPS 1.M.1.2, Rev. 3
Pre-Job Briefing Checklists
Temporary Rigging Load Permit
Confined Space Hazard Evaluation & Classification Report
Maintenance Instruction 0-MI-0.16, Maintenance Guidelines for Belt Driven Equipment, Rev. 0006
WO 115967788 and Task Summaries
WO 116412092
Pre-Job Briefing Checklists
WO 115967788, Attachment A, Rev. 0
TI-100.010, System Pressure Testing, Rev. 0019

1-MI-68.021, Pressurizer PORV Maintenance, Rev. 0000
WO 117379392 and Task Summaries
WO 117379392, Attachment A
Pre-Job Briefing Checklists
Certificate of Compliance/Conformance
Material/Equipment forms
0-MI-0.017, Kerotest Valve Maintenance, Rev. 0007
WO 110774707 and Task Summaries
Pre-Job Briefing Checklists
WO 110774707, Attachment A
Procedure N-VT-4, System Pressure Test Visual Examination Procedure, Rev. 0026, Attachment 1
Manufacturers' Data Report for Nuclear Pumps or Valves
NPG-SPP-09.1.3, ASME Sectio XI Repair/Replacement Activities Program, Attachments 1, Rev. 0000, Attachment 3, Rev. 0000, Attachment 4, Rev. 0000
TI-100.014, ASME Section XI Repairs and Replacements, Rev. 0005, Form NIS-2A
Repair/Replacement Certification Record
WO 116207101
CR 1086609
WO 116036810
1-SI-63-915-B, Safety Injection System – Valve Position Indication Verification and Full-Stroke Exercising (Train B), Rev. 0029
WO 117209454
WO 116036678
1-SI-63-915-A, Safety Injection System – Valve Position Indication Verification and Full-Stroke
Exercising (Train A), Rev. 0037

<u>Section 1R20: Refueling and Other Outage Activities</u>
TI-61.003, Containment Debris Log, Rev. 0011
0-MI-61.06, Servicing Ice Condenser, Rev. 0003
Daily Unit 1 Log, dated October 09, 2015
NPG-SPP-06.14, Troubleshooting Plan for CRs 1092076, 1091918
1-FHI-7, Fuel Handling and Movement, Rev. 0002
0-TI-7.012, Administration of the Reactivity Briefing Sheets and Reactivity Control Plans
1-GO-4, Normal Power Operation, Rev. 0001
Surveillance Task Sheet for WO 116153209
0-SI-82-4, 18 Month Loss of Offsite Power with Safety Injection Test – DG 1B-B, Rev. 0062
0-SI-82-4, 18 Month Loss of Offsite Power with Safety Injection Test – Appendices A-P and R-V
WO 116554801, CC1, Low Duty Cycle, Mild Service Condition
0-MI-0.013, Air Operated Valve Maintenance And Setup, Rev. 0005
TI-100.014, ASME Section XI, Repairs and Replacements, Rev. 0004
1-SI-63-906, Safety Injection Check Valve Full-Flow Testing During Refueling Outages, Rev. 0026
1-SI-0-710, Containment Integrity: Penetrations, Rev. 0015, Appendix A. Valve/Pentration Checklist
1-GO-1, Unit Startup from Cold Shutdown to Hot Standby, Rev. 0004
1-GO-2, Reactor Startup, Appendix A, Rev. 0009
1-PI-OPS-ANN, Annunciator Verification, Appendix B, Rev. 000
DataWare History, dated March 20-May 3, 2014

Shift Turnover Checklist, dated 10/23/2015
Log Entries Report, dated 10/27/2015
N3-92-4003, Neutron Monitoring System
1-PET-201, Power Escalation Test, Rev. 0008
NPG-SPP-10.1, System Status Control, Rev. 0007
Minor Maintenance Document for WO 117330684
NPG-SPP-09.5, Temporary Modifications Temporary Configuration Chagnes, Rev. 0009
Cable Standard Report for Cables 1RR1817 and 1RR1887, dated November 9, 2015
1-SI-0-904, Primary Pressure Boundary Isolation Valve Leak Test (RHR Cold Leg Injection Check Valves), Rev. 0015
1-SI-0-905, Primary Pressure Boundary Isolation Valve Leak Test Residual Heat Removal Return Valves, Rev. 0013
Westinghouse Electric Corporation Power Systems historical documents, dated June 1, 1987
Regulatory Guide 1.45, Guidance on Monitoring and Responding to Reactor Coolant System Leakage, May 2008, Rev. 1
SGN PER 997605, Unit 1 Control Rod H-8 Drop, Rev. 1

<u>Section 1R22: Surveillance Testing</u>
Surveillance Task Sheet for WO 116601589, dated October 7, 2015
1-SI-61-901-A, Valve Full Stroke Exercising During Plant Operation Ice Condenser System (Train A), Rev. 0011
0-SI-82-3, 18 Month Loss of Offsite Power with Safety Injection – DG 1A-A, Rev. 0060
WBN RRS Report - Sep 23, 2015 and Sep 24, 2015
NPG-SPP-22.207, Procedure Use and Adherence, Rev. 0002
0-SI-82-3, 18 Month Loss of Offsite Power with Safety Injection – DG 1A-A, Rev. 0061
WO 116153241
CR 1113513
WO 116153030
1-SI-70-701, Containment Isolation Valve Local Leak Rate Test Component Cooling, Rev. 0014
1-SI-70-701, Containment Isolation Valve Local Leak Rate Test Component Cooling, Rev. 0013, Appendix C, Penetration X-50A
WO 116153016
1-SI-63-905, Boron Injection Check Valve Flow Test During Refueling Outages, Rev. 0024

2RS1: Radiological Hazard Assessment and Exposure Controls

<u>Procedures, Guidance Documents, and Manuals</u>
NPG-SPP-05.1.1, “Alpha Radiation Monitoring Program”, Rev. 5
NPG-SPP-05.1, Radiological Controls, Rev. 0005
RCI-153, Radiation Work Permits (RWPs), Rev. 0005
RCI-100, Radiological Controls, Rev. 46
NPG-SPP-03.7, Stop Work, Rev 2
RCI-103, Radioactive Material Control, Rev. 40
RCI-130, Personnel Monitor Alarm Response and Personnel Decontamination”, Rev. 16
RCI-152, “Radiological Postings”, Rev. 12
RCI-162, Control of Radiological Work, Rev. 0001
RCI-101, Radiation, Contamination, and Airborne Surveys, Rev. 0035

Records and Data

RWP 151191922, (High Radiation Areas, Contamination Areas) Mechanical Stress Improvement Process on the Dissimilar Welds on the Hot and Cold Reactor Vessel Nozzles and Support Activities, Rev. 1

RWP 15192742, U1R13 Outage – (High Radiation Areas, Contamination Areas, Hot Particle Areas) CETNA Assembly and Disassembly and Bullet Notes Installation and Removal

RWP 15196022, U1 Upper Containment for All Tasks Involving Decon Support on Initial Entry in Cavity After Removal of Missile Shields and During Rx Disassembly, Repatch Instacote Protective Coating in Rx Cavity and NIS Covers, Rx Re-Assembly, Rev. 0

RWP 15100971, Routine Operations and Surveillance, Rev. 0

RWP 15196022, Refueling, Rev 0

RWP 15199903, Reactor Pressure Vessel Core Barrel Lift/Replacement and Inspection, Rev 0

RWP 15199803, Reactor Pressure Vessel Core Barrel Lift/Replacement and Inspection for Crane Personnel Only, Rev 0

Radiological Survey WBN-M-20150923-20, U1 Containment Bldg Top of Pzr

Radiological Survey WBN-M-20151011-20, Rx Cavity Elev. 725’, U1R13 Post Rx Cavity Decon

Radiological Survey WBN-M-20150930-38, Rx Cavity Elevation. 725’, U1R13 Update MSIP Conditions

Radiological Survey WBN-M-20150923-42, U1 Containment Bldg Reactor Head and Work Platform

Radiological Survey WBN-M-20150907-28, U1 1A-A RHR Pump Rm. 676’

Radiological Survey WBN-M-20150903-32, U1 Pipe Chase 713’

Radiological Survey WBN-M-20150913-16, U1 Pipe Chase 676’

Radiological Survey WBN-M-20150831-13, U1 1B-B RHR Pump Rm. 676’

Radiological Survey WBN-M-20150904-11, 1A RHR/CS Heat Exchanger Rm. 713’

Radiological Survey WBN-M-20150906-23, 1B RHR/CS Heat Exchanger Rm. 713’

Radiological Survey WBN-M-20151005-45, Upper Containment Elev 802’ Core Barrel Move from Stand to Vessel

Radiological Survey WBN-M-20151003-36, Upper Containment Elev 802’ Core Barrel Move from Vessel to Stand

WBN Unit 1 Core Barrel Move from Stand to RPV, Dose and Dose Rates by Individual

Airborne Radiation Survey 230915112, 802’ U1 Upper Containment

Airborne Radiation Survey 300915120, Top of PZR

WO 116326463, 0-TRI-0-3 Leak Testing of Sealed Sources, 4/16/15

NSTS Annual Inventory Reconciliation, Dated, 01/08/2015

CAP Documents

WBNRPSSA15001, Radiological Hazard Assessment and Exposure Controls, dated 07/01/2015

CR 1019486

CR 1009695

CR 1090220

CR 976255

CR 1034329

CR 1041418

2RS2: ALARA

Procedures and Guidance Documents

NPG-SPP-05.2, ALARA Program, Rev. 6

NPG-SPP-05.2.1, Operation ALARA Planning and Controls, Rev. 4

NPG-SPP-05.2.3, Outage Exposure Estimating and Tracking, Rev. 0

RCI-128, ALARA Program Implementation, Rev. 17

NPG-SPP-05.2.2, Establishing Collective Radiation Exposure Annual Business Plan Goals, Rev. 0
TI-232, Chemical Volume and Control System Temporary Shielding Installation and Removal, Rev. 5

Records and Data Reviewed
EPRI Reactor Coolant Loop Survey Locations
TVA Watts Bar Nuclear Plant Dose Excellence Plan 2015-2019, Rev. 0
Watts Bar Nuclear Plant U1R12 ALARA Outage Report, Spring 2014
APR 2014-037, U1R12 In-Service Inspection Activities, Rev. 1
APR 2015-023, U1R13 RFO Rx Assembly/Disassembly, Rev. 1
APR 2015-025, Reactor Coolant Pump #2 Hydro-nut Installation, Rev. 1
APR 2015-037, U1R13 In-Service Inspection Activities, Rev. 0
APR 2015-040, Mechanical Stress Improvement Process, Rev. 1
Self Assessment WBN-RP-SSA-15-002, Occupation ALARA Planning and Controls, 07/01/2015
FY 2015 June Station ALARA Committee Meeting Minutes
FY 2015 July Station ALARA Committee Meeting Minutes
FY 2015 October Station ALARA Committee Meeting Minutes

Corrective Action Program Documents
CR 1093853
CR 1046128
CR 785772
CR 879234

2RS3: In-Plant Airborne Radioactivity Control and Mitigation

Procedures, Guidance Documents, and Manuals
NPG-SPP-05.10, “Radiological Respiratory Protection Program”, Rev. 0003
RCI-107, “Respiratory Protection Equipment Inspection, Maintenance, Issuance and Accountability”, Rev. 0022
RCI-119, “Use and Control of Portable HEPA Ventilation Units and HEPA Vacuum Cleaners”, Rev. 0015
RCI-123, DOP Testing of Portable HEPA and Vacuum Cleaners, Rev. 0004
RCI-120, “TEDE ALARA Evaluation”, Rev. 0005

Records and Data
TEDE ALARA Worksheet for RWP# 15109136, LLRT Fuel Transfer Tube Flange, 09/18/2015
TEDE ALARA Worksheet for RWP# 15000701, Pre-Operational Limit Switch Adjustment 9/03/2015
TEDE ALARA Worksheet for APR# 15018, Rebuild Letdown Orifice Valve, 9/29/2015
Respirator Issue Log, 09/30 - 10/21/2015
NPG-SPP-05.10-2, Request for Respiratory Protection Equipment for Industrial Hygiene and Safety Purposes, dated 10/20/2015
Work Order (WO) #116488315, Cleaning/Sanitizing, Maintenance, Inspection Storage and Inventory of Positive Pressure MSA SCBA's, 08/03/2015
Work Order (WO) #116416198, Cleaning/Sanitizing, Maintenance, Inspection Storage and Inventory of Positive Pressure MSA SCBA's, 07/06/2015
Air/Gas Quality Report and Certificate, TVA:WBN Station Air Compressors “A, B and C” and Paint Shop Sullair Compressor 05/13/2015

Air/Gas Quality Report and Certificate, TVA:WBN Station Air Compressors “A, B and C” and Paint Shop Sullair Compressor 010/08/2015
Posi3 USB Test Results (Complete SCBA Test) for SCBA Kits AH-41, AH-15 and AH-30, dated 087/10/2015
HEPA/Vacuum Master Inventory List of Calibrated Equipment, dated 02/03/2015 to 08/28/2015
INS027, 2/28/15MSA C.A.R.E Certificate for people who repair SCBA regulators, 9/13/13

CAP Documents
WBNRPSSA15003, Airborne Radioactivity Control and Mitigation, 09/01/2015
CR 937713
CR 1019119
CR 771688
CR 937713
CR 1096230

2RS4: Occupational Dose Assessment

Procedures and Guidance Documents
RCI-111, Special Exposure Monitoring, Rev. 13
RCI-130, Personnel Monitor Alarm Response and Personnel Decontamination, Rev. 16
RCI-137, Radiation Protection Tritium Control Program, Rev. 5
RCDP-7, Bioassay and Internal Dose Program, Rev. 7
RCDP-10, Personnel Contamination Reporting, Rev. 6
RCTP-105, Personnel Inprocessing and Dosimetry Administrative Processes, Rev. 5
RCTP-106, Special Dosimetry Operations, Rev. 3
RCTP-109, Whole Body Counting and Calibration, Rev. 0
NPG-SPP-05.1, Radiological Controls, Rev. 5

Records and Data Reviewed
Self Assessment WBN-RP-SSA-15-004, Occupational Dose Assessment, 07/01/15
Self Assessment CRP-RP-SSA-15-001, Landauer External Dosimetry Services, 04/07/15
NVLAP Certificate Of Accreditation-(OSL) - Landauer, Inc., 1/1/2015-12/31/2015
NVLAP Personnel Dosimetry Performance Testing, 04/02/2014
Alarm Set-point Evaluation for Personnel Monitoring, 09/15/2015
Evaluation of Personnel Monitor Detection Capabilities for Use as Passive Whole Body Count Monitors, 09/07/2015
PC#2014004 – SDE/DDE/LDE Dose Calculation with GM Data
Whole Body Counting Measurement Quality Assurance Performance Testing, Fast Scan #1, Spring 2014

Corrective Action Program (CAP) Documents
CR 1089979
CR 1035368
CR 1041639
CR 794159
CR 890902
CR 867888
CR 873945

2RS5: Radiation Monitoring Instrumentation

Procedures
1-SI-90-3, 18 Month Channel Calibration (Source Cal) of the Train A Containment Lower Compartment High Range Post Accident Area Radiation Monitor Loop 1-LPR-90-273, Rev. 6
RCI-109, Radiological Control Portable Instrumentation, Rev. 22
NP-REP, Radiological Emergency Plan, Appendix C, Rev. 106X
RCI-157, Calibration and Operation of the Small Article Monitor (SAM 12), Rev. 1
NPG-SPP-22.300, Corrective Action Program, Rev. 3

Calibrations and Data
WAR-1A-M, Calibration of the Western Area Radiological Laboratory (WARL) High Level Cs-137 Source Range
Alarm Set-point Evaluation for Personnel Monitoring, 9/15/15
Daily QA Check Trending, October 2015, Gamma Spectroscopy Detector No. 1
Liquid Scintillation Detector Tri-Carb 3100TR Calibration Record, 10/20/15
HPGe Calibration Records for Detector #1, 9/4/14, 9/9/14, 9/18/14, 9/22/14, 9/23/14, 9/24/14, 2/23/15, 2/24/15, 2/25/15, 6/15/15
Ludlum Model 9-3 Calibration Records, Serial No. 273800, 8/21/14, 2/24/15
Mirion Telepole Calibration Records, Serial No. 0912-071, 2/10/15, 9/30/15
Certificate of Conformance, 1-RE-90-101B Calibration Sources
ARGOS-5AB Calibration Records, Serial No. 848508, 6/19/14, 6/5/15
ARGOS-5AB Calibration Records, Serial No. 860782, 5/21/14, 8/29/15
GEM-5 Calibration Records, Serial No. 130, 7/12/14, 7/8/15
GEM-5 Calibration Records, Serial No. 129, 7/12/14, 7/8/15
System Health Report, Rad Monitoring, 2/1/15 – 5/31/15
Calibration of the Canberra “Fastscan 1” WBC System, 10/1/14
Work Order 114693227, 18-Month Calibration of Auxiliary Building Vent – 0-RE-90-101B, 12/15/13
Work Order 116364130, 18-Month Calibration of Auxiliary Building Vent –0-RE-90-101B, 5/22/15
Work Order 115147309, 18-Month Calibration of Steam Generator Blowdown – 1-RE-90-120, 9/26/14
Work Order 116485172, 18-Month Calibration of Steam Generator Blowdown – 1-RE-90-121, 8/26/15
Work Order 114223621, 18-Month Calibration of Upper Containment PAM – 1-RE-90-271, 7/30/13
Work Order 115696710, 18-Month Calibration of Upper Containment PAM – 1-RE-90-271, 1/29/15
Work Order 112674059, 18-Month Calibration of Lower Containment PAM – 1-RE-90-273, 10/18/12
Work Order 114472568, 18-Month Calibration of Lower Containment PAM – 1-RE-90-273, 4/14/14

CAP Documents
WBN-RP-SSA-15-005, Radiation Monitoring Instrumentation Self-Assessment, 5/11/15 - 6/1/15
CR 979211
CR 857560
CR 1019122
CR 1091332
CR 1091330

Section 4OA1: Performance Indicator Verification
List of Dose and Dose Rate Alarms January 2014 to October 2015
Monthly Gaseous Dose Report, September 2015
Monthly Liquid Dose Report, September 2015
2014 Annual Radioactive Effluent Report
CR 960438

Section 4OA2: Problem Identification and Resolution
NETP-116.3, Inservice Testing Program Preconditioning Guidelines, Rev. 0001
Site Trimester Performance Assessment, May 23, 2015 to September 9, 2015
Operations Department Monthly Assessment for September, 2015
Operations Department Monthly Assessment for August, 2015
Operations Department Monthly Assessment for July, 2015
Operations Department Monthly Assessment for June, 2015
Work Management Monthly Performance Assessment, October, 2015
Work Management Monthly Performance Assessment, September, 2015
Work Management Monthly Performance Assessment, August, 2015
CR 1080513
CR 1080513
CR 1068067
CR 1068067
CR 1085104
CR 1086631
CR 1096405
CR 1098888
CR 1072663
CR 1070212

Section 4OA5: Other Activities

Calculations
DCN56341B, Restore 1-FCV-067-0146-A, 1-FCV-067-0066-A, 2-FCV-067-0066-A, 1-FCV-067-0067-B & 2-FCV-067-0067-B, 12/22/2010
EPM-RM-070789, Valve Stroke Time Determination for System 67, Rev.11
EDQ000-999-2008-0014, Diesel Generator Loading Analysis, Rev. 30
EPM-JKJ-110590, Upper Safety Limit – Time Delay for ERCW Pump Start Loss-of-Offsite-Power, Rev. 3

Procedures
0-MI-0.006, MOVATS Testing of Motor Operated Valves, Rev. 5
Modification/Addition Instruction (MAI)-5.10, Concrete Placement, Surface Preparation, Placing, Finishing, Curing, and Testing, Revision 0008
MAI-5.11, Installation of Reinforcing Steel and Embedded Items, Revision 0004
MAI-5.12, Backfill, Revision 0006
Quality Assurance Department Procedure (QADP)-7, Quality Assurance Training and Qualification Program Description, Revision 0005

Specifications
General Engineering Specification G-2 for Plain and Reinforced Concrete, Revision 8
General Engineering Specification G-8 Formwork for Concrete, Revision 2
General Engineering Specification G-9, Earth and Rock Foundations and Fills during Construction, Modification and Maintenance for Nuclear Plants, Revision 9

Drawings
62327-001, ISFSI General Arrangement Plan, Revision 0
62327-003, ISFSI Pad Layout Plan, Sections and Details, Revision 0
62327-009, ISFSI Pad/Heavy Haul Path Location Plan, Revision 0
62327-013, ISFSI General Notes, Revision 0
62327-014, ISFSI Stone Columns General Notes, Revision 0
62327-015, ISFSI Stone Columns Layout Plan, Revision 0
62327-016, ISFSI Stone Columns Sections and Details, Revision 0
62330-001, ISFSI General Arrangement Plan, Revision 0
62330-002, ISFSI Pad/Heavy Haul Path Location Plan, Revision 0
62330-003, ISFSI Pad/Heavy Haul Path Location Plan, Revision 0
62330-007, ISFSI Heavy Haul Path Details, Revision 0
62330-008, ISFSI Heavy Haul Path Details, Revision 0
62330-009, ISFSI Haul Path Profile Plan, Revision 0
62330-013, ISFSI General Notes, Revision 0

Self-Assessments
QA-WB-15-014, Quality Assurance (QA) Independent Spent Fuel Storage Installation (ISFSI) Project Assessment
Site Audit Report - Audit SSA1504, Independent Spent Fuel Storage Installation (ISFSI) Program, dated April 13, 2015

Condition Reports (CRs)
CR 1050092, Concrete Slump Exceeding G-2 Requirements
CR 1064611, ISFSI Self-Assessment 10CFR21 Performance Deficiency
CR 1077893, ISFSI HHP - Bridging Slab #4 Concrete - Max Air Exceeded

CRs Resulting From Inspection
CR 1124154, ISFSI Pad Concrete Does Not Meet Design Output Requirements

Other
Certificate of Conformance (CoC) for Concrete Production Facilities issued by the National Ready-Mixed Concrete Association (NRMCA) to Sequatchie Concrete Services, Inc. for its

Dayton, TN Plant (Number 219), dated May 27, 2015
Design Change Notice (DCN) 62327A 10 CFR 50.59 Screening Review for ISFSI Pad, dated January 13, 2015
DCN 62330A 10 CFR 50.59 Screening Review for ISFSI Heavy Haul Path, dated March 20, 2015
Exception to G-2 (Sections 4.1.1 and 4.8.2) for ISFSI Project, G-2-WBN-006, dated 07/13/2015
NRMCA Fleet Inspection Results of Sequatchie Concrete Services, Inc. fleet of truck-mixers, dated May 13, 2015
Personnel Qualification Records for R. Bevil, J. Cofield, and M. Daoust
Purchase Order (PO) 15006-05A for rebar for ISFSI Project, dated May 7, 2015
Receipt Inspection Report (RIR) # 001 for PO 2246-107623 (#10 rebar), dated 9/1/2015
Report #: CC-000244, 7-Day Concrete Compressive Strength, performed by Rentenbach Constructors Inc. (independent laboratory), dated 10/30/2015
Report #: CC-000338, 28-Day Concrete Compressive Strength, performed by Rentenbach Constructors Inc. (independent laboratory), dated 11/20/2015
RIR # 002 for PO 2246-107623 (#10 rebar), dated 9/1/15
RIR # 003 for PO 2246-107623 (#10 rebar), dated 9/3/15
RIR # 004 for PO 2246-107623 (#10 rebar), dated 9/10/15
RIR # 006 for PO 2246-107623 (#10 rebar), dated 9/9/15
Work Order (WO) 116244173, Install Concrete ISFSI Pad and Remove Forms and Shoring after Concrete Work IAW DCN 62327

<u>Holtec, Inc. Documents</u>
Drawing 9860, ISFSI General Notes, Revision 4, dated 9/16/2015
Engineering Change Order (ECO) 5018, Change Holtec HI-STORM FW FSAR Maximum Compressive Strength from 6000 psi to 7000 psi, Revision 0
Engineering Design Change Request (EDCR)-2246-046, Revision 0, dated 9/19/2015
Engineering Design Change Request (EDCR)-2246-046, Revision 0, Attachment 1
Engineering Design Change Request (EDCR)-2246-046, Revision 0, Attachment 2
Response to Request for Technical Information (RRTI) 2246-003, Justification to Use an Inactive Procedure, Revision 0
Field Condition Report (FCR) 2246-013, The Average 28-Day Compressive Strength Did Not Meet the Specified Minimum Design Strength, Revision 0
FCR 2246-014, The Average 28-Day Compressive Strength Exceeded the Maximum Design Strength, Revision 0
FCR 2246-015, The Maximum ISFSI Pad Thickness Was Exceeded at Some Locations, Revision 0
FCR 2246-016, The Average 28-Day Compressive Strength Exceeded the Maximum Design Strength, Revision 0
FCR 2246-017, The Average 28-Day Compressive Strength Exceeded the Maximum Design Strength, Revision 0
FCR 2246-018, The Average 28-Day Compressive Strength Exceeded the Maximum Design Strength, Revision 0
Final Safety Analysis Report on the HI-STORM FW MPC Storage System, Revision 4
HPP-2246-103, Procedure for Plate Load Test of the Engineered Fill for the Watts Bar ISFSI Pad, Revision 0

LIST OF ACRONYMS

ACAS	auxiliary control air system
ACE	apparent cause evaluation
AFW	auxiliary feedwater
AFWST	auxiliary feedwater storage tank
ALARA	As Low As Reasonably Achievable
ARM	area radiation monitor
ASME	American Society of Mechanical Engineers
BACC	boric acid corrosion control
CAP	Corrective Action Program
CAPR	corrective action to prevent recurrence
CB	core barrel
CCP	centrifugal charging pump
CCS	component cooling system
CFR	*Code of Federal Regulations*
CR	condition report
CS	containment spray
CST	condensate storage tank
DCN	Design Change Notice
DPW	declared pregnant worker
DID	defense-in-depth
ED	electronic dosimeter
EDG	emergency diesel generator
EGTS	emergency gas treatment system
ELAP	extended loss of offsite power
EPIP	emergency plan implementing procedure
FE	functional evaluation
HI-STORM	Holtec International Storage Module
IMC	Inspection Manual Chapter
IP	inspection procedure
ISFSI	independent spent fuel storage installation pad
ISI	in-service inspection
IST	in-service testing
LCV	level control valve
LCO	limiting condition for operation
LER	licensee event report
LHRA	locked high radiation area
LOCA	loss of coolant accident
MDAFW	motor-driven auxiliary feedwater
MSIP	mechanical stress improvement process
NCR	nuclear condition report
NCV	non-cited violation
NDE	non-destructive examination
NPR	negative pressure respirator
NPG-SPP	nuclear power group standard programs and processes
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OOS	out of service

OSLD	optically stimulated luminescent dosimeter
PAMS	post-accident monitoring system
PCM	personnel contamination monitor
PER	problem evaluation report
PDO	prompt determination of operability
PI	performance indicator
PM	preventive maintenance
QA	Quality Assurance
RCA	root cause analysis
RCS	reactor coolant system
RCP	reactor coolant pump
RFO	refueling outage
RG	Regulatory Guide
RHR	residual heat removal
RP	Radiation Protection
RS	radiation safety
RTB	reactor trip breaker
RTP	reactor trip breakert
RWP	radiation work permit
RWST	refueling water storage tank
SAM	small article monitor
SCBA	self-contained breathing apparatus
SDP	Significance Determination Process
SFP	spent fuel pool
SSC	structures, systems, or components
TDAFW	turbine-driven auxiliary feedwater
TS	technical specifications
TSSR	technical specifications surveillance requirement
TVA	Tennessee Valley Authority
U1R13	Unit 1 Refueling Outage 13
UFSAR	Updated Final Safety Analysis Report
URI	unresolved item
UT	ultrasonic testing
WBN	Watts Bar Nuclear Plant
WBC	whole body count
WO	work order