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

August 14, 2015

Mr. Michael D. Skaggs
Senior Vice President
WBN Operations & Construction
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED INSPECTION REPORT 05000391/2015605

Dear Mr. Skaggs:

On June 30, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction and testing activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on July 23, 2015, with Mr. Zeringue, Mr. Simmons and other members of your staff.

This inspection examined activities conducted under your Unit 2 construction permit as they relate to safety and compliance with the Commission's rules and regulations, the conditions of your construction permit, and fulfillment of Unit 2 regulatory framework commitments. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the enclosed report documents two NRC-identified findings which were determined to involve violations of NRC requirements. However, because the findings were all Severity Level IV violations and were entered into your corrective action program, the NRC is treating the violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the NRC Enforcement Policy.

If you contest the non-cited violations in the enclosed report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTENTION: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Watts Bar Unit 2 Nuclear Plant. In addition, 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 Watts Bar Unit 2 Nuclear Plant.

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

Should you have questions concerning this letter, please contact us.

Sincerely,

/RA/

Robert Haag, Chief
Construction Projects Branch 3
Division of Construction Projects

Docket No. 50-391
Construction Permit No: CPPR-92

Enclosure: Integrated Inspection Report 05000391/2015605
w/ Attachment

cc w/encl: (See next page)

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

Should you have questions concerning this letter, please contact us.

Sincerely,

/RA/

Robert Haag, Chief
Construction Projects Branch 3
Division of Construction Projects

Docket No. 50-391
Construction Permit No: CPPR-92

Enclosure: Integrated Inspection Report 05000391/2015605
w/ Attachment

cc w/encl: (See next page)

■ PUBLICLY AVAILABLE □ NON-PUBLICLY AVAILABLE □ SENSITIVE ■ NON-SENSITIVE
ADAMS: ■ Yes ACCESSION NUMBER: ML15226A345 ■ SUNSI REVIEW COMPLETE ■ FORM 665 ATTACHED

OFFICE	RII:DCP	RII:DCP	RII:DCP	RII:DCP	RII:DCP	RII:DCP
SIGNATURE	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/
NAME	T. Nazario	E. Patterson	P. Cooper	C. Cheung	J. Baptist	A. Wilson
DATE						
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
OFFICE	RII: DCP	RII:DCI	RII:DRS	RII:DRS	RII:DRS	RII:DCP
SIGNATURE	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/
NAME	J. Seat	N. Coovert	J.Eargle	T. Su	R. Hamilton	C. Even
DATE						
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
OFFICE	RII: DRS	RII:DCI	RII: DRCI	RII: DCI	RII: DCI	RII: DCI
SIGNATURE	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/
NAME	R. Kellner	R. Mathis	G. Crespo	C. Julian	J. Vasquez	J. Christensen
DATE						
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
OFFICE	RII: DRS	RII:DCI	RII: DRCI	RII: DCI	RII: DCI	
SIGNATURE	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/	/RA via Email/	
NAME	S. Sanchez	O. Lopez-Santiago	J. Dymek	B. Caballero	L. Castelli	
DATE						
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	

OFFICIAL RECORD COPY DOCUMENT NAME: G:\CCI\DCP\CPB3\WATTS BAR 2\CURRENT DRAFT INSPECTION REPORT\2015\

cc w/encl:
Mr. Gordon P. Arent
Director, Licensing
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. O. J. Zeringue, General Manager
Engineering and Construction
WBN Unit Two
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. Paul Simmons, Vice President
WBN Unit Two Project
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City Tennessee 37381

Mr. James O'Dell, Manager
Licensing and Industry Affairs
WBN Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. Joseph P. Grimes
Chief Nuclear Officer
and Executive Vice President
Tennessee Valley Authority
1101 Market Place
3R Lookout Place
Chattanooga, Tennessee 37402-2801

County Executive
375 Church Street
Suite 215
Dayton, Tennessee 37321

Mr. Sean Connors
Plant Manager, WBN Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. R. R. Baron, Senior Manager
Nuclear Construction Quality Assurance
WBN Unit Two
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

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

Mr. E. J. Vigluicci
Assistant General Counsel
Tennessee Valley Authority
400 West Summit Hill Drive
6A West Tower
Knoxville, Tennessee 37402

Mr. Lawrence E. Nanney, Director
Tennessee Department of Environmental
Health & Conservation
Division of Radiological Health
3rd Floor, L&C Annex
401 Church Street
Nashville, TN 37243-1532

Mr. Kevin Walsh
Site Vice President
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

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

Ms. Ann P. Harris
Public
341 Swing Loop
Rockwood, TN 37854

cc email distribution w/encl:

Greg Scott
Tennessee Valley Authority
Electronic Mail Distribution

Watts Bar 2 Licensing
Tennessee Valley Authority
Electronic Mail Distribution

Letter to Michael D. Skaggs from Robert C. Haag dated August 14, 2015.

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED INSPECTION REPORT 05000391/2015605

Distribution w/encl:
Region II Regional Coordinator, OEDO
J. Quichocho, NRR
J. Poole, NRR
J. Dion, NRR
A. Minarik, NRR
V. McCree, RII
L. Douglas, RII EICS
Alan Blamey, RII DRP
J. Nadel, RII WBN Unit 1 SRI
OE Mail
ConE_Resource@nrc.gov
PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-391
Construction Permit No.:	CPPR-92
Report No.:	05000391/2015605
Applicant:	Tennessee Valley Authority (TVA)
Facility:	Watts Bar Nuclear Plant, Unit 2
Location:	Spring City, TN 37381
Dates:	May 17, 2015 – June 30, 2015
Inspectors:	E. Patterson, Senior (Acting) Resident Inspector, Construction Projects Branch (CPB) 3, Division of Construction Projects (DCP), Region II (RII) T, Nazario, Senior Resident Inspector, CPB4, DCP, RII C Cheung, Resident Inspector, CPB3, DCP, RII P. Cooper, Resident Inspector, CPB3, DCP, RII J. Baptist, Senior Construction Project Inspector, CPB3, DCP, RII, Sections P.1.1, P.1.4, P.1.5, P.1.6, P.1.7, P.1.8, P.1.9, P.1.10, and P.1.11 A. Wilson, Construction Project Inspector, CPB3, DCP, RII, Section OA.1.2 J. Seat, Construction Project Inspector, CPB3, DCP, RII, Section P.1.3 C. Even, Senior Construction Project Inspector, CPB3, DCP, RII, Section P.1.3 J. Christensen, Construction Inspector, Construction Inspection Branch (CIB) 3, Division of Construction Inspection (DCI), RII, Section C.1.5 N. Coovert, Senior Construction Inspector, CIB3, DCI, RII, Section C.1.5 J. Vasquez, Construction Inspector, CIB2, DCI, RII, Sections OA.1.8, OA.1.9 C. Julian, Senior Project Manager, CIB1, DCI, RII, Sections OA.1.10 and OA.1.11 G. Crespo, Senior Construction Inspector, CIB1, DCI, RII, Section OA.1.10 L. Castelli, Senior Construction Inspector, CIB1, DCI, RII, Section OA.1.10 and OA.1.11 R. Mathis, Construction Inspector, CIB1, DCI, RII, Section OA.1.10 T. Su, Reactor Inspector, Engineering Branch (EB) 1, Division of Reactor Safety (DRS), RII, Section OA.1.10 J. Eargle, Senior Reactor Inspector, EB1, DRS, RII, Section E.1.1

Enclosure

R. Hamiton, Plant Support Branch (PSB) 1, DRS, RII, Section CH.1.1
R. Kellner, PSB1, DRS, RII, Section CH.1.1
S. Sanchez, Senior Emergency Preparedness Inspector, PSB1, DRS, RII, Sections EP.1.1, EP.1.2
O. Lopez-Santiago, Senior Reactor Inspector, EB 2, DRS, RII, Sections OA.1.5, OA.1.6, and OA.1.7
J. Dymek, Reactor Inspector, EB2, DRS, RII, Sections OA.1.5, OA.1.6, and OA.1.7
B. Caballero, Operations Branch (OB) 2, DRS, RII, Section O.1.1

Approved by: Robert C. Haag, Chief
Construction Projects Branch 3
Division of Construction Projects

SUMMARY
Watts Bar Nuclear Plant, Unit 2

This integrated inspection included aspects of engineering and construction activities performed by Tennessee Valley Authority (TVA) associated with the Watts Bar Nuclear (WBN) Plant Unit 2 construction project. This report covered a seven-week period of inspections in the areas of quality assurance (QA), identification and resolution of construction problems, engineering and construction activities, preoperational testing, and follow-up of other activities. The inspection program for Unit 2 construction activities is described in Nuclear Regulatory Commission (NRC) Inspection Manual Chapter (IMC) 2517, "Watts Bar Unit 2 Construction Inspection Program." Information regarding the WBN Unit 2 Construction Project and NRC inspections can be found at http://www.nrc.gov/info-finder/reactor/wb/watts-bar.html.

Inspection Results

The NRC identified Severity Level a (SL) IV non-cited violation (NCV) of 10 *Code of Federal Regulations* (CFR) Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, Criterion III, "Design Control," for the applicant's failure to consider the effects of a break in the non-seismic portion of the essential raw cooling water (ERCW) discharge flow path to the cooling tower basin in the calculation used to determine the net positive suction head (NPSH) available to the auxiliary feedwater (AFW) pumps. The applicant's failure to consider the effects of a break in the non-seismic portion of the ERCW discharge flow path was a performance deficiency. The inspectors determined that this performance deficiency was more than minor because it represented an inadequate quality oversight function that if left uncorrected, could adversely affect the quality of the analysis of a safety-related structures, systems, or components (SSCs). The inspectors determined this finding to be of very low safety significance, SL IV, in accordance with Section 6.5 of the Enforcement Policy. The finding had a cross cutting aspect in the Design Margin component of the Human Performance area as defined in NRC IMC 0310, because the applicant failed to ensure that design margins were closely guarded by not accurately representing the available margins of safety-related components as a result of calculational errors [H.6].

The NRC identified a SL IV NCV of 10 CFR Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, Criteria V, Instructions, Procedures, and Drawings, because the applicants' procedure used to perform loss of safety function determination evaluations did not contain appropriate qualitative criteria to implement the requirements of Technical Specifications 5.7.2.18, Safety Function Determination Program. The inspectors determined that this performance deficiency was more than minor because it represented an uncontrolled work practice that can impact safety-related structures, systems, or components. The inspectors determined this finding to be of very low safety significance, SL IV, in accordance with Section 6.5 of the Enforcement Policy. This issue was entered in to the corrective action program as Condition Reports 1031436 and 1046617. The finding has a cross-cutting aspect which lies in the Human Performance area. Specifically, the cross-cutting aspect is [H.1], Resources: Leaders ensure that procedures, and other resources are available to support nuclear safety (LA.1). The appropriate quantitative and qualitative criteria in OPDP-8 were not established.

- The inspectors concluded that issues pertaining to several open items, including seven inspection procedures (IPs), four temporary instructions (TI), four construction deficiency reports (CDRs), three supplemental safety evaluation report (SSER) Appendix HH items, two unresolved items (URIs), and one historical violation (VIO) have been appropriately addressed for WBN Unit 2.

- Other areas inspected were adequate with no findings identified. These areas included QA; piping; operations; mechanical components; emergency preparedness; fire protection; preoperational testing activities; and various NRC inspection procedures.

Table of Contents

REPORT DETAILS

Summary of Plant Status

During the inspection period covered by this report, Tennessee Valley Authority (TVA) performed construction completion and preoperational testing activities on safety-related systems and continued engineering design activities of the Watts Bar Nuclear (WBN) Plant, Unit 2 (U2).

I. QUALITY ASSURANCE PROGRAM

Q.1.1 Identification and Resolution of Construction Problems (Inspection Procedure 35007)

a. Inspection Scope

The inspectors continued to review problem evaluation reports (PERs), as part of the applicant's corrective action program, to verify that issues being identified under the corrective action program were being properly identified, addressed, and resolved by the applicant.

The inspectors reviewed PER 1025977, 2-PTI-072-01, Containment spray pump 2A-A and 2B-B did not meet the acceptance criteria, and PER 1001657, Pump functional test for containment spray pump 2A-A did not meet the minimum design flows. The inspectors reviewed the engineering evaluation and Appendix A of calculation B18890926251, "Containment spray pump pressure requirements," Revision (Rev.) 4, to verify that the engineering evaluation was adequate. In addition, the inspectors independently compared the system curve for the test line and the containment spray system curve, using independently obtained test data, to verify the accepted test flows and pressures were adequate. The inspection also was completed to verify that the test deficiencies were properly identified and documented in accordance with procedure SMP-14.0, "Test Deficiency Notices," Rev. 7.

The inspectors also reviewed and followed up on the corrective actions of several PERs discussed throughout various sections of this report.

b. Observations and Findings

No findings were identified.

c. Conclusions

The issues identified in the PERs reviewed were adequately identified, addressed, and resolved.

Q.1.2 Safety Conscious Work Environment (Inspection Procedure 35007 and Temporary Instruction 2512/015)

a. Inspection Scope

On June 18, 2015, the inspectors met with TVA employee concerns program coordinators to discuss the monthly analysis of concerns and any trends. The inspectors reviewed existing program requirements and recent concerns identified by the applicant's and contractor's employee concerns programs.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors did not identify any issues or concerns regarding the ability of the applicant to provide a safety-conscience work environment.

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1 Construction Activities

C.1.1 Unit 1 and Unit 2 Construction Activity Interface Controls

a. Inspection Scope

The inspectors independently assessed applicant controls, associated with Unit 2 construction work activities, to prevent adverse impact on Unit 1 operational safety. The inspectors attended routine Unit 1/Unit 2 interface meetings to assess the exchange and sharing of information between the two site organizations. Periodic construction and planning meetings were observed, at least once per week, to assess the adequacy of the applicant's efforts to identify those construction activities that could potentially impact the operating unit. This included the review of select work activities, which the applicant had screened as not affecting Unit 1, to verify the adequacy of that screening effort.

Specific work activities that the applicant had screened out as not affecting Unit 1 included, but were not limited to, work activities as noted in this inspection report.

b. Observations and Findings

No findings were identified.

c. Conclusions

Overall, management oversight and controls were in place for observed construction activities that could potentially impact the operating unit.

C.1.2 Mechanical Components – Work Observation and Construction Refurbishment (Inspection Procedures 50073 and 37002)

a. Inspection Scope

Background: In January 2014, the 2A safety injection pump shaft was damaged during construction activities while drilling thermocouple mounting holes through the pump journal bearing housing. The applicant determined the pump was delivered from the vendor with an incorrect pilot hole angle in the bearing upper housing. The applicant initiated corrective actions and replaced the 2A safety injection pump shaft and rotating element. In addition, during open vessel testing, the 2A safety injection pump operated at a flow rate greater than 800 gallons per minute (gpm), also known as pump run-out, due to a system valve alignment error which caused the pumps to operate outside of the pump curve specifications for a short period of time. The valve alignment was reconfigured and the test, 2-PTI-063-01, "Safety Injection System SIS Integrated Test," Rev. 0, was completed. The pump operating temperature and vibration specifications were monitored during the test and did not exceed alarm limits. The applicant disassembled the 2A safety injection pumps after the open vessel test and discovered excessive wear on the pump shaft and thrust end-bearings. The pump rotating assembly and shaft drive lube oil pumps were sent off site to the OEM vendor, Flowserve, for repair and a root cause analysis. The applicant initiated several PERs to address a negative quality performance trend related to the pump vendor and corrective actions to repair and replace the pump's rotating elements as described in integrated inspection report (IIR) 05000391/2015602 (Agencywide Documents Access and Management System (ADAMS) Accession Number (No.) ML15083A276).

Inspection Activities: The inspectors reviewed the corrective actions and observed the corrective action management reviews associated with the safety injection pump refurbishment. Also, the inspectors interviewed the applicant's staff and the pump vendor representative on site to verify the utilization of specially trained personnel to meet the manufacturer's instructions. The inspectors reviewed the root cause evaluations from the pump vendor and an independent engineering agency, the pump vendor's as-found condition report, and repair plans to verify that the causes and corrective actions were properly identified, documented, and implemented into the applicant's corrective action plan.

The inspectors observed the installation of the 2A safety injection pump and reviewed work order (WO) 116282967, "Replace rotating assembly and pump bearings as required by PER 907088," to verify the vendor and the applicant assembly instructions were followed to include pre-lubrication of the pump, cleanliness, alignment, tolerances, and clearances. In addition, the inspectors reviewed the pump assembly documents to verify the hold points were observed and the inspection records were adequate to include hold points for the refurbishment cleanliness inspections.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified. The refurbishment program is a unique process specific to the Watts Bar Unit 2 reactivation construction project. The applicant had completed the corrective actions for the 2A safety injection pump and completed an effectiveness review of the corrective actions. The 2A safety injection pump has been repaired and reinstalled and has been adequately accepted during initial component testing.

c. Conclusions

The inspectors determined that the applicant had adequately identified several safety-related pump manufacturing and field construction non-conformances, and had effectively implemented the corrective actions.

C.1.3 (Closed) Instrument Components and Systems – Work Observation (Inspection Procedure 52053)

a. Inspection Scope

Background: As described in Inspection Manual Chapter (IMC) 2517, TVA addressed WBN Unit 1 construction quality issues as part of the implementation of its Nuclear Performance Plan (NPP). The results of the NRC inspection program were published in NUREG-1528, "Reconstitution of the IMC 2512 Construction Inspection Program for Watts Bar Unit 1." In 1985, construction on Watts Bar Unit 1 and Watts Bar Unit 2 was stopped due to the identification of multiple construction QA issues. TVA completed Unit 1 in 1995 but had conducted very little Unit 2-specific work since 1985. In 2007, TVA decided to finish the Unit 2 plant. As part of confirming that all issues and inspection requirements will be completed for Unit 2, a review of all NRC inspection reports was initiated to determine the status of the required inspection procedures (IPs), contained in NRC IMC 2512, in effect at the time construction was stopped. This effort was called the reconstitution process. The NRC used the results of the reconstitution process to identify areas which required additional inspections. IIR 05000391/2009602 (ADAMS Accession No. ML091210420), Attachment 2, documented the reconstitution results for IP 52053 and determined that the inspection requirements were not met and the IP should be performed in its entirety. It was also noted that the applicant plans to rework or replace most instrumentation.

The purpose of this IP was to determine by direct observation and independent evaluation of work performance, work in progress, and completed work whether activities relative to safety-related instrument components and systems were being accomplished in accordance with NRC requirements, safety analysis report (SAR) commitments, and applicant procedures. The purpose of the IP was also to determine whether inadequacies in completed work, partially completed work, or work activities in progress associated with instrument components indicated a management control problem or generic weaknesses.

Inspection Activities:

The following table lists the previous inspections that were performed under this IP.

IP Section Sample Requirements	IIRs	ADAMS Accession Number
02.02.a – Receiving Inspection *(Reactor Trip System (RTS) & Engineered Safety Features Actuation*	• 05000391/2010603 Section C.1.1 (RTS & ESFAS) • 05000391/2013607 Section C.1.8 (RTS & ESFAS)	• ML102170465 • ML13273A512

System (ESFAS))		
02.02.b – Storage (*RTS, ESFAS, and Safety Related Display)*	• 05000391/2010603 Section C.1.1 (RTS & ESFAS) • 05000391/2013607 Section C.1.8 (RTS & ESFAS) • 05000391/2014603 Section C.1.4 (Safety Related Display)	• ML102170465 • ML13273A512 • ML14129A381
02.02.c – In-Process Installation (*RTS, ESFAS, and Safety Related Display)*	• 05000391/2012605 Section C.1.7 (Safety Related Display) • 05000391/2014603 Section C.1.4 (RTS & Safety Related Display) • 05000391/2014605 Section C.1.3 (ESFAS & RTS) • 05000391/2014608 Section C.1.4 (ESFAS)	• ML12220A536 • ML14129A381 • ML14226A049 • ML14322A182
02.02.d – Completed Work (*RTS, ESFAS, and Safety Related Display*)	• 05000391/2012605 Section C.1.7 (RTS & Safety Related Display) • 05000391/2013603 Section C.1.9 (Instrument Air) • 05000391/2013607 Section C.1.8 (RTS, ESFAS, Instrument Air) • 05000391/2014603 Section C.1.4 (RTS) • 05000391/2014605 Section OA.1.13 (RTS & ESFAS)	• ML12220A536 • ML13134A239 • ML13273A512 • ML14129A381 • ML14226A049
02.02.e – As-Built Verification (*RTS, ESFAS, Safety Related Display, and Instrument Air*)	• 05000391/2014603 Section C.1.4 (RTS) • 05000391/2014605 Section OA.1.13 (RTS & ESFAS) • 05000391/2014608 Section C.1.4 (RTS & ESFAS)	• ML14129A381 • ML14226A049 • ML14322A182
02.02.f – Testing and Calibration (*RTS, ESFAS, and Safety Related Display*)	• 05000391/2012607 Section C.1.6 (RTS)	• ML12276A028
02.03 – Additional Inspections	This section allowed for an expansion of scope according to the SALP process, which is no longer used. This section was considered not applicable for the Watts Bar Unit 2 reactivation inspection program.	N/A

During this inspection period, the inspectors performed as-built verification of the following safety-related display instrument components and systems required to provide information to the reactor operator so that required manual safety actions could be taken:

- 2-PDT-30-42, Containment Differential Pressure Transmitter

- 2-PDT-30-43, Containment Differential Pressure Transmitter
- L-63-50, Refueling Water Storage Tank Level Transmitter
- L-63-51, Refueling Water Storage Tank Level Transmitter
- L-63-52, Refueling Water Storage Tank Level Transmitter
- L-63-53, Refueling Water Storage Tank Level Transmitter

The inspectors also performed as-built verification of the following instrument air system components used for safety-related control components:

- 2-PCV-68-340B, Reactor Coolant System Pressure Control Valve
- 2-PCV-68-340D, Reactor Coolant System Pressure Control Valve
- 2-LCV-3-148, Auxiliary Feedwater Level Control Valve
- 2-LCV-3-156, Auxiliary Feedwater Level Control Valve

For the as-built verification, the inspectors reviewed the installation drawings and other applicable installation documents. The inspectors compared the actual installation with the above drawings and documents and verified that the components shown are of the type specified and have been installed and located in accordance with the drawings.

The inspectors observed calibration work performed under WO 112762436, which involved steam generator (S/G) 1 narrow range level channel III level transmitter 2-LT-3-39. This instrument is a process variable within the RTS and required to be monitored for S/G water level low-low reactor trip initiation. It is also a process variable which is displayed to provide information to the reactor operator so that required manual safety actions can be taken. The inspectors observed additional calibration work performed under WO 112857454 and WO 112857466, which involved S/G 3 motor driven auxiliary feedwater (MDAFW) level control valves 2-LCV-3-148 and 2-LCV-3-156 respectively. The inspectors also observed logic testing performed under WO 112800226, which involved S/G 2 turbine driven auxiliary feedwater (TDAFW) level control valve 2-LCV-3-173. These three level control valves are within the ESFAS that can actuate under S/G water level low-low engineered safety feature.

For the testing and calibration, the inspectors verified that the (1) latest revisions of applicable procedures were available at the work location and used by personnel performing the testing, (2) calibration and measuring and testing equipment (M&TE) used was properly identified, traceable, and calibrated, (3) components calibrated were able to obtain the set point and within the tolerance specified, (4) testing and calibration results were recorded during the activity, (5) components were adequately identified, (6) personnel were properly qualified, and (7) personnel adhered to any applicable special handling and removal requirements.

The following samples were inspected:

Section 02.02.e

- Six samples (Safety-Related Display)
- Four samples (Instrument Air)

Section 02.02.f

- One sample (RTS)
- Three samples (ESFAS)
- One sample (Safety-Related Display)

b. Observations and Findings

No findings were identified.

Below is a summary of each section of IP 51053:

- Section 02.01 – Complete
- Section 02.02 - Complete
- Section 02.03 – NA

c. Conclusion

Based on the activities reviewed in this and previous inspections, the inspectors concluded that work performance, work in progress, and completed work were being accomplished in accordance with NRC requirements, SAR commitments, and licensee procedures. IP 52053 is considered closed; however, additional inspections may be performed at the NRC's discretion.

C.1.4 Containment Penetrations (Mechanical) - Work Observation (Inspection Procedure 53053)

a. Inspection Scope

Background: The purpose of IP 53053 is to confirm adequate installation of mechanical containment penetrations. This IP covers material certification, method of assembly, protection, installation activities, nondestructive examination, and inspection, as well as, a semi-annual requirement to observe installation and confirm adequacy of documents used for installation. All containment penetrations were previously installed prior to initial suspension of the Unit 2 construction effort in 1985. A reconstitution of historic Unit 2 inspection results identified that inspection requirements were not met and that only minimal inspection samples were noted. Because of previously completed installations, inspections of work observation cannot be performed. To satisfy the requirements of this IP, it was decided that inspection efforts focus on visual examination, records reviews, and witnessing local leak rate testing and/or integrated leak rate testing.

Previous inspections of containment penetrations have been documented in the following reports:

- IIR 05000391/2008007 (ADAMS Accession No. ML082110474) Section E.1.1
- IIR 05000391/2008010 (ADAMS Accession No. ML090291033) Section C.1.3
- IIR 05000391/2011604 (ADAMS Accession No. ML111810890) Section C.1.8
- IIR 05000391/2013603 (ADAMS Accession No. ML13134A239) Section C.1.6
- IIR 05000391/2013605 (ADAMS Accession No. ML13220A640) Section C.1.7

Inspection Activity: The inspectors observed local leak rate testing of four mechanical penetrations performed under WO 116125298. The inspectors reviewed the work

instructions and the testing setup against the applicable requirements, standards, and approved procedures to ensure they were met. The inspectors also reviewed M&TE records for equipment used for testing and that appropriate hold points were adhered to.

The following mechanical penetrations were inspected:

- WBN-2-PENT-304-0025A, Containment Penetration 2x-25A
- WBN-2-PENT-304-0025D, Containment Penetration 2x-25D
- WBN-2-PENT-304-0027A, Containment Penetration 2x-27A
- WBN-2-PENT-304-0027B, Containment Penetration 2x-27B

b. Observations and Findings

No findings were identified.

c. Conclusions

Work associated with containment mechanical penetrations listed above was adequate. Additional inspections will be performed to satisfy completion of this IP.

C.1.5 (Discussed) Testing Piping Support and Restraint Systems, and Bulletin 88-11: Pressurizer Surge Line Thermal Stratification (Inspection Procedure 70370)

a. Inspection Scope

Background: Appendix A to IMC 2513 identifies that, IP 70370 – Testing Piping Support and Restraint Systems, shall be performed prior to fuel load. The purpose of IP 70370 is to ensure that pipe supports, component supports, and restraint systems were installed in accordance with regulatory requirements, programs, and procedures for the following plant conditions:

- ambient temperature
- intermediate temperature
- normal operating temperature and pressure
- after steam transient testing

Inspection Activities: Section P.1.4 of this report outlines the inspection activities associated with the applicant's implementation of hot functional testing. One component of hot functional testing is the applicant's implementation of 2-PTI-999-02, "Thermal Expansion" to verify that safety-related systems exhibit expansion consistent with design. As part of the inspection activities associated with the thermal expansion, the inspectors reviewed the applicant's programs and procedures to determine if the applicant established adequate programs and procedures pertaining to the examination and testing of piping support and restraint systems. Specifically, the inspectors verified that the programs and procedures:

- examined piping support systems at various temperatures from ambient to normal operating temperature to detect interference caused by thermal expansion;

- set and/or calibrated snubbers, restraints, and vibration arrestors and that these were checked at predetermined temperatures;
- examined piping supports and restraint systems during transient testing to ascertain that pipe motion and vibration were within design limits and that water hammer did not exist;
- conducted vibration tests, including resolution of high vibration; and
- ensured that displacement measurements were made at ambient and operating temperatures.

In addition to reviewing the applicant's programs and procedures, inspectors also performed direct observation of applicant activities related to field measurements and performance of visual examination of dynamic, fixed, and component supports. Specifically, the inspectors ensured that:

- hydraulic fluid in snubbers, shock suppressors, and restraints were at the proper level;
- fluid leaks through seals or elsewhere were not evident;
- deterioration, corrosion, physical damage, or deformation was not noticeable;
- lubricants were applied as required;
- all required bolts, locking devices, nuts, and washers were installed;
- support plates, extension rods, and connecting joints were not bent, deformed, loose, or otherwise out of specification;
- connecting joints, moving parts, piston shafts, seals, etc. were free from arc strikes, weld spatter, paint, scoring, roughness, general corrosion, or other materials that may obstruct proper operation;
- snubber positions were at or near their predicted position and not near their limits in either extension or compression;
- fixed pipe supports were not deteriorated and corrosion was not evident;
- springs in hangers were not obstructed by foreign material;
- spring hangers provided with indicators were consistent with the plant condition;
- threaded connections were secured by locknuts, fasteners, cotter pins, or similar locking devices and conform to the as-built drawings;
- sliding or rolling supports were provided with material and/or lubricants suitable for the environment and compatible with sliding contact surfaces;
- thermal expansion of the piping system was not restricted by the supports; and
- component supports showed no signs of deformation and that no other discontinuities or detrimental indications appeared on welded surfaces.

Additionally, the inspectors performed a review the records for pipe support testing to verify that licensee had evaluated all piping support testing, results were within the established acceptance criteria, and identified deficiencies identified in pipe support testing records were corrected.

The following samples were inspected:

- Ambient Temperature Samples (<105 degrees Fahrenheit (^{o}F)):
  02.02.a Dynamic Support Samples: 60
  02.02.b Fixed Support Samples: 16
  02.02.c Component Support Samples: 48

Specifically, the inspectors observed the applicant's inspection teams in the areas of the lower containment from azimuth 95^{o} to 150^{o}, the accumulator 1 room, the pressurizer enclosure, and the auxiliary building. These areas contained supports from the chemical and volume control (CVCS), safety injection (SI), main feedwater (MFW), reactor heat removal (RHR), reactor coolant (RCS), and main steam (MS) systems.

- Intermediate Temperature Samples (~350^{o}F):
  02.02.a Dynamic Support Samples: 69
  02.02.b Fixed Support Samples: 20
  02.02.c Component Support Samples: 40

Specifically, the inspectors observed the applicant's inspection teams and performed inspections in the areas of the raceway and the lower containment from azimuth 95^{o} to 150^{o}. These areas covered supports from the SI, CVCS, RCS, MS and MFW systems. The inspectors also observed inspections of the S/G upper ring girders, inner and outer bumper plates, upper ring girder rear bumpers, and the Paul Monroe snubbers on the S/Gs.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspectors determined that the applicant adequately inspected the condition of and measured the movement of supports on safety-related systems. This inspection procedure will remain open to inspect the supports at operational (~557^{o}F) temperature and upon return of the plant to ambient conditions. Additionally, the inspectors plan perform a walkdown of 25 percent of piping and component supports on three separate systems that were exposed to steam during hot functional testing.

E.1 Engineering Activities

E.1.1 Component Design Basis Inspection (Inspection Procedure 71111.21)

a. Inspection Scope

Background: In IIR 05000391/2015603 (ADAMS Accession No. ML15124A921) Section E.1.1, an unresolved item (URI) was opened related to the applicant's failure to consider the effects of a break in the non-seismic portion of the essential raw cooling water (ERCW) discharge flow path to the cooling tower basin in the calculation used to determine the net positive suction head (NPSH) available to the AFW pumps. The URI was to determine if the performance deficiency was more-than-minor.

Inspection Activities: The inspectors reviewed the applicant's design and licensing basis documentation related to the ERCW system and AFW system. Additionally, the inspectors and NRC headquarters staff reviewed the applicant's prompt determination of operability. ERCW is a shared system that can supply water to the Unit 1 AFW system.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

Introduction: The NRC identified a Severity Level (SL) IV non-cited violation (NCV) of 10 Code of Federal Regulations (CFR) Part 50, Appendix B, Criterion III, "Design Control," for the applicant's failure to consider the effects of a break in the non-seismic portion of the ERCW discharge flow path to the cooling tower basin in the calculation used to determine the NPSH available to the AFW pumps.

Description: The non-seismic normal discharge flow path of the ERCW system is to the cooling tower basin. The inspectors noted that ERCW system description document WBN-SDD-N3-67-4002, "Essential Raw Cooling Water System, System 67," Rev. 0028, stated, in part, that nonsafety-related ERCW system components shall be designed such that their failures do not jeopardize safety-related components. The inspectors also noted that calculation EPMJKJ011191, "WBN AFW System – Pump Net Positive Suction Head (NPSH) Available Calculation," Rev. 010, was used to determine the available NPSH for the AFW pumps.

The inspectors determined that calculation EPMJKJ011191 did not consider the effects of a break in the non-seismic portion of the discharge flow path to the cooling tower basin. A break of this type could result in a much lower backpressure on the ERCW system and result in a reduction of available NPSH to the AFW during accident conditions. The applicant entered the issue into their corrective action program as PER 979323. The applicant has planned corrective actions to seismically qualify portions of the ERCW discharge path to the cooling towers to limit the back pressure reduction if a piping break occurred.

The applicant's failure to consider the effects of a break in the non-seismic portion of the ERCW discharge flow path to the cooling tower basin in calculation EPMJKJ011101 was a performance deficiency. The inspectors determined that this performance deficiency was more than minor because it represented an inadequate quality oversight function that, if left uncorrected, could adversely affect the quality of the analysis of a safety-

related structures, systems, and components. The inspectors determined this finding to be of very low safety significance, SL IV, in accordance with Section 6.5 of the NRC Enforcement Policy. Specifically, the finding was a SL IV violation because it represented a failure to meet a regulatory requirement, including one or more QA criteria that had more than minor safety significance. The finding has a cross cutting aspect in the Design Margin component of the Human Performance area, as defined in NRC IMC 0310, because the applicant failed to ensure that design margins were closely guarded by not accurately representing the available margins of safety-related components as a result of calculational errors [H.6].

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires, in part, that design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, since October 20, 2014, the applicant failed to appropriately verify or check the adequacy of design of the ERCW system discharge piping. Specifically, the applicant failed to consider the effects of a break in the non-seismic portion of the ERCW discharge flow path to the cooling tower basin in the calculation used to determine the NPSH available to the AFW pumps. This finding was determined to be a SL IV violation using Section 6.5 of the NRC Enforcement Policy. Because this was a SL IV violation and the issue was entered into the applicant's corrective action program, this violation is treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. This violation is identified as NCV 05000391/2015605-01, "Failure to Consider the Effects of a Break in Non-Seismic ERCW Discharge Piping."

c. Conclusion

Based on the aforementioned inspection activities, URI 05000391/2015603-01, "Break In Non-Seismic ERCW Discharge Piping" is closed.

P.1 Preoperational Activities

P.1.1 (Closed) Preoperational Testing Quality Assurance (Inspection Procedure 35301)

a. Inspection Scope

Background: The objective of this inspection procedure was to confirm that the appropriate QA program requirements were applied to the conduct of the preoperational test program and related activities in accordance with commitments and regulatory requirements. Requirements for the preoperational test program are contained in the Final Safety Analysis Report (FSAR) Chapter 14; TVA Nuclear Quality Assurance Plan, TVA-NQA-PLN89-A; Regulatory Guide 1.68, "Initial Test Programs for Water Cooled Nuclear Power Plants," Rev. 2; American National Standards Institute (ANSI) 18.7-1976, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants"; ANSI N45.2.4-1972, "Quality Assurance Requirements for the Installation, Inspection and Testing of Instrumentation and Electrical Equipment"; and ANSI N45.2.8-1975, "Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants." Portions of this inspection procedure were performed and documented in NRC IIRs 05000391/2011603 (ADAMS Accession No. ML111370702), Section P.1.1, 05000391/2013603 (ADAMS Accession No.

ML13134A239), Section P.1.1 and 05000391/2013604 (ADAMS Accession No. ML13179A079), Section P.1.1. This inspection specifically focused on the QA controls in place that controlled surveillance custody of safety-related systems.

Inspection Activities: IP 35301, Section 02.02, "QA Surveillance and Inspection," subpart 'a.4' requires verification, by observation and document review of system turnover packages, that QA/QC surveillance of system turnover activities from construction to the preoperational test organization are being conducted in accordance with established procedures or checklists. The inspectors reviewed the turnover packages for Systems 63 (safety injection) and 74 (residual heat removal) to verify that proper custody has been transferred from construction to the startup testing organization and that provisions existed to ensure that the safety-related system surveillances were properly controlled.

This satisfied the required inspection for IP 35301, Section 02.02.a.4.

b. Observations and Findings

No findings were identified.

c. Conclusion

Based on this inspection and three previous inspections of IP 35301, the inspectors determined that the applicant has implemented QA programmatic controls over preoperational testing. Inspection of this item is complete; IP 35301 is closed.

P.1.2 Preoperational Test Program Implementation Verification (Inspection Procedure 71302)

a. Inspection Scope

(Weekly Inspection Activities): The inspectors verified that the applicant's management control system was effectively discharging its responsibilities over the preoperational testing program by direct observation of activities, tours of the facility, interviews and discussions with the applicant's personnel, and reviewing facility records. Preoperational testing activities were limited during the inspection period and included the following systems or portions thereof:

- System 074 – Residual Heat Removal System
- System 063 - Safety Injection System
- System 003 – Auxiliary Feedwater
- System 062 – Chemical and Volume Control System

As systems became available for preoperational testing, inspectors toured the accessible areas of the facility to make an independent assessment of equipment conditions, plant conditions, security, and adherence to regulatory requirements. The inspectors also verified the following, as available and on a sampling basis, during the tours:

- general plant/equipment conditions;

- plant areas for fire hazards - examined fire alarms, extinguishing equipment, actuating controls, firefighting equipment, and emergency equipment for operability and also verified that ignition sources and flammable material were being controlled in accordance with licensee's procedures.
- activities in progress (e.g., maintenance, preoperational testing, etc.) were being conducted in accordance with licensee's procedures;
- watched for abuse of installed instrumentation such as stepping or climbing on the instrumentation that could affect the calibration or ability to function
- listened for the public address system announcements to determine that blind spots do not exist; (i.e., cannot be heard clearly enough to be understood);
- construction work force authorized to perform activities on systems or equipment;
- looked for uncontrolled opening in previously cleaned or flushed systems or components; and
- reviewed records maintained by the test group to identify problems or plant activities that may be appropriate for additional follow-up.

In addition, the inspectors observed the component tests of the 2A SI pump, 2A charging pump, and 2B RHR pump to verify that the tests were completed in accordance with approved WOs 116282967, 116886379, and 112861479 and that the maintenance activities did not invalidate previous performed accepted preoperational testing. Also the inspectors observed the uncoupled overspeed test for the TDAFW pump to verify that the tests were completed in accordance with approved WO 112861479.

02.02 (Monthly Inspection Activities): As described in Section P.1.1, the inspectors reviewed the turnover packages for the Unit 2 portion of the Systems 63 and 74 as part of procedure SMP 4.0, “System Completion and Turnover,” Rev.12, to verify jurisdiction controls were appropriate and applicant procedures were followed. Additionally, the inspectors reviewed the turnover packages to ensure required preventative maintenance was incorporated into a schedule for accomplishment.

During this inspection period, the inspectors observed the implementation of one instrument maintenance instruction for the TDAFW pump overspeed test and two post maintenance tests for the 2A charging pump and 2B RHR pump. The inspections were completed to verify the required preventative maintenance was incorporated into a schedule for accomplishment, the maintenance activity was accomplished using approved procedures, and the post maintenance tests did not invalidate the preoperational testing.

02.03 (Quarterly Inspection Activities): As described in Section P.1.1, the inspectors reviewed jurisdictional controls to verify that maintenance activities were performed by the proper group and sampled preventative maintenance activities to ensure satisfactory completion. Additionally, the inspectors witnessed testing and interviewed personnel to verify that the method for testing was current, that methods existed to assure personnel involved were knowledgeable of the test, that approved change methodologies were followed, that criteria for test interruptions were discussed, and that test deficiencies were properly documented.

b. Observations and Findings

No findings were identified.

c. Conclusion

The applicant's implementation of the preoperational test program was in accordance with procedures for those activities observed during the inspection period.

P.1.3 (Closed) Preoperational Test Procedure Review (Inspection Procedures 70300, 70337, 70342, 70348)

a. Inspection Scope

Background: The purpose of preoperational test inspection is to verify through direct observation, personnel interviews, and review of facility records that:

- systems and components important to the safety of the plant are fully tested to demonstrate that they satisfy their design requirements; and
- management controls and procedures, including QA programs, necessary for operation of the facility have been documented and implemented.

IMC 2513 defines the minimum inspection program for a finding of readiness for license issuance (IP 94302, Status of Watts Bar Unit 2 Readiness for an Operating License). IMC 2513 requires the procedural review of the mandatory tests defined in IMC 2513 and five of the primal tests defined in IMC 2513. The following inspections were performed in relation to satisfying the required procedural reviews.

Inspection Activities: The inspectors reviewed procedures to verify that the test procedure adequately addressed NRC requirements and licensing commitments outlined in the FSAR, docketed correspondence, safety evaluation report (SER), Technical Specifications (TS), and Regulatory Guide 1.68. The test procedures reviewed were:

- 2-PTI-001-01, Main Steam Isolation Valves and Bypass Isolation Valves, Rev. 1
- 2-PTI-003A-01, Feedwater Isolation Valves, Rev. 0
- 2-PTI-268-01, Permanent Hydrogen Mitigation System, Rev. 0

Additionally, the inspectors reviewed the preoperational test procedures to verify that the procedures contained the following administrative good practice attributes:

- the title described the purpose of the procedure;
- the cover page had appropriate information and approval signatures;
- each page had appropriate identification information;
- the last page was clearly identifiable by markings;
- a clear statement of procedure purpose/objectives;
- planning information such as prerequisites, precautions, required tools, reference documents, and coordination requirements;
- signoff requirements including concurrent and independent verification steps established where appropriate;
- equipment alignment instructions are clear and concise;
- equipment identifiers are accurate;
- actions to be taken within the steps are specifically identified;

- instrumentation units are consistent for data collection;
- graphs, charts, tables, data sheets, and work sheets are clearly usable;
- calculation sheets are technically accurate;
- clear coordination instructions exist for test activities involving multiple test personnel;
- clear instructions exist for system restoration;
- guidance for follow-up actions and points of contact;
- clear concise steps for testing with action critical (acceptance criteria) steps identified;
- clear quantitative acceptance criteria with acceptability and contingencies;
- overall sequence of the procedure is consistent with obtaining the intended result; and
- system boundaries were reviewed to verify adequate overlap exists between tests to ensure the entire system will be tested.

The inspectors also reviewed the procedure to verify that precautions or explanations were placed immediately ahead of the steps to which they applied. The inspectors performed a detailed review with the responsible test engineer to verify that the acceptance criteria met design requirements.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedures were written in a manner consistent with the guidance of procedure SMP-8.0, "Watts Bar Nuclear Plant Unit 2 Administration of Preoperational Test Instructions," Rev. 11. This completes the procedure review of preoperational test procedures 2-PTI-001-01, 2-PTI-003A-01, and 2-PTI-268-01. The preoperational testing procedure reviews for Systems 001, 003A and 268 (IPs 70337, 70342, and 70348) are closed.

P.1.4 Hot Functional Testing Witnessing (Inspection Procedure 70314)

a. Inspection Scope

Background: The purpose of preoperational test inspection is to verify through direct observation, personnel interviews, and review of facility records that:

- systems and components important to the safety of the plant are fully tested to demonstrate that they satisfy their design requirements; and
- management controls and procedures, including QA programs, necessary for operation of the facility have been documented and implemented.

IMC 2513 defines the minimum inspection program for a finding of readiness for license issuance (IP 94302, Status of Watts Bar Unit 2 Readiness for an Operating License). IMC 2513 requires the preoperational test witnessing of the mandatory tests defined in

IMC 2513 and five of the primal tests defined in IMC 2513. The following inspection was performed in relation to satisfying the required preoperational test witnessing.

Inspection Activities: The inspectors witnessed activities associated with the performance of Hot Functional Test (HFT) instruction 2-PTI-068-01, "HFT – Heatup and Cooldown," Rev. 1 to verify that the testing was conducted in accordance with approved procedures and to verify the adequacy of test program records and preliminary evaluation of test results. The following test sections were selected for inspection:

- Section 6.1, Ambient Plateau (Less than 105^0F) and Increase to 180^0F
- Section 6.2, 250^0F
- Section 6.3, 350^0F

The inspectors assessed the following attributes associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- test prerequisites were performed;
- plant systems were in service to support the test;
- minimum crew requirements were met;
- testing was performed in accordance with the approved procedure;
- test interruptions and continuations were handled in accordance with approved procedures and documented in the chronological test log;
- testing events and discrepancies were properly documented in the test deficiency log;
- testing was executed and coordinated properly;
- data was properly collected;
- temporary equipment was installed and tracked appropriately;
- administrative test controls were properly followed; and
- test personnel were using approved drawings and vendor manuals.

The inspectors observed the tests to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the preliminary test evaluations were consistent with the inspector's observations. During the tests, the inspectors observed important data gathering activities to ensure the data was properly gathered and recorded. A post-test cursory review of the test data was performed to verify legibility, traceability, and permanence of the data sheet entries.

Specific inspection efforts dedicated to the witnessing of the aforementioned test sections of 2-PTI-068-01 were as follows:

- adherence to temperature limits through heatup using reactor coolant pumps (RCP) and pressurizer heaters/spray using 2-TOP-068-05, "Plant Heatup;"
- acceptable thermal expansion of system components and piping through performance of 2-PTI-999-02, "Thermal Expansion" (as discussed in Section C.1.5) and Bechtel execution of WDP-DATA-1148 and WDP-DATA-1149, " Data Walkdown Gap Measurements" inspections;
- isothermal cross-calibration of RCS resistance temperature detectors and thermocouples using 2-PTI-085-01, "Rod Control Functional Testing;"

- CVCS (System 62) capabilities to charge water and the pressurizer pressure control system to maintain RCS/Pressurizer pressure within limits via 2-SI-68-44, "Temperature/Pressure and Pressurizer Temperature Limits;"
- proper operation of the auxiliary feedwater system (System 003B) through performance of 2-PTI-003B-05, "Auxiliary Feedwater System Dynamic Test;"
- vibration monitoring through performance of 2-PTI-999-01, "Operational Vibration Testing" and TI-31.02, "Plant Equipment Vibration Monitoring Program;" and
- proper operation of the steam dump control system.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedure was performed in a manner consistent with the guidance of procedure SMP-9, Watts Bar Nuclear Plant Unit 2, "Conduct of Test," Rev. 5.

P.1.5 Preoperational Test Witnessing (Inspection Procedures 70312 and 70433)

a. Inspection Scope

Background: The background for this preoperational test witnessing is the same as that in the background section of P.1.4 and this test was performed in conjunction with or in support of 2-PTI-068-01, "HFT – Heatup and Cooldown."

Inspection Activities: The inspectors witnessed activities associated with the performance of preoperational test instruction 2-PTI-062-03, "HFT – Charging and Letdown," Rev. 0 to verify that the testing was conducted in accordance with approved procedures and to verify the adequacy of test program records and preliminary evaluation of test results. The following component's logic test was selected for inspection:

- Section 6.2, Standpipe Level Alarm Tests

The inspectors assessed the following attributes associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- test prerequisites were performed;
- plant systems were in service to support the test;
- test equipment was installed and within calibration;
- testing was performed in accordance with the approved procedure;
- test interruptions and continuations were handled in accordance with approved procedures and documented in the chronological test log;
- testing events and discrepancies were properly documented in the test deficiency log;
- testing was executed and coordinated properly;
- data was properly collected;
- temporary equipment was installed and tracked appropriately;

- administrative test controls were properly followed; and
- test personnel were using approved drawings and vendor manuals.

The inspectors observed the test to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the preliminary test evaluations were consistent with the inspector's observations. During the test, the inspectors observed important data gathering activities to ensure the data was properly gathered and recorded. A post-test cursory review of the test data was performed to verify legibility, traceability, and permanence of the data sheet entries.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedure was performed in a manner consistent with the guidance of procedure SMP-9, Watts Bar Nuclear Plant Unit 2, "Conduct of Test," Rev. 5.

P.1.6 Preoperational Test Witnessing (Inspection Procedures 70312 and 70438)

a. Inspection Scope

Background: The background for this preoperational test witnessing is the same as that in the background section of P.1.4 and this test was performed in conjunction with or in support of 2-PTI-068-01, "HFT – Heatup and Cooldown."

Inspection Activities: The inspectors witnessed activities associated with the performance of preoperational test instruction 2-PTI-003B-04, "Auxiliary Feedwater Pumps and Valve Logic Test," Rev. 1 to verify that the testing was conducted in accordance with approved procedures and to verify the adequacy of test program records and preliminary evaluation of test results. The following component tests were selected for inspection:

- Section 6.12, 2-LCV-3-156 & 2-LCV-3-156A
- Section 6.19, 2-MTR-3-118, AFW Pump 2A-A
- Section 6.25, 2-FCV-1-51, TDAFW Pump Trip & Throttle Valve
- Section 6.26, 2-FCV-1-52, TDAFW Pump Governor Valve

The inspectors assessed the following attributes associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- test prerequisites were performed;
- plant systems were in service to support the test;
- test equipment was installed and within calibration;
- testing was performed in accordance with the approved procedure;
- test interruptions and continuations were handled in accordance with approved procedures and documented in the chronological test log;

- testing events and discrepancies were properly documented in the test deficiency log;
- testing was executed and coordinated properly;
- data was properly collected;
- temporary equipment was installed and tracked appropriately;
- administrative test controls were properly followed; and
- test personnel were using approved drawings and vendor manuals.

The inspectors observed the tests to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the preliminary test evaluations were consistent with the inspector's observations. During the tests, the inspectors observed important data gathering activities to ensure the data was properly gathered and recorded. A post-test cursory review of the test data was performed to verify legibility, traceability, and permanence of the data sheet entries.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedure was performed in a manner consistent with the guidance of procedure SMP-9, Watts Bar Nuclear Plant Unit 2, "Conduct of Test," Rev. 5.

P.1.7 Preoperational Test Witnessing (Inspection Procedures 70312 and 70433)

a. Inspection Scope

Background: The background for this preoperational test witnessing is the same as that in the background section of P.1.4 and this test was performed in conjunction with or in support of 2-PTI-068-01, "HFT – Heatup and Cooldown."

Inspection Activities: The inspectors witnessed activities associated with the performance of preoperational test instruction 2-PTI-003B-05, "Auxiliary Feedwater System Dynamic Test," Rev. 0 to verify that the testing was conducted in accordance with approved procedures and to verify the adequacy of test program records and preliminary evaluation of test results. The following component tests were selected for inspection:

- Section 6.5, 2-PMP-3-118, AFW Pump 2A-A , 2-PMP-3-128, AFW Pump 2B-B, Flow Tests at ≥300 ≤500 pounds per square inch gauge (PSIG) and all AFW Pump Verification of Minimum Curve Acceptability
- Section 6.7, 2-PMP-003-0002A-S, TDAFW Pump 2A-S, Electrical & Mechanical Overspeed Trip Test
- Section 6.14, 2-PMP-3-118, AFW Pump 2A-A and 2-PMP-3-128, AFW Pump 2B-B, Full Flow Tests

The inspectors assessed the following attributes associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- test prerequisites were performed;
- plant systems were in service to support the test;
- test equipment was installed and within calibration;
- testing was performed in accordance with the approved procedure;
- test interruptions and continuations were handled in accordance with approved procedures and documented in the chronological test log;
- testing events and discrepancies were properly documented in the test deficiency log;
- testing was executed and coordinated properly;
- data was properly collected;
- temporary equipment was installed and tracked appropriately;
- administrative test controls were properly followed; and
- test personnel were using approved drawings and vendor manuals.

The inspectors observed the tests to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the preliminary test evaluations were consistent with the inspector's observations. During the tests, the inspectors observed important data gathering activities to ensure the data was properly gathered and recorded. A post-test cursory review of the test data was performed to verify legibility, traceability, and permanence of the data sheet entries.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedure was performed in a manner consistent with the guidance of procedure SMP-9, Watts Bar Nuclear Plant Unit 2, "Conduct of Test," Rev. 5.

P.1.8 Preoperational Test Witnessing (Inspection Procedures 70312 and 70436)

a. Inspection Scope

Background: The background for this preoperational test witnessing is the same as that in the background section of P.1.4. and this test was performed in conjunction with or in support of 2-PTI-068-01, "HFT – Heatup and Cooldown."

Inspection Activities: The inspectors witnessed activities associated with the performance of preoperational test instruction 2-PTI-074-02B, "RHR HFT Heatup/Cooldown," Rev. 0 to verify that the testing was conducted in accordance with approved procedures and to verify the adequacy of test program records and preliminary evaluation of test results. The following component tests were selected for inspection:

- Section 6.1, A Train RHR Heatup During Hot Functional Testing
- Section 6.2, B Train RHR Heatup During Hot Functional Testing

The inspectors assessed the following attributes associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- test prerequisites were performed;
- plant systems were in service to support the test;
- test equipment was installed and within calibration;
- testing was performed in accordance with the approved procedure;
- test interruptions and continuations were handled in accordance with approved procedures and documented in the chronological test log;
- testing events and discrepancies were properly documented in the test deficiency log;
- testing was executed and coordinated properly;
- data was properly collected;
- temporary equipment was installed and tracked appropriately;
- administrative test controls were properly followed; and
- test personnel were using approved drawings and vendor manuals.

The inspectors observed the tests to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the preliminary test evaluations were consistent with the inspector's observations. During the tests, the inspectors observed important data gathering activities to ensure the data was properly gathered and recorded. A post-test cursory review of the test data was performed to verify legibility, traceability, and permanence of the data sheet entries.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedure was performed in a manner consistent with the guidance of procedure SMP-9, Watts Bar Nuclear Plant Unit 2, "Conduct of Test," Rev. 5.

P.1.9 Preoperational Test Witnessing (Inspection Procedures 37301 and 70312)

a. Inspection Scope

Background: The background for this preoperational test witnessing is the same as that in the background section of P.1.4.

Inspection Activities: The inspectors witnessed activities associated with the performance of preoperational test instruction 2-PTI-067-03, "ERCW Valve Logic Test," Rev. 1 to verify that the testing was conducted in accordance with approved procedures and to verify the adequacy of test program records and preliminary evaluation of test results. The following component tests were selected for inspection of this item:

- Section 6.21, 1-FCV-67-9A, ERCW Strainer 1A-A Backwash Valve Unit 2 Thermal Overload Bypass Test

- Section 6.22, 1-FCV-67-9A, ERCW Strainer 2A-A Backwash Valve Unit 2 Thermal Overload Bypass Test
- Section 6.25, 1-FCV-67-9B, ERCW Strainer 1A-A Flush Valve Unit 2 Thermal Overload Bypass Test

The inspectors assessed the following attributes associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- test prerequisites were performed;
- plant systems were in service to support the test;
- test equipment was installed and within calibration;
- testing was performed in accordance with the approved procedure;
- test interruptions and continuations were handled in accordance with approved procedures and documented in the chronological test log;
- testing events and discrepancies were properly documented in the test deficiency log;
- testing was executed and coordinated properly;
- data was properly collected;
- temporary equipment was installed and tracked appropriately;
- administrative test controls were properly followed; and
- test personnel were using approved drawings and vendor manuals.

The inspectors observed the tests to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the preliminary test evaluations were consistent with the inspector's observations. During the tests, the inspectors observed important data gathering activities to ensure the data was properly gathered and recorded. A post-test cursory review of the test data was performed to verify legibility, traceability, and permanence of the data sheet entries.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedure was performed in a manner consistent with the guidance of procedure SMP-9, Watts Bar Nuclear Plant Unit 2, "Conduct of Test," Rev. 5.

P.1.10 Preoperational Test Witnessing (Inspection Procedure 70317)

a. Inspection Scope

Background: The background for this preoperational test witnessing is the same as that in the background section of P.1.4; however, this inspection was performed to satisfy the mandatory test witnessing requirement.

Inspection Activities: The inspectors witnessed activities associated with the performance of preoperational test instruction 2-PTI-099-05, "Overpower Delta-T and

Overtemperature Delta-T Turbine Runback," Rev. 0 to verify that the testing was conducted in accordance with approved procedures and to verify the adequacy of test program records and preliminary evaluation of test results. The following component's logic test was selected for inspection:

- Section 6.3, Relay 2STDX and Runback Timing Logic

The inspectors assessed the following attributes associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- test equipment was installed and within calibration;
- testing was performed in accordance with the approved procedure;
- testing was executed and coordinated properly;
- data was properly collected;
- proper system response to protection channel signals,
- expected alarm, logic, and instrumentation functions; and
- adequate automatic/manual system operation.

The inspectors observed the tests to verify that the overall test acceptance was met. During the tests, the inspectors observed important data gathering activities to ensure the data was properly gathered and recorded. A post-test cursory review of the test data was performed to verify legibility, traceability, and permanence of the data sheet entries.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedure was performed in a manner consistent with the guidance of procedure SMP-9, Watts Bar Nuclear Plant Unit 2, "Conduct of Test," Rev. 5.

P.1.11 Preoperational Test Results Evaluation (Inspection Procedure 70400)

a. Inspection Scope

Background: IMC 2513,"Light Water Reactor Inspection Program - Preoperational Testing and Operational Preparedness Phase," issue date January 1, 1984, purpose is to verify through direct observation, personnel interviews, and review of facility records that:

- systems and components important to the safety of the plant are fully tested to demonstrate that they satisfy their design requirements.
- management controls and procedures, including QA programs, necessary for operation of the facility have been documented and implemented.

IMC 2513 defines the minimum inspection program for a finding of readiness for license issuance (IP 94302, Status of Watts Bar Unit 2 Readiness for an Operating License). IMC 2513 requires the pre-operational test results review of the mandatory tests defined

in IMC 2513 and five of the primal tests defined in IMC 2513. The following inspection was performed to in relation to satisfying the required pre-operational test results review.

Inspection Activities: The inspectors performed a detailed review of the results for pre-operational test procedure 2-PTI-063-01, "Safety Injection System (SIS) Integrated Test," Rev. 1, to verify that the applicant's evaluation of the procedure performance and results was conducted in accordance with approved procedures. This review was performed to provide assurance that the test data was within the established acceptance criteria and the applicant's methods for identifying and correcting deficiencies were adequate. The inspectors performed the following activities associated with this test results review:

- reviewed all changes made to the test procedure to verify they were properly annotated, did not affect the objective of the test, and were performed in accordance with administrative procedures;
- reviewed all documented test deficiencies to verify they had been properly resolved, reviewed, and accepted;
- reviewed the test summary and evaluation to verify that the system was evaluated to meet design requirements and acceptance criteria;
- reviewed the original "as-run" copy of the test to verify completion of data sheets, calculations, and signatures/initials;
- QA inspection records were reviewed to verify they were completed as required by the test procedure; and
- the approval of the test results were reviewed for completeness to ensure that personnel charged with the responsibility for review and acceptance had documented their evaluation and corrected any identified discrepancies.

The inspectors reviewed the test results to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the test evaluation was performed in accordance with established procedures.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test results were processed in a manner consistent with the guidance of procedure SMP-10.0, "Watts Bar Nuclear Plant Unit 2 Packaging and Processing Test Results," Rev. 2. This completes the test results evaluation of preoperational test procedure 2-PTI-063-01.

III. OPERATIONAL READINESS ACTIVITIES

O.1 Operations

O.1.1 Technical Specification Review (Inspection Procedure 71301)

a. Inspection Scope

Background: The purpose of the inspection was to review the proposed WBN Unit 2 TS to ensure they were clear, enforceable, and reflected the installed plant systems. The inspection was required by Appendix B of IMC 2513, Light Water Reactor Inspection Program – Preoperational Testing and Operational Preparedness Phase.

Unit 1 and Unit 2 both utilize standardized TS, in accordance with NUREG-1431, "Standard Technical Specifications for Westinghouse Plants," Revision 4.0, Volume 1. Since WBN Unit 2 TS are similar to Unit 1, the scope of the inspection was limited to:

- comparing Unit 1 and Unit 2 TS to identify differences and ensuring that differences were appropriately identified; and
- walking down surveillance procedures for selected systems to verify TS surveillance capability. The surveillance procedure selections were based on plant systems that were new or different from previous Unit 1 systems, and systems that were shared between Unit 1 and Unit 2.

Inspection Activities: The inspectors compared the TS Table of Contents, List of Tables, and List of Figures for Unit 1 (Amendment 98) and Unit 2 (Developmental Revision I, ADAMS Accession No. ML14569A525).

The inspectors reviewed the following TS to identify differences, verify differences were appropriately identified, and to verify that surveillance and/or implementing program procedures existed:

- S/G (TS 3.3.1, 3.3.2, 3.4.7, 3.4.17, and 5.7.2.12)
- Reactor Vessel Level Indicating System, Inadequate Core Cooling Monitor, Core Exit Thermocouples, Sub cooling Margin Monitor (TS 3.3.9)
- Essential Raw Cooling Water (TS 3.7.8)
- Emergency Gas Treatment System (TS 3.6.9)
- Component Cooling System (TS 3.7.7)
- Auxiliary Building Gas Treatment System (TS 3.7.12)
- Safety Function Determination Program (TS 5.7.2.18)

The portion of the inspection related to system walkdowns to verify TS surveillance capability could not be performed during this inspection report interval because the surveillance procedures were not yet completed. Additional inspection will be required to perform system walkdowns.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

The inspectors found a typographical error where Table 3.8.6-1, "Battery Cell Parameter Requirements," was missing from the list of tables at the front of the Unit 2 TS. The applicant will correct the typographical error in the Unit 2 TS, Rev. J.

The inspectors determined that the applicant's procedure used to implement the Safety Function Determination Program (OPDP-8, "Operability Determination Process and Limiting Conditions for Operation Tracking," Attachment 6, Safety Function Determination Program

(SFDP) WBN Only) relied solely on operator knowledge to identify SUPPORT and SUPPORTED system relationships when performing cross train checks during loss of safety function evaluations.

The following finding was identified:

Background:

- Limiting Condition for Operation (LCO) 3.0.2 states that the required actions of an LCO must be performed when the requirements of the LCO are not met.
- LCO 3.0.6 provides an exception to LCO 3.0.2 when the failure to meet a SUPPORTED SYSTEM LCO is solely due to the inoperability of a SUPPORT SYSTEM.
    - LCO 3.0.6 allows performing only the required actions for the SUPPORT SYSTEM LCO, unless "cascading" is specifically directed. ("Cascading" means declaring all of the related SUPPORTED systems inoperable when a SUPPORT system is inoperable.)
    - LCO 3.0.6 allows the alternative of not entering the Tech Spec Actions for the inoperable SUPPORTED SYSTEM unless a loss of safety function exists.
- When the LCO 3.0.6 allowance is used, Tech Spec 5.7.2.18, SFDP, requires a loss of safety function (LOSF) evaluation to be performed.

Introduction: A NRC-identified finding and SL IV NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified because the applicant's procedure, used to perform loss of safety function determination evaluations, did not contain appropriate qualitative criteria to implement the requirements of TS 5.7.2.18, "Safety Function Determination Program (SFDP)."

Description: At Watts Bar Nuclear Plant, OPDP-8, "Operability Determination Process and Limiting Conditions for Operation Tracking," Attachment 6, Safety Function Determination Program (SFDP) WBN Only was used to implement the SFDP. The inspectors identified three deficiencies in the applicant's SFDP.

- The applicant's SFDP did not ensure, in accordance with TS 5.7.2.18.c, that an inoperable SUPPORTED system's Completion Time was not inappropriately extended when multiple SUPPORT system inoperabilities occurred.

  The inspectors found that OPDP-8, Attachment 6, Item 4.0, "Extending Supported SSC Completion Times," stated:

  "Refer to TS 3.0.6 and 5.7.2.18 for LCO entry relative to support systems and supported systems. TS 1.3 addresses extending LCO Action completion times."

  The inspectors determined that citing TS 1.3, "Completion Times," as a means to satisfy TS 5.7.2.18.c was a misapplication of TS 1.3 because TS 1.3 only establishes the convention for entry into more than one Condition within a single LCO; TS 1.3 does not address SUPPORT and SUPPORTED systems completion times when multiple LCOs are entered to satisfy TS 5.7.2.18.c.

- The inspectors determined that OPDP-8, Attachment 6, Step 3.1.A, was inadequate to ensure TS-required cross-train checks were performed. When used as the entry point to the LOSF evaluation process, Step 3.1.A inappropriately limited the scope of when a LOSF evaluation was required to situations that involved degraded or nonconforming conditions. Step 3.1.A stated:

  "*Upon determining that an SSC is in a degraded or nonconforming condition and [emphasis added] has been declared inoperable, an LOSF evaluation shall be initiated.*"

  Section 5, Definitions, specifically defined degraded and nonconforming conditions as follows:

  - *Degraded Condition - A degraded condition is one in which the qualification of an SSC or its functional capability is reduced.*

  - *Nonconforming Condition - A nonconforming condition is a condition of an SSC that involves a failure to meet the CLB or a situation in which quality has been reduced because of factors such as improper design, testing, construction, or modification.*

  The inspectors determined that a LOSF evaluation is also required in situations other than degraded or nonconforming conditions. For example, a LOSF evaluation is also required when a component is inoperable solely due to Tech Spec required surveillance testing, concurrent with an equipment inoperability on a different SUPPORT system.

- The inspectors found that OPDP-8, Attachment 6, Step 3.1.E stated:

  "*If only one TS LCO action [emphasis added] has been entered, then follow the required actions for that LCO and no further LOSF evaluation is required.*"

  The inspectors determined that Step 3.1.E was inadequate to ensure Tech Spec required cross train checks were performed because Step 3.1.F precluded a LOSF evaluation for a situation when only one Tech Spec LCO action statement was entered for a SUPPORT system. For example, a LOSF evaluation is still required when only one Tech Spec LCO action was entered for a SUPPORT system, if another opposite train SUPPORT system was inoperable solely for the performance of surveillance testing.

The inspectors determined that the applicant's failure to provide appropriate quantitative and qualitative criteria in OPDP-8, Attachment 6, as required by 10 CFR 50 Appendix B Criterion V, was a performance deficiency. Specifically, OPDP-8, Attachment 6 contained multiple deficiencies to implement the requirements of TS 5.7.2.18, "Safety Function Determination Program (SFDP)." The inspectors determined that this performance deficiency was more than minor because, if left uncorrected, the performance deficiency represents an improper or uncontrolled work practice that can impact safety-related systems. The inspectors determined this finding to be of very low safety significance in accordance with Section 6.5.d.1 of the NRC Enforcement Policy, that is, SL IV, because it did not represent an actual loss of safety function event on Unit 1.

The finding has a cross-cutting aspect which lies in the Human Performance (H) area. Specifically, the cross-cutting aspect is H.1, Resources: Leaders ensure that procedures,

and other resources are available to support nuclear safety (LA.1). The appropriate quantitative and qualitative criteria in OPDP-8 were not established.

Enforcement: 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that procedures must include appropriate quantitative or qualitative criteria for determining whether important activities have been satisfactorily accomplished. Contrary to this, on May 27, 2015, the inspectors identified three examples of inappropriate quantitative or qualitative criteria in the applicant's procedure, OPDP-8, "Operability Determination Process and Limiting Condition for Operation Tracking," Attachment 6, Safety Function Determination Program (SFDP) WBN Only, which was used to implement TS 5.7.2.18.

- The first example is that OPDP-8, Attachment 6, Item 4.0, Extending Supported SSC Completion Times, was inappropriate qualitative criteria because it referenced TS 1.3, Completion Times, as the method to satisfy TS 5.7.2.18.c. TS 5.7.2.18.c required provisions to ensure an inoperable SUPPORTED system's Completion Time was not inappropriately extended as a result of multiple SUPPORT system inoperabilities. Referencing TS 1.3, Completion Times, as the method to satisfy TS 5.7.2.18.c was a misapplication of TS 1.3 because TS 1.3 only establishes the convention for entry into more than one Condition within a single LCO and TS 1.3 does not address SUPPORT and SUPPORTED system completion times in situations involving multiple LCOs.

- The second example is that OPDP-8, Attachment 6, Step 3.1.A, was inappropriate qualitative criteria because it limited the scope of when a LOSF evaluation was required to situations involving degraded or nonconforming conditions even though a LOSF evaluation is required in situations other than degraded or nonconforming conditions. For example, a LOSF is required when a component is inoperable solely due to Tech Spec required surveillance testing concurrent with an equipment inoperability on a different SUPPORT system.

- The third example is that OPDP-8, Attachment 6, Step 3.1.E, was inappropriate qualitative criteria because it precluded LOSF evaluations when only Tech Spec LCO action statement was entered for one system even though a LOSF evaluation can be required this situation. For example, a LOSF is required when one SUPPORT system's LCO action statement is entered and another system was declared inoperable solely due to surveillance testing.

This finding was determined to be a SL IV violation consistent with Section 6.5.d.1 of the Enforcement Policy. Because this was a SL IV violation, and the issue was entered into the applicant's corrective action program as CR 1031436 and CR 1046617, this violation is being treated as an NCV, in accordance with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000391/2015605-02; "Loss of Safety Function Determination Program Deficiency."

c. Conclusions

The portion of the inspection related to system walkdowns to verify TS surveillance capability could not be performed during this inspection report interval because the surveillance inspection procedures were not yet completed. Additional inspection will be required to perform system walkdowns.

The applicant's procedure contained deficiencies associated with the implementation of TS 5.7.2.18, "Safety Function Determination Program (SFDP)." Additionally, the procedure's reliance on operator knowledge to identify SUPPORT and SUPPORTED system relationships when performing cross train checks during LOSF evaluations did not provide adequate assurance and confidence that LOSF evaluations were consistent and thorough for dual unit operations.

No further conclusions were made at this time because the portion of the inspection related to system walkdowns to verify surveillance capability has not been completed.

CH.1 Chemistry

CH.1.1 (Closed) Plant Systems Affecting Plant Water Chemistry (Inspection Procedure 79502)

a. Inspection Scope

The inspectors walked down various sample system components in the turbine and auxiliary buildings with the System 043 startup engineer. This included hotwell, condensate, and blowdown sample sinks in the turbine building, the sample panels in the titration room, and sampling room that include hotwell, blowdown and primary sampling. The inspectors walked down the primary water sampling sink in the auxiliary building to verify system prints and component identification. The inspectors walked down condensate polishing systems to include process control, ion exchange vessels, and process tanks and pumps with a representative from operations department. The inspectors walked down the water treatment plant with a water treatment plant operator and chemist. The inspectors inspected the chemical injection systems with representatives from chemistry department.

The inspectors reviewed the procedures that would be used during hot functional and power ascension testing. The inspectors discussed the vulnerability of the original S/Gs to corrosion and the need for molar ratio control when using ultrapure feedwater. The inspectors discussed with chemistry the plans to use boric acid to reduce the likelihood of tube denting due to the drilled tube support plates, the need for molar ratio control to prevent caustic stress corrosion cracking of the tubes and the use of polyacrylic acid to enhance the effectiveness of S/G blowdown removal of iron introduced in the feedwater.

The inspectors also discussed the primary side chemistry plan for startup, the planned use of depleted zinc to reduce cobalt production from the incorporation of iron onto the crud layer on the fuel. The potential for creation of an axial offset anomaly if excessive zinc was used at high power was also discussed. The use of submicron filters on purification and seal injection loops as well as the use of macroporus resin overlay in primary mixed bed ion exchangers was discussed.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified. The inspectors noted that the applicant plans to send a request to the NRC for a variance to allow the plant to be at action levels longer than recommended by the Electric Power Research Institute (EPRI) documents in order to

clean up the secondary and condensate systems. The plant is planning on stopping power ascent at 30 percent instead of 50 percent to prevent a dry out region from forming in the upper bundle which in turn should result in preventing the deposition of corrosion products and impurities in the upper region of the tube bundle and on top of tube support plates. The lower power level will affect the amount of blowdown purification that is available to remove impurities.

c. Conclusions

The inspectors concluded that processes, procedures, systems and plans are in place which should promote long term primary and secondary system integrity. Operational Preparedness Inspection IP 79502 is closed.

EP. 1 Emergency Preparedness

EP.1.1 (Closed) Supplemental Safety Evaluation Report, Confirmatory Item XX: Review of Letters of Agreement and Memoranda of Understanding Between Tennessee Valley Authority (TVA) and Entities Providing Support and Resources During Hostile Action Events (Inspection Procedure 92701)

a. Inspection Scope

Background: Planning Standard 10 CFR 50.47(b)(3) requires that arrangements for requesting assistance and effectively using resources have been made, arrangements to accommodate various state and local staff at the licensee's near-site emergency operations facility (EOF) have been made, and other organizations capable of augmenting the planned response have been identified. Supporting requirements are provided in Appendix E Section IV.A.

Subsequent to the issuance of Supplemental Safety Evaluation Report (SSER)-22, the NRC amended Appendix E Section IV.A.7 to require the emergency plan to include an identification and description of the assistance expected from, appropriate State, local, and Federal agencies with responsibilities for coping with emergencies, including hostile action at the site. In Section 13.3.2.3 of SSER-22, the NRC described its evaluation of the arrangements for emergency response support and resources as described in the WBN- Radiological Emergency Plan (REP) and its finding that the planning standard 10 CFR 50.47(b)(3) was met for Unit 1 and Unit 2.

In reviewing Rev. 103 and Rev. 104X of the WBN-REP, the NRC determined that additional information was required to determine whether TVA had adequately complied with Appendix E, Section IV.A.7. A Request for Additional Information (RAI) was issued on June 16, 2014 (ADAMS Accession No. ML14168A001). In its August 29, 2014, response, TVA stated that descriptions of provisions for addressing hostile actions against the plant are maintained on file with site security, with specific details in referenced offsite plans, agreement letters, and memorandum of understanding.

Inspection Activities: The inspector reviewed the letters of agreement between TVA and the entities providing support and resources during hostile action events, including letters for offsite law enforcement and medical services, to verify that the letters were current and covered the requirements of the Radiological Emergency Plan.

b. Observations and findings

No findings were identified.

c. Conclusion

The inspectors confirmed the adequacy of the licensee's arrangements regarding emergency response support and resources. Based on the results of this inspection SSER Confirmatory Item XX is closed.

EP.1.2 (Closed) Supplemental Safety Evaluation Report (SSER), Confirmatory Item YY: Inspection of the Alternate (Alternative) Facility (Inspection Procedure 92701)

a. Inspection Scope

Background: Planning Standard 10 CFR 50.47(b)(8) requires that adequate emergency facilities and equipment to support the emergency response are provided and maintained. Supporting requirements are provided in Appendix E Section IV.E. Section IV.E.8.d requires licensees to have an alternative facility (or facilities) that would be assessable even if the site were under threat of or experiencing a hostile action.

In Section 13.3.2.8 of SSER-22, the NRC described its evaluation of the emergency facilities and equipment in the WBN-REP and its finding that the planning standard 10 CFR 50.47(b)(8) was met for Unit 1 and Unit 2. In reviewing Revision 103 of the WBN-REP, the NRC determined that additional information was required to determine whether TVA had adequately complied with Appendix E Section IV.E.8.d. The NRC issued a RAI to request this information on June 16, 2014 (ADAMS Accession No. 14168A001). In its August 29, 2014, response to the RAI, TVA identified that they had relocated the Alternate Facility for WBN to meet the new requirements and that the new facility currently meets the requirements of Section IV.E.8.d to Appendix E of 10 CFR 50. TVA stated that this facility would satisfy the new requirements prior to December 23, 2014, and revised the emergency response organization augmentation call out messages to include staffing at the new alternative facility.

Inspection Activities: The inspector performed a walkdown of the new alternative facility and inspected the various equipment available in the facility to verify the equipment meets the requirements of 10 CFR 50, Appendix E, Section IV.E.8.d.

Documents reviewed are listed in the Attachment.

b. Observations and findings

No findings were identified.

c. Conclusion

The inspector confirmed the adequacy of the emergency response facilities and equipment to support dual unit operations, including the alternate (alternative) facility, and determined that the new WBN facility meets the requirements of 10 CFR Part 50

Appendix E Section IV.E.8.d. Based on the results of this inspection, SSER Confirmatory Item YY is closed.

IV. OTHER ACTIVITES

OA.1.1 (Discussed) Mechanical Equipment Qualification Special Program (Inspection Procedure 50071 and Temporary Instruction 2512/038)

a. Inspection Scope

Background: The Mechanical Equipment Qualification (MEQ) Special Program (SP) was created to meet the requirements of 10 CFR Part 50 Appendix A, General Design Criterion 4.

For Unit 1, the applicant evaluated the non-metallic parts of safety-related equipment in harsh environments and produced a controlled MEQ binder to establish and maintain the qualification status of equipment in the plant.

For Unit 2, the applicant has committed to following the same process as Unit 1. Portions of this inspection procedure were performed and documented in NRC IIR 05000391/2012603 (ADAMS Accession No. ML12123A156), Section OA.1.7 and 05000391/2013604 (ADAMS Accession No. ML13179A079), Section OA.1.14. During these inspections, the inspectors reviewed the applicant's program to verify the ability of the program to ensure that all applicable equipment is addressed in the MEQ SP.

Inspection Activities: The inspectors met with the applicant's responsible staff to discuss the program and determine the material that was available for inspection. The inspectors sampled components from the containment spray system to verify that the previously inspected adequate program was appropriately followed for identification and processing of the MEQ items. The inspectors reviewed the mechanical equipment list to verify that the applicant adequately selected the equipment for the MEQ list. The inspectors reviewed the MEQ list and functional requirements calculation to verify that the applicant adequately determined the active safety function and harsh environment of the equipment. The inspectors then reviewed the MEQ change supplements to verify that the applicant properly processed the equipment identified as being active and in a harsh environment for incorporation into the MEQ Binder. Finally, the inspectors reviewed the Environmental Quality Information Releases (EQIR) for the containment spray system to verify that the items identified in the MEQ program were inspected and matched the on-site conditions.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that the applicant's program was adequate to ensure that all applicable equipment from the containment spray system was entered into the MEQ

Program for evaluation. Further inspection of the safety-related systems are required to complete this item.

OA.1.2 (Discussed) Inspection of Licensee's Actions Taken to Implement Unresolved Safety Issue A-26: Reactor Vessel Pressure Transient Protection for Pressurized Water Reactors (Temporary Instruction 2500/19 and Inspection Procedure 92701)

a. Inspection Scope

Background: The NRC issued Temporary Instruction (TI) 2500/19 in November 1986, after a technical issue was identified concerning the safety margin-to-failure for PWRs should they be subject to severe pressure transients while at a relatively low temperature. Plants committed to design reviews, procedure changes, equipment modifications, operator training, and surveillance.

For Unit 1, the applicant designed and installed the cold overpressure mitigation system (COMS) to provide the capability, during relatively low RCS temperature, to prevent RCS pressure from exceeding allowable limits determined by 10CFR50 Appendix G. The pressurizer power-operated relief valves (PORVs) are signaled to open by the COMS actuation logic if RCS pressure approaches an unacceptable pressure for the particular RCS temperature. The COMS instrument system actuation logic is to monitor both the RCS temperature and pressure whenever the temperature is below the arming setpoint (350 degrees F for Unit 1). COMS is manually armed and actuates automatically. Administrative controls are in place to deactivate specified injection sources when RCS temperature is below the arming setpoint. Inspection was performed and documented in NRC inspection report 50-390/95-37 and 50-391/95-37 (ADAMS Accession No. ML072760547), which closed TI 2500/19 for Unit 1.

For Unit 2, the approach to address low temperature overpressure conditions is fundamentally the same as the Unit 1 approach. Unit 2 contains the same design PORVs as used on Unit 1. For Unit 2, the Unit 1 COMS analog circuitry has been replaced by a digital distributed control system (DCS). The DCS uses the same inputs and duplicates the function of the Unit 1 COMS analog controls. The valves and actuation circuitry will be tested in the same manner as used in Unit 1. The Unit 2 COMS will be manually armed at the temperature specified in the RCS Pressure and Temperature Limits Report to prevent pressure from exceeding 10CFR50 Appendix G limits. Administrative controls for cold overpressure protection will remain unchanged.

Previous inspection activities of TI 2500/19 have been documented in IIR 05000391/2013607, Section OA.1.4 (ADAMS Accession No. ML13273A512).

Inspection Activities: The inspectors performed a review of component test data, surveillance instructions and preoperational testing instructions to confirm that COMS surveillance testing met the requirements as described in TI 2500/19. Specifically, the inspectors reviewed 2-PTI-068-015, Sections 6.3 and 6.4, to verify that pressurizer PORV logic, indicating lights, annunciators, and status monitoring inputs function correctly. The inspectors reviewed completed surveillances 2-SI-68-92 and 2-SI-68-93 to verify appropriate calibration of COMS actuation channels and to ensure operability of the system. The inspectors reviewed TS Surveillance Requirement 3.4.12.7 to verify that a channel operational test is required every 31 days and is also required to be performed within 12 hours after decreasing RCS cold leg temperature to less than 350

degrees. Additionally, the inspectors reviewed lesson plan 3-OT-SYS068D, to verify that operators receive training concerning RCS low-temperature overpressure event causes, the operation and maintenance of the system that mitigates the events, and the consequences of inadvertent actuation.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors' review of COMS in the areas of training and surveillances concluded that the applicant has implemented an effective mitigation system for low-temperature overpressure transient conditions at WBN Unit 2. TI 2500/19 will remain open for the inspectors to review the most recent measurement of PORV stroke time data.

OA.1.3 (Closed) Construction Deficiency Report 05000391/89-08: Kapton Insulated Pigtail Penetration Damage (Inspection Procedure 51053)

a. Inspection Scope

Background: The historical concern that primary containment electrical penetrations containing Kapton insulated pigtails were found with nicks in the insulation, such that their ability to support the safety function of the serviced load or signal, was initially reported to the NRC on August 25, 1989, in accordance with 10 CFR Part 50.55(e) as condition adverse to quality report (CAQR) WBP 890302 for Unit 1 and CAQR WBP 89436 for Unit 2. The follow-up final report associated with the notification (ADAMS Accession No. ML073551006) was transmitted by letter dated September 25, 1989, and identified the apparent cause, safety implications, and planned or completed corrective actions. By letter dated April 30, 1993 (ADAMS Accession No. ML073241164), the applicant changed the original commitment, which required quality control (QC) inspection of all penetration pigtail wires for damage, to state that appropriately trained modifications personnel utilizing a two-party inspection process would be used instead.

The background on this issue is discussed in further detail in Section OA.1.4 of IIR 05000931/2014607 (ADAMS Accession No. ML14274A076).

Inspection Activities: The inspectors observed qualified Kapton inspectors performing quality inspections of the individual strands comprising the Kapton insulation system for 2-PENT-293-0043-D (inboard and outboard) and 2-PENT-293-0054-E (inboard and outboard). The inspectors also reviewed training records and qualifications of the Kapton inspectors.

Previous inspections of Kapton pigtails have been documented in the following reports:

- IIR 05000391/2010603 (ADAMS Accession No. ML102170465) Section T.1.1
- IIR 05000391/2014603 (ADAMS Accession No. ML14129A381) Section T.1.1

- IIR 05000391/2014607 (ADAMS Accession No. ML14274A076) Section O.A.1.4
- IIR 05000391/2015603 (ADAMS Accession No. ML15124A921) Section OA.1.1
- IIR 05000391/2015604 (ADAMS Accession No. ML15181A446) Section OA.1.2

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that the two-party inspections observed were adequate and performed by qualified Kapton inspectors. The inspectors have concluded that the historical concern that primary containment electrical penetrations containing Kapton insulated pigtails were found with nicks in the insulation has been adequately addressed through the use of appropriately trained personnel utilizing a two-party inspection process. Based on the previous NRC inspections, and the recent inspection efforts, a sufficient number of samples have been reviewed in order to consider Construction Deficiency Report (CDR) 05000391/89-08 closed; however, if additional Kapton inspection activities are performed, inspections may be performed at the NRC's discretion.

OA 1.4 (Closed) Moderate Energy Line Break Special Program (Temporary Instruction 2512/040) / Protection from Flooding of Equipment Important to Safety (Temporary Instruction 2515/88) (Inspection Procedure 35007)

a. Inspection Scope

Background: The Moderate Energy Line Break (MELB) Special Program (SP) was initiated by TVA to address the inadequate documentation to conclude that there were no unacceptable consequences as a result of flooding in a seismic category I structure outside of containment following a moderate energy pipe failure. In addition, it was not shown that the requirements of WB-DC-40-31.51 were met for affected equipment or structures.

For Unit 1, the corrective actions included evaluations of the effects of flooding due to the moderate energy pipe failures outside containment in category I structures and implementation of plant upgrades. The MELB closure report was completed for Unit 1 on October 26, 1995. The NRC staff reviewed the MELB program and determined the program was adequately implemented in IR 50-390/95-61 and 50-391/95-61.

For Unit 2, the applicant committed to implement the MELB program in the same manner as was done for Unit 1 in the framework letter from TVA to the NRC dated January 29, 2008, Enclosure 2, Item 134 commitment. The Unit 2 MELB SP closure report was issued on September 12, 2011. The Unit 2 MELB SP provided assurance that Watts Bar had adequately addressed and documented the effects of flooding from moderate energy piping failure outside containment in Category I structures and was accomplished with the following program elements: (1) calculations that identified components required to bring the plant to a safe shutdown condition in the event of a MELB scenario; (2) determine flood levels that would occur in a MELB event and assess the effect on the plant; (3) complete walkdowns to confirm the conditions reflected the

calculations and; (4) implement engineering modifications where needed to avoid the effects of a MELB.

Inspection Activities: The inspectors evaluated the implementation of the MELB SP. In previous reports the inspectors reviewed the MELB calculations and completed walkdowns to confirm field conditions relative to flood-related commodities (curbs, drains, doors, etc.), susceptible piping, and safe shutdown equipment locations; coupled with calculations, were updated as required. The inspections were completed to verify the appropriate modifications were initiated as necessary to provide protection of safe shutdown equipment. In addition, the inspectors reviewed the calculations to verify the applicant's actions taken to implement NRC guidelines for protection from flooding of equipment important to safety were adequate.

The inspectors reviewed portions of calculation WBNOSG4099, "Moderate Energy Line Break Flooding Study," Rev. 13, associated with flooding due to non-isolatable breaks for the refueling water storage tank piping. The inspections were conducted to verify that a single failure of components or pipes would not result in a loss of systems important to safety.

Previous inspections were conducted and documented in NRC IIRs 05000391/2009604, 2010602, 2011602, 2011603, 2011607, 2011608, 2012602. The applicant's plans were previously shown to be equivalent to or exceed those performed for Unit 1.

The following table lists the inspections that were performed under TI 2512/040.

Applicant Commitments	Inspection Report
Calculations identified components required to bring the plant to a safe shutdown condition in the event of a MELB scenario	05000391/2010602 (ADAMS Accession No. ML101230144) 05000391/2011608 (ADAMS Accession No. ML11311A082) 05000391/2012602 (ADAMS Accession No. ML12087A324)
Walkdowns completed to confirm the conditions in the calculations	05000391/2010602 05000391/2011603 (ADAMS Accession No. ML101230144) 05000391/2011608
Engineering modification packages to implement plant modification to avoid the effects of a MELB	05000391/2011602 (ADAMS Accession No. ML110800483) 05000391/2011607 (ADAMS Accession No. ML112730197) 05000391/2011608

In addition, during this inspection period the inspectors reviewed PER 237418 to verify the corrective actions were implemented for Unit 2. The inspectors reviewed portions of Engineering Document Construction Releases (EDCR) 57879 and associated WOs to verify the MELB design requirements were implemented into the drawings and work instructions. In addition the inspectors observed two conduit seal installations, and seven as-built inspections for conduit penetrations to verify the conduit sealant was installed in accordance with the approved procedures, drawings, and vendor requirements to prevent water intrusion due to a MELB event.

TI 2515/88, Protection from Flooding of Equipment Important to Safety:

The applicant also evaluated that equipment important to safety would not be affected by flooding damage caused by the rupture of non-class I system components in the MELB program. The inspectors used TI 2515/88 inspection attributes to verify that the equipment important to safety would not be damaged by flooding caused by the rupture of a non-Class I system component or pipe to the extent that engineered safety features would not perform their design functions.

The inspectors reviewed portions of calculation WBNOSG4099, "Moderate Energy Line Break Flooding Study," Rev. 13, associated with flooding due to non-isolatable breaks for the condensate storage tank piping, the component cooling water piping entering the turbine building, and an isolatable pipe break in the 125 volt breaker board room 5. The inspections were conducted to verify that a single failure of non-Class I system components or pipes would not result in a loss of systems important to safety.

The inspectors reviewed design criteria WB-DC-40-61, "Equipment and Floor Drainage System drainage, " Rev. 5 and electrical schematic drawings to verify adequate Water level alarms throughout the auxiliary, turbine, and reactor buildings would alarm in the control room and limit flooding within the design volume. In addition, the inspectors reviewed worse-case breaks from the component cooling water system piping in the turbine building that may cause flooding. The inspectors reviewed the in-process corrective actions associated with PERs 896228, "Evaluation of doors C020 and C026 to be watertight," and 884690, "Evaluation to remove Unit 2 hatches to be watertight in the control building El. 708." The inspections were conducted to verify watertight doors were fitted with reliable switches and circuits that provide an alarm in the control room when the access was open. Also, the inspectors reviewed PER 904806 which commits TVA to update its licensing statements to accurately describe that the auxiliary building flood detection system does not meet Institute of Electrical and Electronics Engineers (IEEE) 279 as described in the Unit 2 FSAR Rev. 112.

The inspectors inspected two conduit seal installations and seven as-built conduit penetrations to verify the conduit sealant was installed in accordance with the approved procedures, drawings, and vendor requirements to prevent water intrusion due to a MELB event. In addition, the inspectors verified that measures were in place to properly evaluate that electrical and mechanical penetration seal assemblies were designed to consider loading created by movement of the barrier and piping during a seismic event. The inspectors also verified that the applicant's approved design basis events criteria did not require the applicant to evaluate a seismic event in addition to a MELB incident. As noted in IIR 05000391/2012602 and 05000391/2011607, the inspectors reviewed WCG 1951, "Evaluation of Worst Case Concrete Shield Walls," Rev. 3, and WCGE023, "Review of Flood Protection Requirements for Watertight Doors and Hatches," Rev. 3. The inspectors observed installation of flood channels (curbing) being installed for safety injection and charging pumps to confirm field conditions relative to flood-related commodities (curbs, drains, doors, etc.), susceptible piping, and safe shutdown equipment locations; coupled with calculations, were updated as required and that the as-built conditions met the MELB program requirements.

The inspectors also reviewed portions of calculation WBNOSG4099, associated with flooding due to non-isolatable breaks for the refueling water storage tank piping, the condensate storage tank piping, and the component cooling water piping entering the

turbine building which is connected to the river. In addition, the 10CFR50.59 evaluation was reviewed for the auxiliary feedwater storage tank modification which added approximately 500,000 gallons of water that could cause internal flooding in the turbine building. The inspections were conducted to verify that a rupture of a non-Class I system connected to a tower containing water or body of water would not result in a failure of the equipment relied on for safety from the flooding.

Portions of calculation WB-DC-40-31.51, "Evaluating the Effects of Flooding Due to Moderate Energy Pipe Failures Inside and Outside Containment," Rev. 5, were reviewed by the inspectors, and WBNOSG4100, "System Isolation for MELB Flooding," Rev. 4, was reviewed to verify that the analysis adequately addressed the simultaneous loss of offsite power with the rupture of a non-class I system component or pipe.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

TI 2512/040 and TI 2515/88 are closed. MELB engineering evaluations for dual unit operations were in place. A significant portion of the MELB engineering field implementations were complete and adequate. The MELB program also adequately addressed the protection of safety-related components from the effects of flooding of non-Class I system components, tanks, bodies of water, and piping. Additional MELB or flooding inspection activities may be performed at the NRC's discretion.

OA.1.5 (Closed) URI 391/1987-20-02: Meeting FSAR Commitment Associated with Fire Protection System (Inspection Procedure 35007)

a. Inspection Scope

Background: IRs 50-390/87-20 and 50-391/87-20 reviewed a concern related to fire protection and separation. The fire protection concern referenced areas where the licensee failed to meet the requirements set forth in the, 10 CFR Part 50 Appendix R, related to fire suppression and minimum separation criteria for SSCs important to safe shutdown of the plant. In addition, discrepancies were identified to exist between the as-built condition and the commitments made in the FSAR. The applicant identified and reported all known deficient items. The applicant documented these deficiencies utilizing CDRs, non-conformance reports (NCRs), and CAQRs. The concern that the licensee failed to meet the requirements of the 10 CFR Part 50, Appendix R and the requirements specified in the FSAR were substantiated. However, at the time of the inspection, FSAR changes necessary to make needed corrections were not ready for inspection and URI 390/87-20-03, 391/87-20-02, "Meeting of FSAR Commitments Associated with the Fire Protection System," was opened to track the corrective actions.

For Unit 1, the NRC closed URI 390/87-20-03 in IR 50-390/94-45. As a corrective action, the licensee developed a corrective action program for fire protection and submitted it to the NRC on December 1988. A revision to this corrective action program was subsequently submitted on March 28, 1990 (RIMS IA4900328804). Included within

the corrective action program was a commitment to complete a revised safe shutdown analysis and incorporate the results into Section 9.5.1 of the FSAR. On April 2, 1994, the licensee submitted a proposed change to FSAR Section 9.5.1, via Amendment 87. This proposed change stated that the WBN Fire Protection Program was described in the Fire Protection Report (FPR). In a letter dated February 5, 1992, the licensee submitted the FPR to the NRC for review and approval. The report superseded previous fire protection commitments and submittals, as well as the fire protection program described in the FSAR. As stated in a letter from the NRC to the licensee dated April 6, 1994, the NRC accepted and completed the initial review of the fire protection report.

Inspection Activities: On December 19, 2014, the NRC completed an inspection to examine the licensee's readiness in the area of fire protection, fire safe shutdown procedures, and operator manual actions to support future licensing. The results of the inspection were captured in IIR 05000391/2014612 (ADAMS Accession No. ML15034A211.) As part of the inspection, the NRC reviewed the Unit 1/Unit 2 As-Constructed Fire Protection Report, submitted on September 18, 2014 (ADAMS Accession No. ML14265A449), EDQ00099920090016, "Appendix R - Units 1 & 2 Manual Action Requirements," Rev. 3, EDQ00299920090013, "Appendix R - Unit 2 Cables Required for Safe Shutdown Following a Fire," and EDQ00099920090012, "Unit 1 and 2 Appendix R Safe Shutdown Analysis," Rev. 3. For the selected fire areas, the inspectors verified that credible fire induced failure modes, such as open circuits, hot shorts, and spurious operations, were considered in the determination of the equipment available for fire safe shutdown. The inspectors also verified that the applicant had demonstrated compliance with applicable Appendix R requirements. Items identified during the inspection, which the NRC determined as not meeting the Unit 1/Unit 2 As-Constructed Fire Protection Report, required corrective actions and NRC staff evaluation of the resolution for these items during subsequent inspections. As the Unit 2 construction is nearing completion, the applicant plans to revise the above documents to incorporate any changes in the fire safe shutdown model required due to field changes. The final as-constructed versions of these documents will be issued near the end of the Unit 2 project. The applicant stated that the final versions will ensure all adverse interactions (e.g. spurious operations, cable separation, etc.) are satisfactorily resolved. The applicant is tracking the development and submittal to NRC of the final as-constructed version of the Fire Protection Report, which will be inspected via TI 2515/022, "Inspection of Watts Bar Nuclear Plant Fire Protection Corrective Action Plan," dated July 07, 1992. Since URI 391/1987-20-02 is a subset of the overall program tracked via TI 2515/022, the URI is considered closed.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

URI 391/1987-20-02 is closed.

OA.1.6 (Closed) Construction Deficiency Report 391/81-88: Fire Prevention Spray Protection for Oil Lift Assembly and Upper Bearing Cooler (Inspection Procedure 35007)

a. Inspection Scope

Background: This deficiency was initially reported to the NRC on October 30, 1981, as nonconformance report WBN MEB 8133 in accordance with 10 CFR 50.55(e). The issue was documented as CDR WBRD-50-390/81-94 for Unit 1 and WBRD-50-391/81-88 for Unit 2.

The CDR concerned the deficiency to provide spray shields for the upper bearing coolers of the RCPs. Should a rupture of one of these components occur, the potential exists for pressurized lube oil to come in contact with hot reactor coolant system piping; resulting in a fire. TVA concluded the cause of the deficiency was the incorrect assumption that oil spray from an upper bearing cooler rupture would be contained within the drain pans located below the RCP motors. Additionally, the lift pumps were only partially enclosed so they could be sprayed by the RCP fixed water spray systems.

For Unit 1, TVA issued Engineering Change Notice (ECN) 3271 to address the modifications to the spray shields around the oil lift assembly and upper bearing cooler for the RCPs. On July 9, 1982, TVA issued a letter that provided information regarding how compliance with 10 CFR Part 50 Appendix R, was to be achieved for Units 1 and 2, including the requirements of Section III.O that outlined the need for RCPs to be provided with an oil collection system to include spray shields for the oil lift pumps.

On May 11, 1984, the NRC issued IR 50-390/84-28 (ADAMS Accession No. ML082261059) that closed the spray shield deficiency for Unit 1 (CDR 390/81-94) subsequent to the inspection of the constructed configuration of the spray shields.

For Unit 2, the applicant initiated PERs 172587 and 172669 to address the corrective actions. TVA issued EDCR 52312 and WO Nos. 1108412596, 114119806, and 116047623 to address the Appendix R issues around the RCPs to include the spray shields for the oil lift pumps.

Inspection Activities:

To address Unit 2 actions the inspectors performed the inspection in accordance with IP 64100, “Post-Fire Safe-shutdown, Emergency Lighting and Oil Collection Capability at Operating and near-Term Operating Reactor Facilities,” Section 02.04, Section III.O Oil Collection Systems for Reactor Coolant Pumps, as follows:

- reviewed PERs 172669 and 172587 to verify information regarding the requirements for TVA to design and install spray shields to prevent RCP lube oil leaks in a potential fire scenario;
- reviewed EDCR 52312, “Installation of Unit 2 Reactor Coolant Pump (RCP) Spray Shield Platforms”, Rev. A, including associated field change requests (FCRs) and DRAs, to verify that the RCP spray shield installation for Unit 2 conformed with the as-constructed fire protection report and Appendix R requirements;
- reviewed WO 110841256, 114119806, and 116047623, to verify that work activities addressed the work scope of EDCR 52312;
- reviewed Calculation WCB-1-1942, Rev. 2, Retrofit of Unit 1 and Unit 2 RCP Spray Shields MK4 (A), MK1(A), MK2(A) and MK3(A) for Increased Live Load; Requirements to verify that seismic requirements were addressed; and

- performed an inspection of the oil spray shield installations on RCP 4 to verify the as-built design configuration met the Appendix R requirements.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the installed spray protection for RCP oil lift assembly and upper bearing cooler complied with applicable Appendix R requirements. CDR 391/81-88 is closed.

OA.1.7 (Closed) Construction Deficiency Report 391/84-44: Reactor Coolant Pump Oil Drain does not meet Appendix R Requirements

a. Inspection Scope

Background: This deficiency was initially reported to the NRC on October 29, 1984, in accordance with 10 CFR 50.55(e) as NRC WBN MEB 8414. NCR WBNMEB8414 was written to document the auxiliary sump for the RCP oil collection system had an inadequate free volume to contain the required lube oil inventory. This deficiency was tracked as CDR 390/84-49 (Unit 1) and CDR 391/84-44 (Unit 2). The CDR concerned the inadequacy of the RCP oil seal system auxiliary sump capacity that could result in oil backing up through the floor drains and onto the containment floor. This spilled oil could present a fire hazard. A fire inside containment could adversely affect the safe operation of the plant. TVA considered this failure to adhere the Appendix R commitments to be a design oversight error.

For Unit 1, TVA issued ECN 5218 to reroute the drain lines for the RCP oil drip collection pans from the auxiliary sump to the reactor building floor and equipment drain sump. TVA letter dated November 21, 1984, provided the final report for CDR 50-390/84-49. In the letter, TVA stated that the equipment drain sump was a vented closed container which had adequate capacity to contain the entire lube oil capacity of one RCP and the lube oil system was qualified to seismic category I. For Unit 1, the NRC closed CDR 390/84-49 in IR 390/85-09 dated March 11, 1985.

For Unit 2, the applicant issued PER 172614 to address the corrective actions. In addition, TVA issued ECN 5219 to reroute the RCP drip collection pan piping from the reactor building auxiliary sump to the reactor building floor and equipment drain sump. EDCR 54318 and associated field change request FCR 59395 AA01 were issued to complete the installation of the piping for all four RCPs. Implementation of corrective actions to address drain line slope, seismic pipe supports and rerouting of the common drain line header were performed under WOs 113351252, 115552072, and 115464616-18.

Inspection Activities: To address Unit 2 actions the inspectors performed the inspection in accordance with IP 64100, “Post-Fire Safe-shutdown, Emergency Lighting and Oil

Collection Capability at Operating and near-Term Operating Reactor Facilities Section," 02.04, Section III.O Oil Collection Systems for Reactor Coolant Pumps, as follows;

- reviewed PER 172614 to verify that the corrective actions were identified to address the historical construction deficiency;
- reviewed Calculation 50052-C3-160, Rev. 0, System 77 (Waste Disposal) Category 1(C) Piping Proximity, Falling and Spray Walkthrough Evaluation to verify that seismic requirements were addressed;
- reviewed calculation EPMBFS052395, "Fire Hazard Evaluation for the Reactor Coolant Pump Oil Collection System," Rev.3, to verify the design for the oil collection system was sized to accommodate the maximum leak rate and the designed storage capacity was adequate;
- reviewed ECN 5219, EDCR 54318, drawing 47W476-7, "Mechanical Containment Drains & Embedded Piping", Rev. 9, Drawing 47W476-8, "Mechanical Containment Drains & Embedded Piping", Rev. 6, and FCR 59395 to ensure the oil collection piping system and storage capacity was adequate;
- verified proper drain pipe sloping and pipe seismic support installation, and skirting and seam seal integrity around the perimeter of the access platforms for RCPs 2 – 4;
- verified installation of the lift oil pump enclosure on RCP 4 and its associated drain piping to access platform below was also inspected; and
- inspected a sample of the RCP oil collection system piping along its entire length to its termination point at the reactor building floor and equipment drain sump and verified the installation of a combustible vapor flame arrestor above the sump.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the RCP oil drain complied with Appendix R requirements. CDR 391/84-44 is closed.

OA.1.8 (Closed) Violation 391/87-19-02: Failure to Preserve Equipment Installed in the North and South Valve Rooms (Inspection Procedure 52053)

a. Inspection Scope

Background: During an NRC inspection of the north and south valve rooms conducted in October 1987, several examples of failure to control the preservation of equipment and general housekeeping deficiencies were found. This was identified as a violation of 10 CFR Part 50 Appendix B, Criterion XIII, which requires that measures shall be established to control the handling, storage, shipping, cleaning, and preservation of material and equipment in accordance with work and inspection instructions to prevent damage or deterioration. Notice of Violation (VIO) 50-391/87-19-02 was issued and documented in NRC IR 50-390/87-19 and 50-391/87-19. TVA initiated a total of six PERs in order to address the 13 samples associated with maintenance and preservation issues found in the north and south valve rooms. The inspectors previously reviewed

seven out of 13 examples, and documented the results in IIR 05000391/2014-607 (ADAMS Accession No. ML14274A076).

Inspection Activities: The inspectors performed a walkdown and a document review of the following items:

- Item 1: Bailey positioner for valve 2-PCV-1-12 was found in the north valve room with open fittings. The inspectors reviewed WOs associated with the installation of the valve and performed a walkdown to determine if the applicant's corrective actions were adequate. The valve was replaced along with the supply air-line. This item is closed.

- Item 2: A damaged instrument line was found adjacent to hanger 2-032-AB-000. The inspectors performed a walkdown of the instrument supply line mentioned above to determine its condition. The inspectors were able to establish that the instrument line was replaced and that no damaged was found. This item is closed.

- Item 4: A broken supply line fitting to valve 2-PCV-1-30 was found in the south valve room. The inspectors reviewed work orders, EDCRs, and performed a field verification of the valve to determine if the applicant's corrective actions were adequate. The valve was replaced along with the control air supply system and the positioner eliminating any previously found issues. This item is closed.

- Item 5: A temporary support was disconnected and jammed between the process pipe and valve 2-PCV-1-30. The inspectors performed a walkdown to verify if there were any issues with the installation of the valve and its surrounding components. This item is closed.

- Item 6: There were several instances of loose electrical parts and hanger pins throughout the north and south valve rooms. To determine how the applicant planned to address these issues, the inspectors performed a general review of the housekeeping program. The inspectors reviewed the applicant's and Bechtel standard procedures on the housekeeping program, interviewed applicant's personnel in charge of oversight of the program and physical condition of the plant, and sampled EDCRs to evaluate how the program is being implemented. This item is closed.

- Item 11: Valve 2-PCV-1-12 was observed with a damaged air line from the operator diaphragm to the solenoid, frayed jackets on exposed wiring from the solenoid, and limit switches with missing covers and gaskets. The inspectors performed a walkdown to determine the adequacy of the applicant's corrective actions. The valve and its support systems were reinstalled addressing the aforementioned issues. This item is closed.

- Note on Items 3 and 9: Numerous instances of uncapped condulets, broken flexible conduits, missing condulet covers, and visible rust on some of the conduits were observed in the north and south valve rooms. These items were closed under the guidance of TI 2512/018, "Inspection of Watts Bar Nuclear Plant Electrical Conduit and Supports Corrective Action Program Plan," and

documented in IIR 05000391/2014-604. No actions were required under the scope of this inspection.

Documents reviewed are listed in the Attachment.

b. Observation and Findings

No findings were identified

c. Conclusions

The inspectors determined that the issues associated with VIO 391/87-19-02 were properly addressed and tracked in the applicant's corrective action program and appropriate measures were taken to prevent recurrence. Based on the results of this inspection, VIO 391/87-19-02, "Failure to Preserve Equipment in the North and South Valve Rooms," is closed.

OA.1.9 (Closed) Construction Deficiency Report 391/86-24: Inadequate Flexibility of 3/8-inch Tubing Attached to the Steel Containment Vessel (Inspection Procedure 50090)

a. Inspection Scope

Background:

For 3/8-inch tubing attached to and routed through the steel containment vessel (SCV), design instructions issued in 1979 required that the first tubing support beyond the SCV penetration be located 30 to 40 inches from the penetration whether it was inside or outside of the vessel. This was to ensure at least 30 inches of tubing would be available to absorb SCV thermal movements. However, as a result of questions by construction personnel, it was determined that design personnel failed to identify that detail A-14 on drawing 47W625-14 included a stub piece of approximately 16 to 18 inches to which the 3/8-inch tubing was attached.

The stub piece was designed as part of the penetration and should not have been considered as an extension of the 3/8-inch tubing. Because of the rigidity of the piping, the tubing supports should have been located 30 to 40 inches from the end of the pipe stub. Construction personnel did not consider the stub piece as part of the penetrations. This resulted in installations with as little as 12 inches of tubing between the penetration and the support. Such installations are much less flexible than the intended design.

This condition of reduced lengths of unrestrained 3/8-inch tubing could result in stress and loads to the tubing or supports which could exceed the values allowed by design criteria WB-DC-40-31.7 or WB-DC-40-31.9 and could cause the loss of the tubing's pressure boundary. A rupture outside the SCV of the tubing connected to the reactor coolant system and a simultaneous loss of the tubing's inboard containment isolation valve could result in a breach of the containment boundary. This condition could adversely affect the safe operation of the plant.

The applicant completed its evaluation of the existing installations and concluded that some of the installations are acceptable as-is, some will require removal of supports and some will require relocating. Also, as part of TVA's design changes, drawing details which were misinterpreted are being deleted from the original drawings and the new typical drawings refer to the pipe stub as a point of reference for determining the tube support location. The applicant developed procedures with a high level of interface and close communication between disciplines which should prevent a recurrence of this condition.

Inspection Activities: The inspectors performed the following inspections activities for Unit 2:

- reviewed engineering drawings containing modifications associated with system 43, Non-radioactive Sampling and Water Quality, supports at the steel containment vessel penetrations;
- interviewed TVA personnel in-charge of pipe stress analysis to discuss how support modifications reduced the sampling tube's rigidity and improved its ability to absorb the SCV's thermal movement;
- reviewed pipe stress analysis and resultant pipe support calculations, based on hardware modifications, to determine if such modifications addressed the identified deficiencies;
- performed a walkdown of modified/unmodified sampling line supports to determine if they met the requirements of TVA's design criteria, WB-DC-40-31.7, for a distance of 30 to 40 inches for the location of the first support after the SCV penetration; and
- reviewed field change requests to determine if supports were properly removed or modified in order to meet the requirements of the design criteria mentioned above.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on the walkdown of the SCV penetrations, interview of the applicant's personnel, and a document review associated with the pipe stress analysis of system 43, the inspectors determined that the applicant had resolved the issues described on CDR 391/86-24. This item is closed.

OA.1.10 (Closed) Environmental Qualification Special Program and Supplemental Safety Evaluation Report Appendix HH Item 16: Perform Detailed Inspection/Evaluation Prior to Fuel Load on Equipment Qualification Program Compliance with 10CFR50.49 Requirements (Temporary Instruction 2512/36)

a. Inspection Scope

Background: 10 CFR 50.49 requires the environmental qualification (EQ) of safety-related and important to safety electrical equipment to ensure the electrical equipment required to maintain the reactor coolant pressure boundary integrity remains operable when needed. It is furthermore required that the records that substantiate equipment EQ capabilities be available and maintained in auditable files. TVA initiated the EQ SP at Watts Bar 2 to ensure and document that safety related electrical equipment installed in the plant is qualified to perform their designated function when subjected to potentially harsh environments. TVA is developing environmental qualification data packages (EQDP) change documents for Unit 2 equipment to integrate them into the existing EQDPs for Unit 1. EQDPs are also known as EQ binders. For new model or types of equipment that are only installed in Unit 2, new EQ files and documents are being developed. The purpose of this inspection was to review the status and progress of this effort. Previous inspections on these topics were documented in NRC IIRs 05000391/2014604 (ADAMS Accession No. ML14177A214) and 05000391/2014615 (ADAMS Accession No. ML15044A424).

Inspection Activities: The inspectors interviewed responsible personnel to determine the status of the project and the progress made since the last inspection. The inspectors reviewed samples of completed EQ change supplements (EQCS) and environmental qualification information releases (EQIRs). EQCSs are used to document the engineering basis for qualification of equipment. The inspectors reviewed EQCSs to ensure that engineering design information for Unit 2 components and cables were appropriately extracted from EDCR to be included in the EQCS documents for later addition to the corresponding combined Units 1 and 2 EQDPs. EQIRs are used to document actual field installation of equipment. Samples of completed EQIRs were reviewed to ensure that as-installed devices were the same or similar to those devices identified in the EQCS and to ensure that information required for maintaining installed equipment and maintaining compliance to 10 CFR 50.49 was properly documented.

The inspectors selected a sample of EQDPs for inspection. The inspectors reviewed the associated EQCSs posted against the applicable EQDPs to verify the qualified life and surveillance requirements were established. The inspectors also reviewed a sample of the associated EQIRs that provided the field-verification installation information. The inspectors sampled the associated master equipment list and harsh environment records management system database to verify that the EQ data and maintenance requirements had been updated in accordance with the associated EQIR. The inspectors verified that selected industry operating experience had been adequately entered into the EQ program. The inspectors reviewed selected EQDPs to assess the evaluation of synergistic effects on equipment. No significant discrepancies were observed in the documents reviewed. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on the above activities, the inspectors gained a clearer understanding of the status and direction of the EQ special program for Watts Bar Unit 2. The inspectors concluded that the records reviewed met the 10 CFR 50.49 requirements to substantiate equipment EQ capabilities, and to be available and maintained in auditable files. Based

on the aforementioned activities, the EQ Special Program, TI 2512/036, is closed. Additionally, SSER Appendix HH Item 16 is closed.

OA.1.11 (Closed) Inspection of Licensee's Implementation of Multiplant Action A-17: Instrumentation for Nuclear Power Plants To Access Plant and Environs Conditions During and Following an Accident (Regulatory Guide 1.97) (Temporary Instruction 2515/087)

a. Inspection Scope

Background: NRC issued Regulatory Guide 1.97 to provide to the industry a method acceptable to the NRC staff for complying with the Commission's regulations to provide instrumentation to monitor plant variables and systems during and following, an accident in a light-water cooled nuclear power plant. TVA had committed to implement Revision 2, December 1980, of the Regulatory Guide 1.97 at Watts Bar Unit 1. This inspection was conducted to verify that TVA is putting into place the same or equivalent measures for Watts Bar Unit 2.

Inspection Activities: The inspectors reviewed actions taken for Watts Bar Unit 2 to implement Regulatory Guide 1.97. The FSAR describes the identification, classification, and qualification of the accident monitoring instrumentation, and describes the exceptions that TVA takes to Regulatory Guide 1.97 and the justification for those exceptions. The inspectors reviewed the NRC SSER Rev. 23 to conclude that the NRC Office of Nuclear Reactor Regulation is in agreement with those exceptions. The inspectors reviewed TVA documents describing the Regulatory Guide 1.97 program for Unit 2. For a selected sample of the Category 1 and Category 2 designated instruments, the inspectors examined the master equipment list to confirm that, where required, the sampled instruments were seismically and environmentally qualified and included in the QA program. The inspectors reviewed selected surveillance instructions to confirm that adequate periodic calibration is performed on the instruments. The inspectors observed a sample of the instruments in the plant and the control room to confirm their ranges and category markings.

Documents reviewed are listed the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

Based on the aforementioned inspection activities, the inspectors determined that the applicant is taking adequate measures to implement the provisions of Regulatory Guide 1.97 on Watts Bar Unit 2. This item is closed.

V. MANAGEMENT MEETINGS

X1 Exit Meeting Summary

An exit meeting was conducted on July 23, 2015, to present inspection results to Mr. Zeringue, Mr. Simmons, and other members of your staff. The inspectors identified that no proprietary information had been received during the inspection and none would be used in the inspection report. The applicant acknowledged the observations and provided no dissenting comments.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Applicant personnel

G. Arent, TVA – Licensing Manager
A. Bangalore, Bechtel - Electrical Engineer
R. Banks, WBN2 Outage Manager
R. Bowling, WBN2 SI Project Manager
E. Brumfield, Bechtel Project QA Manager
J. Calle, Dual Unit Transition Manager
D. Charlton, TVA - Regulatory Compliance
C. Cooke, Senior Program Maintenance OE/Procedures
C. Deblok, WBN2 Surveillance Program Coordinator
T. Detchmendy, EP Supervisor
J. Grant, Start-Up Engineer Manager
S. Hilmes, TVA - Electrical Engineer
Z. Keeton, WBN2 PM Coordinator
J. Kepler, Engineering Group Supervisor
W. Lee, Corporate EP Manager
D. Myers, Senior QA Manager
J. O'Dell, TVA - Regulatory Compliance
C. Ottenfeld, System Area Turnover Support Operations Manager
L. Peterson, WBN2 Site Support Manager
J. Perrel, Program Manager, EP Procedures
B. Perry, Management Services Supervisor
R. Phillips, Start-Up Manager
T. Powell, Dual Unit Master Schedule Coordinator
G. Scott, TVA – Licensing
D. Shutt, TVA - Licensing
M. Skaggs, TVA – Senior Vice President
T. Wallace, WBN2 Senior Manager Operations Unit 2 Construction
T. Wilburn, Chemistry Project Supervisor
N. Welch, TVA - Preoperational Startup Manager
O. J. Zeringue, TVA - General Manager Engineering and Construction

INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction and Pre-Construction Activities
IP 35301	Preoperational Testing - Quality Assurance
IP 37002	Construction Refurbishment Process - Watts Bar Unit 2
IP 37301	Comparison of As-Built Plant to FSAR Description
IP 50071	Safety-Related Components - Procedure Review
IP 50073	Mechanical Components - Work Observation
IP 50090	Pipe Support and Restrain Systems
IP 51053	Electrical Components and Systems – Work Observation
IP 52053	Instrument Components and Systems - Work Observation
IP 53053	Containment Penetrations (Mechanical) Work Observation
IP 70300	Preoperational Test Procedure Review
IP 70312	Preoperational Test Witnessing
IP 70314	HFT Witnessing
IP 70317	Reactor Protection System Test Preoperational Test Witnessing
IP 70337	Main Stream Isolation Valve Test - Preoperational Test Procedure Review
IP 70342	Containment Combustable Gas Control System Test -Preoperational Test Procedure Review
IP 70348	Main Feedwater Control System Test - Preoperational Test Procedure Review
IP 70370	Testing Piping Support and Restraint Systems
IP 70400	Preoperational Test Results Evaluation
IP 70433	Chemical Control System Test - Preoperational Test Witnessing
IP 70436	Residual / Decay Heat Removal System Test - Preoperational Test Witnessing
IP 70438	Auxilliary Feedwater System Test - Preoperational Test Witnessing
IP 7111.21	Component Design Bases Inspection
IP 71301	Technical Specification Review
IP 71302	Preoperational Test Program Implementation Verification
IP 79502	Plant Systems Affecting Plant Water Chemistry
IP 92701	Followup
TI 2500/19	Inspection of Licensee’s Actions Taken to Implement Unresolved Safety Issue A-26: Reactor Vessel Pressure Transient Protection for Pressurized Water Reactors
TI 2512/015	Inspection of Watts Bar Nuclear Plant Employee Concerns Program
TI 2512/036	Inspection of Watts Bar Nuclear Plant Environmental Qualification Special Program
TI 2512/038	Inspection of Watts Bar Nuclear Plant Mechanical Equipment Qualification Special Program
TI 2512/040	Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break Special Program
TI 2515/87	Inspection of Licensee’s Implementation of Multiplant Action A-17: Instrumentation for Nuclear Power Plants To Access Plant and Environs Conditions During and Following an Accident (Regulatory Guide 1.97)
TI 2515/88	Inspection of Licensee’s Actions Taken to Implement NRC Guidelines for Protection from Flooding of Equipment Important to Safety

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened and Closed

05000391/2015605-01	NCV	Failure to Consider the Effects of a Break in Non-Seismic ERCW Discharge Piping (Section E.1.1)
05000391/2015605-02	NCV	Loss of Safety Function Determination Program Deficiency (Section O.1.1)

Closed

52053	IP	Instrument Components and System – Work Observation (Section C.1.3)
05000391/2015603-01	URI	Break In Non-Seismic ERCW Discharge Piping (Section E.1.1)
35301	IP	Preoperational Testing Quality Assurance (Section P.1.1)
70300	IP	Preoperational Test Procedure Review (Section P.1.3)
70337	IP	Main Steam Isolation Valve Test - Preoperational Test Procedure Review (Section P.1.3)
70342	IP	Containment Combustible Gas Control System Test - Preoperational Test Procedure Review (Section P.1.3)
70348	IP	Main Feedwater Control System Test - Preoperational Test Procedure Review (Section P.1.3)
79502	IP	Plant Systems Affecting Plant Water Chemistry (Section CH.1.1)
Item XX	SSER	Confirmatory Item: Review of Letters of Agreement and Memoranda of Understanding Between Tennessee Valley Authority (TVA) and Entities Providing Support and Resources During Hostile Action Events (Section EP.1.1)
Item YY	SSER	Confirmatory Item: Inspection of the Alternate (Alternative) Facility (Section EP.1.2)

391/89-08	CDR	Kapton Insulated Pigtail Insulation Damage (Section OA.1.3)
2512/040	TI	Moderate Energy Line Break Special Program (Section OA.1.4)
2515/088	TI	Protection from Flooding of Equipment Important to Safety (Section OA.1.4)
391/87-20-02	URI	Meeting FSAR Commitment Associated with Fire Protection System (Section OA.1.5)
391/81-88	CDR	Fire Prevention Spray Protection for Oil Lift Assembly and Upper Bearing Cooler (Section OA.1.6)
391/84-44	CDR	Reactor Coolant Pump Oil Drain Does Not Meet Appendix R Requirement (Section OA.1.7)
391/87-19-02	VIO	Failure to Preserve Equipment Installed in the North and South Valve Rooms (Section OA.1.8)
391/86-24	CDR	Inadequate Flexibility of 3/8-inch Tubing Attached to the Steel Containment Vessel (Section OA.1.9)
2512/036	TI	Environmental Qualification (EQ) Special Program (Section OA.1.10)
Item 16	SSER Appendix HH	Perform Detailed Inspection/Evaluation Prior to Fuel Load on Equipment Qualification Program Compliance with 10CFR50.49 Requirements (Section OA.1.10)
2515/087	TI	Instrumentation for Nuclear Power Plants to Access Plant and Environs Conditions During and Following an Accident (Regulatory Guide 1.97) (Section OA.1.11)

Discussed		
70370	IP	Testing Piping Support and Restraint Systems (Section C.1.5)
88-11	BL	Pressurizer Surge Line Thermal Stratification (Section C.1.5)
		Hot Functional Testing Witnessing (Section P.1.4)
70314	IP	Technical Specification Review (Section O.1.1)
71301	IP	Mechanical Equipment Qualification (MEQ) Special Program (SP) (Section OA.1.1)

2512/038	TI	Inspection of Licensee's Actions Taken to Implement Unresolved Safety Issue A-26: Reactor Vessel Pressure Transient Protection for Pressurized Water Reactors (Section OA.1.2)
2500/019	TI	

LIST OF DOCUMENTS REVIEWED

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1 Construction Activities

C.1.2 Mechanical Components – Work Observation and Construction Refurbishment

PERS

945339, 2A Safety Injection pump was found in a degraded condition when inspected by the vendor, 12/08/14
939339, Safety Injection Pump 2A and 2B shaft and thrust-end bearing found with excessive wear
937185, Safety Injection Pump 2B shaft and thrust-end bearing found with excessive wear after open vessel testing, 12/2/2014
857667, ASME Section III Components, Trend PER, assembly qualify issues with OEM Flowserve for safety related pumps, 9/10/2014
907088, Hardware non-conformance, During performance of open vessel testing, Safety Injection pumps, 2A and 2B achieved greater than design flow rates, 8/18/2014
857667, ASME Section III Components, Trend PER and Effectiveness Review, assembly qualify issues with OEM Flowserve for safety related pumps, 9/10/2014
851810, 2A Safety Injection Pump multiple deficiencies were identified during disassembly, 7/18/2014
839037, 2A Safety Injection pump Hardware non-conformance, pump shaft damaged during drilling thermocouple mounting holes, 3/28/2014
307092, 2A Safety Injection pump hardware non-conformance from vendor, (lower thrust end bearing housing to case clearances, and packing gland damage), 1/31/2011

Miscellaneous

NC PP-13 10CFR50.55(e) screening form, Potential Reportability Determination, 2A Safety Injection pump multiple deficiencies identified, Trend PER, assembly qualify issues with OEM Flowserve, 4/2/2014
Flowserve Final Report of the Evaluation of Deviation Pursuant to 10CFR21.21, 6/2/2014
Flowserve, As Found Condition Report and Repair Plan for SI Pump 2A, 10/22/2014
MPR-4152, Root Cause Evaluation of Watts Bar Unit 2 Safety Injection Pump Bearing Damage, 3/9/2015
Flowserve, Root Cause Evaluation for 2.5” RLIJ CCPs, 3 & 5 HMTA Pumps, and 3.0” JHF SIPs for TVA Watts Bar II Nuclear Plant, Rev. 1
Order Number CC0146588 Flowserve, Rotor clearance as-built inspection procedure Data Sheet 6 and 9, 4/16/15
PL-1500, Flowserve, Electrodeposited Chromium Plating Procedure IAW Aerospace Material Specification (AMS) 2460, Rev. B
280-RLCU00227-01, WBN-2-PMP-063-0010-A (2A-A) Factory Test Report, 3/20/2015
WBN-VTD-D245-0350, Operating & Maintenance Instruction for Dresser Pump Division Model JHF Safety Injection Pumps, Rev. 22
0-MI-63.001, Safety Injection Pump, Disassembly, Inspection, and Reassembly, Rev. 3

C.1.5 Testing Piping Support and Restraint Systems

WBNP Unit 2 Preoperational Test Procedure 2-PTI-999-02, “Thermal Expansion,” revision 0 dated 11/12/2014
Bechtel WDP-DATA-1148, “ Data Walkdown Gap Measurements”
Bechtel WDP-DATA-1149, “ Data Walkdown Gap Measurements”
Bechtel WDP-DATA-1152, “ Data Walkdown Gap Measurements”

E.1.1 Component Design Basis Inspection

E.1 Engineering Activities

Design/Licensing Bases Documents

WBN-SDD-N3-67-4002, Essential Raw Cooling Water System, System 67, Rev. 0026
WBN-SDD-N3-3B-4002, Auxiliary Feedwater System, Rev. 017
WBN-SDD-N3-3B-4002, Auxiliary Feedwater System, Rev. 017
2-TSD-67, Essential Raw Cooling Water System, Rev. 20
NUREG-0847, Safety Evaluation Report Related To The Operation Of Watts Bar Nuclear Plant Units 1 And 2, June 1982
WBN-DCD-40-36, The Classification Of Piping, Pumps, Valves, And Vessels (Unit 1 / Unit 2, Rev. 0020

Calculations

EPMJKJ011191, “WBN AFW System – Pump Net Positive Suction Head (NPSH) Available Calculation,” Revision 010
MDQ00006720080341, “ERCW System Pressure Drop Calculation,” Revision 014
MDQ00006720080341, “ERCW System Pressure Drop Calculation,” Revision 015

Miscellaneous Documents

February 14, 2015 Letter From Facility Risk Consultants, INC. To Bryce C. Cusick
Change Request 65448, Determine The Throttle Positions For Valves 0-FCV-067-, 0360, And -0362, That Limit The Flow Out Of A Potential Failure Of The TVA Class H ERCW Discharge Headers A And B To Acceptable Levels, Rev. A

Corrective Action Program Documents

PER 979323

P.1.3 Preoperational Test Procedure Review

2-PTI-001-01, Main Steam Isolation Valves and Bypass Isolation Valves, Rev. 1
2-TSD-1-1, Main Steam Isolation Valves & Bypass Isolation Valves, Rev. 1
WBN2-1-4002, Main Steam System, Rev. 4
2-PTI-003A-01, Feedwater Isolation Valves, Rev. 0
2-TSD-3A-1, Feedwater Isolation & Bypass Valves, Rev. 1
2-TSD-3A-3, Main Feedwater System Functional Test, Rev. 2
WBN2-3A-4002, Main Feedwater, Feedwater Control and Injection Water, Rev. 5

P.1.11 Preoperational Test Results Evaluation

SMP-8.0, Watts Bar Nuclear Plant Unit 2 Administration of Preoperational Test Instructions, Rev. 0011
SMP-3.0, Watts Bar Nuclear Plant Unit 2 Joint Test Group Charter, Rev. 0005
PER 909704
PER 907088
2-PTI-063-02, Rev. 1, Safety Injection System (SIS) Integrated Test Results Package
Joint Task Group Meeting Minutes dated February 18, 2015
QA Review and Comment Form for Instruction 2-PTI-063-01 Rev.0000

III. OPERATIONAL READINESS ACTIVITIES

O.1 Operations

O.1.1 Technical Specifications Review

Procedures

Unit 1 (Amendment 98) TS
Unit 2 (Developmental Revision I, ADAMS Accession No. ML14569A525) TS
Unit 1 and Unit 2 Technical Requirements Manual
OPDP-8, Operability Determination Process & LCO Tracking, Rev. 17
2-SI-3-10, 18 Month Channel Calibration Narrow Range Level
2-SI-3-1, 18 Month Channel Calibration SG1
2-SI-0-2A/2B, Shift & Daily Surveillance Log
2-SI-0-4, Monthly Surveillances, Appendix D
2-SI-68-80-A (B), Channel Calibration of Train A(B) ICCM System
2-SI-99-300-B, Engineered Safety Feature Actuation System Slave Relay GO Test
0-SI-30-7-A (B), ABGTS Pressure Test

CH.1 Chemistry

CH.1.1 Plant Systems Affecting Plant Water Chemistry

Procedures

0-CM-5.14, Determination of Condenser Tube Leakage by Injection of Sulfur Hexafluoride, Rev. 0
0-CM-6.08, Sampling the CSTs and AFWST, Rev. 0
0-CM-6.09, Sampling Condensate Demineralizers and Condensate Demineralizer Waste Tanks, Rev. 0
2-CM-5.28, Secondary HFT [Hot Functional Testing], Rev. 0
2-CM-6.11, Feedwater, Hotwell, and Gland Seal Grab Sampling, Rev. 0
2-CM-6.60, Steam Generator Sampling in Hot Sample Room (Modes 2-6), Rev. 0
2-CM-6.61, Steam Generator Sampling in Hot Sample Room (Modes 1-4), Rev. 0
2-SOI-14.01, Condensate Demineralizer Polisher Operations, Rev. 0U2
Chemistry Manual Chapter 3.01, System Chemistry Specifications, Rev. 99
NEDP-8.0, Evaluations for Procurement of Materials, Items and Services, Rev. 1
0-PI-CEM-8.0, Bulk Chemical Specification Verification, Rev. 2
NPG-SPP-04.2, Material Receipt and Inspection, Rev. 3

Documents

WBN 2 HFT Secondary Chemistry Plan, 5/26/2015
WBN 2 PAT (Power Ascension Testing) Chemistry Plan, 5/26/2015
System 014 (Polishers, Neutralization/Waste System, Regeneration System, and Chemical Injection System) Equipment Status panel
TVA Purchase order 774336-1 (3 each 302 gallon containers of hydrazine), TVA Receiving Report, Certificate of Analysis and Bill of lading, 12/18/2014
NPG-SPP-05.3, NPG Bulk Chemical Specifications, Section D-Purchase Specifications, Rev. 39
Work Order 116343576, 0-PI-CEM-8.0 Bulk Chemical Specification Verification [Hydrazine and Monoethanolamine], 5/6/2015
NPG-SPP-05.3 NPG Bulk Chemical Specifications, Section D Purchase Specifications for: Resin-Condensate Demineralization- Gel Uniform Bead Size Anion, Hydroxide Form (Purolite SGA5550OH)
NPG-SPP-05.3 NPG Bulk Chemical Specifications, Section D Purchase Specifications for: Resin-Condensate Demineralization- Gel Uniform Bead Size Cation, Hydrogen Form (Purolite SGC650H)
Watts Bar FSAR Chapter 10

EP.1 Emergency Preparedness

EP.1.2 SSER Item YY: Inspection of the Alternate (Alternative) Facility

Radiological Emergency Plan (Generic Part), Rev. 104
NPG-SPP-18.3.7, Alternate Facility Activation and Operation, Rev. 1
2014 and 2015 Agreement Letters

IV. OTHER ACTIVITES

OA.1.1 MEQ SP

Calculations

WBNOSG4183 “Functional Requirements of Mechanical Components in Systems 2, 3, 61, 68, 72, & 74,” revision 018 dated 04/24/2015
MDQ00299920090365 “Unit 2 MEQ List (Active Mechanical Equipment in Harsh Environment,” revision 001 dated 03/06/2015
QDQ0029992014000504 “Material Aging Calculation for Unit 2 Mechanical Equipment Qualification (Binder WBN-MEQ-001),” revision 001 dated 02/25/2015

DCNs

55050-A dated 12/09/2009
55891-A dated 06/14/2010

Drawings

0-47E235-48 revision 0 dated 12/15/2014
0-47E235-50 revision 0 dated 12/15/2014
0-47E235-52 revision 0 dated 12/15/2014
0-47E235-58 revision 0 dated 12/15/2014
0-47E235-77 revision 0 dated 12/17/2014

0-47E235-41 revision 2 dated 11/24/2009

EDCRs

53344-A dated 03/27/2009
53580-A dated 05/20/2010
53590-A dated 06/23/2010

Environmental Quality Information Releases (EQIRs)

WBNEQ-14098 dated 05/11/2015
WBNEQ-15050 dated 04/30/2015
WBNEQ-15063 dated 05/22/2015

FCRs

57368 dated 11/07/2012

Miscellaneous

Limited Scope Walkdown LSWD-110 revision 1 dated 07/01/2009
WBN Mechanical Equipment List
MEQ Change Supplement WBNMEQ-001-53590, revision 4 dated 04/30/2015
MEQ Change Supplement WBNMEQ-001-53580, revision 1 dated 08/30/2012
MEQ Change Supplement WBNMEQ-001-53344, revision 1 dated 05/15/2012
MEQ Change Supplement WBNMEQ-001-54255, revision 0 dated 12/06/2012

Procedures
Bechtel Procedure 25402-3DP-GEM-00001, “Mechanical Equipment Environmental Qualification (MEQ) Program,” revision 003 dated 05/29/2015
WBN SPP-9.2, “Equipment Environmental Qualification (EQ) Program, “ revision 0006 dated 06/30/2014

OA.1.2 Inspection of Licensee’s Actions Taken to Implement Unresolved Safety Issue A-26: Reactor Vessel Pressure Transient Protection for Pressurized Water Reactors

2-TSD-68-15, Rev. 4; Pressurizer Pressure and Level Control
2-PTI-068-15, Rev. 1; Pressurizer Pressure and Level Control
2-SI-68-92; 18 Month Channel Calibration of PORV 2-PCV-68-340A Cold Overpressure Mitigation System Actuation Channel; Rev. 3
2-SI-68-93; 18 Month Channel Calibration of PORV 2-PCV-68-334 Cold Overpressure Mitigation System Actuation Channel; Rev. 2
Technical Specification 3.4.12; Cold Overpressure Mitigation System
WO 112815860
WO 112816164
Lesson Plan 3-OT-SYS068D; Cold Overpressure Protection System; Rev. 11

OA 1.4 Moderate Energy Line Break (MELB) Special Program (SP) / Protection from Flooding of Equipment Important to Safety

Calculations

CDQ 001 027 2013 000268, Seismic II/I Evaluation of the CCW piping and condenser in the Turbine Building, Rev. 4
WBANAPS2165, Turbine Building Flooding Due to a Break in the Condenser Circulating Water System, Rev. 7

Procedures

WB-DC-46-66, Section 4.4.2, Penetration Assemblies and Seals for Category I Structures, Rev. 5
WB-DC-46-69, Section 4.4.3, Design Criteria for Electrical and Mechanical Penetration Seal Assemblies for Category I Structures, Rev. 4

Work Orders

WO 114811476, seal conduit at location C15882B
WO 114306265, install conduit seal for 2PV2641
WO 116540944, seal conduits, 2VC6070B, 2SG934B
WO 116619605, seal conduits, 0LTB1430, 2SG934B, 2VC9589A
WO 114306062, seal conduits, 2NM3368J, 2NM3367J

Drawings
1-45W600-40, Wiring Diagram Station Drainage, Rev. 8
1-45W610-40-1, Wiring Diagram Station Drainage, Rev. 11
2-45W610-40-1, Wiring Diagram Station Drainage, Rev. 4

OA.1.5 URI 391/1987-20-02: Meeting FSAR Commitment Associated with Fire Protection System

Unit1/Unit2 As-Constructed Fire Protection Report, submitted on September 18, 2014 (ADAMS Accession No. ML14265A449)
EDQ00099920090016, Appendix R - Units 1 & 2 Manual Action Requirements, Revision 3
EDQ00299920090013, Appendix R - Unit 2 Cables Required for Safe Shutdown Following a Fire
EDQ00099920090012, Unit 1and 2 Appendix R Safe Shutdown Analysis, Revision 3

OA.1.6 CDR 391/81-88: Fire Protection Spray Protection for Oil Lift Assembly and Upper Bearing Cooler

EDCR 52312
PER 172587
PER 172669
WO 110841256
WO 114199806
WO 116047623RCP
Lube Oil Collection System Industry Position Paper, May 2007
Calculation WCB-1-1942, Rev. 2, Retrofit of Unit 1 and Unit 2 RCP Spray Shields, MK4(A), MK1(A), MK2(A) and MK3(A) for Increased Live Load Requirements
47W600-256, Electrical Instruments and Controls, Rev. G
47W850-9, Flow Diagram, Fire Protection, Rev. 21

48W914-2, Miscellaneous Steel Fire Protection RCP Oil Lift Assembly Guard, Rev. 7
48W914-5, Miscellaneous Steel Fire Protection Covers, Rev. 0
48W914-6, Miscellaneous Steel Fire Protection Reactor Coolant Pump Hood, Rev. 4
48W991-1, Miscellaneous Steel Fire Protection R.C. Pump, Rev. 12
48W991-2, Miscellaneous Steel Fire Protection R.C. Pump, Rev. 9
114E920, Outline-Reactor Coolant Pump, Rev. 17
1 PMP-068-0008, Reactor Coolant Pump Oil Collection System Visual Inspection, Rev. 0

OA.1.7 CDR 391/84-44: Reactor Coolant Pump Oil Drain Does not meet Appendix R Requirements

PER 172614
WO 113351252
WO 115552072
WO 115464616
WO 115464617
WO 115464618
Drawing Revision Authorization (DRA) 54318 141-143, 155 and 160-170 for 47W476-8 Rev. 6
50052-C3-160, System 77 (Waste Disposal) Category 1(C) Piping Proximity, Falling and Spray Walkthrough Evaluation, Rev. 0
2-47W851-1, Mechanical Flow Diagram, Floor and Equipment Drains, Rev. 16
MI-57.116 WBN Unit 2 Maintenance Instruction, Troubleshooting Reactor Coolant Pump (RCP) Oil Level Hi/Lo Alarms Rev. 0
2 TI-12.07 WBN Unit 2 Technical Instruction, Containment Access Modes 1-4, Rev. 0

OA.1.8 Violation 391/87-19-02: Failure to Preserve Equipment Installed in the North and South Valve Rooms

Work Orders

08-953490-005
09-954183-004
113358458
113718457
09-954183-002
113298100
113358176

Procedures

NPG-DPP-01.3, Housekeeping, Rev. 4
25402-000-GPP-0000-N2102, Housekeeping, Rev. 9

PER

1027189
143928
172756
172758

Condition Report

1037973

OA.1.9 Construction Deficiency Report 391/86-24: Inadequate flexibility of 3/8-inch tubing attached to the steel containment vessel

Work Orders

09-954183-002

Drawings

2-47W625-717B
2-47W625-702B
2-47W625-717A
2-47W625-703A
2-47W625-702A
2-47W625-714A
2-47W625-714B
2-47W625-703B

Field Change Requests

64950-A
65287-A

Calculations

43207
43209
43216
43218

Design Criteria

WB-DC-40-31.7, “Analysis of Category I and I(L) Piping Systems”, Rev. 24

OA.1.10 Environmental Qualification Special Program

Environmental Qualification Data Packages (EQDP)

WBNEQ-XMTR-009, Rosemount Model 3154N Transmitters, Rev. 0
WBNEQ-ITE-006, WEED Instrument Company Resistance Temperature Detector (RTD), Rev.9
WBNEQ-CABL-065, Westinghouse WINCISE Thermocouple Cables, Rev. 0
WBNEQ-SPLC-005, TYCO/RAYCHEM NHVS Medium Voltage Splice, Rev. 0
WBNEQ-ILS -001, MAGNETROL FLS Series Level Switches, Rev. 11
WBNEQ-CABL-027 Okonite / Medium Voltage Power – EPR INS (TVA Type EPSJ) Rev. 11
WBNEQ-CABL-037 Rockbestos / Signal Cable (TVA Type MS), Rev. 10
WBNEQ-CSC-005 NAMCO EC290 Series Electrical Connectors, Rev. 1
WBNEQ-XMTR-001 Barton 764 Transmitter, Rev. 33
WBNEQ-MOT-002 Baldor Electric Co.
WBNEQ-XMTR-008 Rosemount Model 1154 Series H Transmitters, Rev. 2
WBNEQ-ITE-005 Westinghouse In-core Thermocouple System, Rev. 13
WBNEQ-SOL-001, Target Rocky Models 79A-001 and 79AB-003 SOV’s, Rev. 37
WBNEQ-SOL-002, Target Rocky Models 82AB; 82KK; 82UU; 85V, Rev. 35.

WBNEQ-SOL-003, ASCO Model 206-381 (DC) SOVS, Rev. 42.
WBNEQ-SOL-006, ASCO Solenoid Valves Model NP8316 Series, Rev. 37.
WBNEQ-JBOX-001, Junction Boxes, Rev. 27.

EQ Change Supplements (EQCS)

WBNEQ-INM-001-54241, Rev. 0
WBNEQ-PENT-002-55244, Rev. 0
WBNEQ-CABL-065-52321, Rev. 0
WBNEQ-ILS -001-53217, Rev. 11
WBNEQ-XMTR-001-52449, Rev. 0
WBNEQ-MOT-002-52861, Rev. 0
WBNEQ-MOT-002-53764, Rev. 0
WBNEQ-ITE-005-52321, Rev. 0

EQ Information Releases (EQIR)

WBNEQ-MTR-002- 1035

Drawings

82UU-001-12BB Sheet 1 of 2, Power Operated Relief Valve (PORV) Energized to Open (F/C) On/Off 3 Inch Flanged, Rev. H, Dated 11/18/09
82UU-001-12BB Sheet 2 of 2, Power Operated Relief Valve (PORV) Energized to Open (F/C) On/Off 3 Inch Flanged, Rev. H, Dated 11/18/09
82KK-003BB, Sheet 1 of 2, Valve Solenoid Operated Bi-Directional Flow Energized To Open 3/8 Inch, Rev. C, Dated 2010/6/2
82KK-003BB, Sheet 2 of 2, Valve Solenoid Operated Bi-Directional Flow Energized To Open 3/8 Inch, Rev. C, Dated 3/10/11
82AB-001-4BB Sheet 1 of 2, Solenoid Operated Valve Energized to Open 4” ANSI Class 900 (FC), Rev. E, Dated 10/8/09
82AB-001-4BB Sheet 2 of 2, Solenoid Operated Valve Energized to Open 4” ANSI Class 900 (FC), Rev. E, Dated 5/26/10
300984, Sheet 1 of 1, Electrical Assembly, Rev. B, Dated 10/15/95

Miscellaneous

WBN-VTD-R369-0830, “Rosemount Series 3150 Series Nuclear Pressure Transmitters Manual”, Revision 0 (Rosemount Reference Manual 00809-100-4835 Revision BA August 2009)
WBNOSG4048, Equipment Submergence Requirements in the Reactor Building and Auxiliary Building for 10CFR50.49 Equipment Qualification”, Revision 26
2-LT-063-0182-F QMDS Verification and Implementation Activities item E03
NPG-SPP-06.7, “Instrument Setpoint, Scaling and Calibration Program”, dated 03/02/15
BTI-EEB-TI-28, Setpoint Calculations, Revision 0011, dated 12/31/14
Certificate of Conformance, Purchase Order 75148, Gamma-Metrics Neutron Flux Monitoring System, dated 4/29/11
2-TE-072-0006, “RHR and CS Heat Exchanger Outlet Temperature Pam Cat 2, Accuracy Calculation, dated 6/26/13
EDCR 52321, Revision A, dated 3/11/2011
EDCR 53217, Revision A, dated 5/28/2010
45N2622-1, “WINCISE PAM 1 Wiring Diagram Electrical CAT 4-2,” Revision 1, dated 1/3/2011
2-47E235-42, “Environmental Data Environment – Harsh Lower Compartment,” Revision 2, dated 11/24/2009

2-47E235-45, “Environmental Data Environment – Harsh Instrument Room,” Revision 2, dated 11/24/2009
2-ASSY-094-00CETE-J, “QMDS Verification Implementation and EQ Activities,” QMDS Item E01
1-2PP-062-0550-A, “QMDS Verification Implementation and EQ Activities,” QMDS Item E02
Certificate of Conformance, Magnetrol X057-0002-001, FLS-EP/VPX-S1MD4H, Level Switches, dated 4/9/2010
Certificate of Conformance, RayChem NHVS-822S, High Voltage Splice, dated 3/19/2012
WO 114118120, Construction to perform an inspection of safety related junction boxes for UNIT 2, Dated 6/24/2014.
Appendix E-1 – WBN U2 10CFR50.49 Equipment List, Rev. 003
Test Report No. 17733-1, Terminal Blocks and Cables, Rev. A, Dated October 11, 1985
EDCR 54938, Perform Modification to Correct Deficiencies and Adverse Conditions in EQ junction Boxes as Identified by Per 145041, Rev. a, Dated 3/13/2010

OA.1.11 Inspection of Regulatory Guide 1.97

Watts Bar Unit 2 FSAR, section 7.5 Instrumentation Systems Important to Safety
WBN-DCD-30-7 Post Accident Monitoring Instrumentation regulatory Guide 1.97, Rev. 27
Calculation WNEEBIDQ29990903 PAM Instrumentation Evaluation and Verification Methodology, Standards, and Guidelines, Rev. 3

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
AFW	Auxiliary Feedwater
ANSI	American National Standards Institute
CAQR	Condition Adverse to Quality Report
CDR	Construction Deficiency Report
COMS	Cold Overpressure Mitigation System
CVCS	Chemical Volume Control System
DCS	Distributed Control System
ECN	Engineering Change Notice
EDCR	Engineering Document Construction Releases
EPRI	Electric Power Research Institute
EOF	Emergency Operations Facility
EQ	Environmental Qualification
EQCS	EQ Change Supplements
EQDP	Environmental Qualification Data Package
EQIR	Environmental Qualification Information Release
ERCW	Essential Raw Cooling Water
ESFAS	Engineered Safety Features Actuation System
FCR	Field Change Requests
FPR	Fire Protection Report
FSAR	Final Safety Analysis Report
gpm	gallons per minute
HFT	Hot Functional Test
IEEE	Institute of Electrical and Electronics Engineers
IIR	Integrated Inspection Report
IMC	Inspection Manual Chapter (NRC)
IP	Inspection Procedure (NRC)
LCO	Limiting Condition for Operation
LOSF	Loss of Safety Function
M&TE	Measuring and Test Equipment
MELB	Moderate Energy Line Break
MEQ	Mechanical Equipment Qualification
MFW	Main Feedwater
MS	Main Steam
NCR	Non-Conformance Report
NCV	Non-Cited Violation
No.	Number
NPP	Nuclear Performance Plan
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
PER	Problem Evaluation Report
PSIG	Pounds per Square Inch Gauge
PTI	Preoperational Test Instruction
PORV	Power Operated Relief Valve
QA	Quality Assurance
QC	Quality Control
RAI	Request for Additional Information
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
Rev.	Revision
RHR	Residual Heat Removal

RTS	Reactor Trip System
S/G	Steam Generator
SAR	Safety Analysis Report
SCV	Steel Containment Vessel
SER	Safety Evaluation Report
SFDP	Safety Function Determination Process
SI	Safety Injection
SL	Severity Level
SP	Special Program
SSER	Supplemental Safety Evaluation Report
TI	Temporary Instruction (NRC)
TS	Technical Specifications
TVA	Tennessee Valley Authority
URI	Unresolved Item
U2	Unit 2
WBN	Watts Bar Nuclear Plant
WO	Work Order
10 CFR	Title 10 to the Code of Federal Regulations
^{o}F	Degrees Fahrenheit