



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
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May 10, 2013

Mr. Michael D. Skaggs  
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**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2013603**

Dear Mr. Skaggs:

On March 30, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on April 11, 2013, with Mr. Hruby, General Manager, 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.

No findings were identified during this inspection.

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

M. Skaggs

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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: Inspection Report 05000391/2013603 w/Attachment

cc w/encl: (See next page)

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

Sincerely,

**/RA/**

Robert C. Haag, Chief  
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cc w/encl: (See next page)

\* Previous Concurrence

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Letter to Michael D. Skaggs from Robert C. Haag dated May 10, 2013.

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2013603

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2013603

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: Spring City, TN 37381

Dates: February 17 – March 31, 2013

Inspectors: T. Nazario, Senior Resident Inspector, Construction Projects Branch (CPB) 3, Division of Construction Projects (DCP) Region II (RII)  
R. Lewis, Resident Inspector, CPB3, DCP, RII  
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S. Rose, Senior Construction Project Inspector, CPB3, DCP, RII, Sections P.1.1, P.1.2, P.1.3

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

Enclosure

## **EXECUTIVE SUMMARY**

### **Watts Bar Nuclear Plant, Unit 2**

This integrated inspection included aspects of engineering and construction activities performed by TVA associated with the Watts Bar Nuclear (WBN) Plant Unit 2 construction project. This report covered a six-week period of inspections in the areas of quality assurance, identification and resolution of construction problems, construction activities, and follow-up of other activities. The inspection program for Unit 2 construction activities is described in NRC Inspection Manual Chapter 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 inspectors concluded that concerns pertaining to several open items, including an unresolved item (URI), a historical violation, and two construction deficiency reports (CDRs) had been appropriately addressed for WBN Unit 2. These items are closed.
- Other areas inspected were adequate with no findings identified. These areas included quality assurance; piping; mechanical systems and components; electrical systems and components; fire protection; pre-operational testing activities; various NRC inspection procedures; CDRs; and refurbishment activities.



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## REPORT DETAILS

### Summary of Plant Status

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

### I. QUALITY ASSURANCE PROGRAM

#### Q.1 Quality Assurance (QA) Oversight Activities

##### Q.1.1 Identification and Resolution of Construction Problems (Inspection Procedure [IP] 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 applicant disposition and actions associated with PER 665549, Actuator stem in side-loading packing on chemical and volume control system flow control valve 2-FCV-062-0089, and PER 673393, Loose bolting on flange joints for system WBN065 (EGTS). The inspectors also reviewed applicant actions associated with the discovery of indications in manufacturer's longitudinal seam welds on historically-supplied piping in association with new work (PERs 459520 and 630635).

The inspectors also reviewed PERs 390014 and 417153, written due to a deficiency in refurbishment activities that incorrectly applied the wrong set point to relief valve tests, and nozzle damage to 2-RVF-070-0683B. NRC inspectors observed the reassembly inspections and refurbishment bench test for the safety-related relief valve 2-RVF-070-0683B to verify that the valve was assembled and tested in accordance with the work instructions as part of work order (WO) 112032018 and procedure 25402-000-GPP-000-N3541, "Bench Set Point Testing of Relief/Safety Valves," Revision (Rev.) 1.

In addition, PER 639165, ASME Section III activity - traceability for containment spray heat exchanger bolting, was reviewed by the inspectors to verify that adequate corrective actions were completed. This inspection included a review of the material traceability record, WBC-11-303, December 7, 2011, for the 2A and 2B containment spray heat exchangers, and field verification to verify that the correct bolting material was installed.

Documents reviewed are listed in the attachment.

###### b. Observations and Findings

No findings were identified.

c. Conclusions

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

## 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. Additionally, the inspectors independently assessed select construction activities to verify that potential impacts on the operating unit had been identified and adequately characterized with appropriate management strategies planned for implementation. Furthermore, the inspectors performed independent walkdowns of select construction work locations to verify that controls to protect the operating unit provided an adequate level of protection and had been properly implemented. The inspectors also followed up on unexpected work activities which did affect the operating unit (PER 692589), as well as unexpected activities which did not affect the operating unit (PER 688407).

Specific work activities observed included work associated with:

- WO 111880143, CRDR EDCR 52343: Fabricate/install Top Hat for SPEC 200 Cabinet 2-L-11A IAW FCR 55709-A
- WO 111880143, CRDR EDCR 52343: Fabricate/install Top Hat for SPEC 200 Cabinet 2-L-11B IAW FCR 55709-A
- WO 111069768, Install/Inspect 2-FT-067-0061A on Panel 2-L-193

Specific work activities that the applicant had screened out as not affecting Unit 1 included, but were not limited to, those discussed throughout this report.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Overall, adequate management oversight and controls were in place for observed construction activities that could potentially impact the operating unit, and an adequate level of protection had been implemented.

**C.1.2 Electrical Components – Work Observation and Construction Refurbishment Process (IPs 51053 and 37002)**

a. Inspection Scope

The inspectors observed receipt inspection and storage of safety-related components using guidance in IP 51053-02.02.a and b. Specifically, the inspectors reviewed and observed commercial grade dedication testing activities associated with TVA CATID CQA446A, 600VAC, 400A fuse blocks. The inspectors observed traceability maintenance for proper component identification, material handling to ensure component physical condition, traveler documents, segregation practices for nonconforming components, procedural compliance, storage environments, as well as results of functional and qualification testing.

Documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 51053 Section 02.02.a - 1 sample
- IP 51053 Section 02.02.b - 1 sample

b. Observations and Findings

No findings were identified.

c. Conclusions

The applicant's receipt inspection and material storage/handling were appropriate for the material and its expected end-use.

**C.1.3 Mechanical Components – Work Observation and Construction Refurbishment Process (IPs 50073 and 37002)**

a. Inspection Scope

The inspectors observed the pump alignment for thermal barrier booster pump WBN-2-PMP-070-0130-B to verify that the alignment activities were completed in accordance with WO 114314888 and installation procedure 25402-000-GPP-0000-N3602, "Installation of Rotating Equipment," Rev. 3. The inspectors reviewed the vendor specification WBN-VTD-G200-0400, Rev. A, to verify that the vendor manual requirements were properly translated into the work order activities. Also, the inspectors reviewed measuring and test equipment (M&TE) calibration records to verify the M&TE were labeled to indicate the due date, or interval of the next calibration.

The inspectors observed the passive refurbishment inspections, engineering evaluations, and construction reassembly activities for the residual heat removal (RHR) 2B heat exchanger, the component cooling water system seal water heat exchanger, excess letdown heat exchanger, and the letdown heat exchanger. The inspections were completed to verify the appropriate refurbishment inspections were conducted in accordance with the applicant's procedures, 25402-00-GPP-000-T1216, "Watts Bar Unit 2 Completion Project Refurbishment Program", Rev. 9, and 25402-3DP-G04G-0090, "Engineering Evaluation for Commodity Refurbishment," Rev. 8. As part of the heat exchanger reassembly activities, the inspectors reviewed the associated WO instructions, vendor manual specifications, and torque data sheets, to verify that the heat exchangers were reassembled in accordance with the associated WO instructions, and applicant procedures 25402-00-GPP-0000-N3601, "Vessel, Tank, Stationary and Non-Rotating Equipment," Rev. 2 and 25402-00-GPP-0000-N3529, "Pressure Retaining Bolted Connections," Rev. 2. The inspectors reviewed the bolting material certificates of conformance and certified material test reports to verify that the material met the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Section II, 1995 edition 1996 Addenda, and that the records met the requirements of the QA program. The inspectors reviewed the associated field change requests (FCRs) to verify that an adequate engineering justification was completed to reconcile and approve the use of the heat exchanger bolting material between the original commitment to ASME B&PV Section II, 1971 edition through summer 1973 Addenda and the requirements to ASME B&PV Section II, 1995 edition 1996 Addenda.

Documents reviewed for this inspection are listed in the attachment.

The following samples were inspected:

- IP 37002 Section 02.02.b - one sample
- IP 37002 Section 02.02.d - four samples
- IP 37002 Section 02.02.e - four samples

b. Observations and Findings

No findings were identified.

c. Conclusions

The refurbishment and reassembly activities for the 2B thermal barrier booster pump alignment and heat exchanger refurbishment were completed in accordance with the applicable WO instructions and procedures.

**C.1.4 Piping – Work Observation (IPs 49063 and 37002)**

a. Inspection Scope

The inspectors observed the planning and preparation reviews associated with a hydrostatic test for the emergency raw cooling water (ERCW) system to verify applicable requirements were implemented in accordance with 25402-000-GPP-0000-N3506, "Pressure Testing of Piping, Tubing and Components," Rev. 8. The inspectors observed the development of hydrotest package 2-067-47W845-7-2-B-16 and performed an independent review within the established test boundaries to verify that all required

welds will be adequately tested. Additionally, inspectors observed fit-up and welding activities associated with WO 09-952202-002 which added a vent line and valve at the high point of the pressurizer spray line. Specifically, inspectors reviewed the associated work package to verify that fit-up was in conformance with construction/installation specifications and that designated quality control (QC) hold-points had been satisfied and record keeping was adequate for work performed.

The inspectors also observed the hydrolaser (water jet) flushing of the auxiliary feedwater (AFW) system from approximately valve 2-3-829 to pipe support 03B-2AFW-R106 upstream of the motor-driven 2A-A AFW pump and from valve 2-3-828 to pipe support 03B-2AFW-R101 upstream of the motor-driven 2B-B AFW pump. The inspection was completed to verify the hydrolaser flushing process was accomplished in accordance with the work instructions and met the requirements of procedure SMP-7.0, "Control of Cleanness, Layup and Flushing," Rev. 3.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Planning and preparation reviews were consistent with procedural expectations. Piping modifications were governed by WO and consistent with requirements for the applicable piping class.

**C.1.5 Construction Activities – Heating, Ventilation, and Air Conditioning (HVAC) Cooling Coil Piping Installation Observations (IPs 49063 and 50100)**

a. Inspection Scope

The inspectors reviewed the records for four construction component hydrostatic tests for the lower compartment cooling coils to verify the tests were completed in accordance with Bechtel procedure 25402-000-GPP-0000-N3506, "Pressure Testing of Piping, Tubing and Components," Rev. 8, and the test acceptance criteria was observed and recorded in accordance with the test procedure. In addition, the inspectors reviewed the training records for the test director and supervisors to verify the personnel completing the tests were qualified and knowledgeable of the test procedure requirements. Also, the inspectors reviewed M&TE calibration records for two pressure gauges and a thermometer. The inspectors verified that M&TE was labeled to indicate the due date, or interval of the next calibration, and was uniquely identified to provide traceability to its calibration data.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the cooling coil construction hydrostatic tests were completed in accordance with the approved procedures and the test acceptance criteria were met.

**C.1.6 Construction Activities –Containment Penetrations (Mechanical) Work Observation (IP 53053)**

a. Inspection Scope

The inspectors observed visual inspections and reviewed at least three documents including WO 111151676, material data reports, and QC personnel qualifications for the installation of mechanical seals R2S117 and R2S118. The inspections were completed to verify the following: (1) penetration seal components met the material specifications; (2) the work activities were completed in accordance with approved instructions, procedures, and drawings; (3) the penetrations were inspected by qualified personnel; (4) measures existed to protect the seal material during installation; and (5) visual examinations were performed in accordance with procedure MAI-2.2, “Mechanical Penetration Seals,” Rev. 6.

Documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 53053 Section 02.02.a - two samples
- IP 53053 Section 02.02.b - two samples

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the mechanical seal penetrations were installed in accordance with the approved procedures and instructions.

**C.1.7 Electrical Components and Systems – Work Observation (IP 51053)**

a. Inspection Scope

The inspectors observed and evaluated portions of receiving inspections and storage activities for safety-related raceway systems. The inspectors reviewed receipt inspection reports and storage activities of safety-related raceway systems consisting of rigid galvanized steel 1 inch to 5 inch conduits, and focused on 1½ inch and 2 inch conduits. The inspectors verified that proper identification was provided on the components and in the receiving inspection reports. The inspectors reviewed documented reports of receipt inspection parameters. The inspectors reviewed Form 6, “Procurement Data Sheet QA Record,” for procurement engineering group package BYC739C and BYC741R to confirm that items specified matched stored components in



the warehouse for specified requirements such as caps, couplings, threads, and labels. The inspectors reviewed the certificate of qualification and experience evaluation records for the individuals that performed the receipt inspections to evaluate adequate number of qualified staff assigned to receipt inspections and required storage functions. In addition, the inspectors interviewed the receipt inspectors to inquire on the methods used to perform the receipt inspections. The inspectors visited the Class D warehouse area (outdoor storage) to confirm storage level designation matched environmental condition requirements, component segregation, identification including Underwriters Laboratory UL-6 labels, and to verify there was no physical damage. The inspectors confirmed that each conduit had the required coupling fitting and the appropriate color end cap in proper condition. The inspectors reviewed TVA electrical engineering standard specification SS-E21.001, "Rigid Steel Conduit (Zinc Coated)," Rev. 5, to identify component requirements for this type of raceway system.

The following samples were inspected:

- IP 51053 Section 02.02.a - 2 samples
- IP 51053 Section 02.02.b - 2 samples

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that the raceway systems receipt inspections and storage methods were appropriate.

### **C.1.8 Electrical Components and Systems – Work Observation (IP 51053)**

a. Inspection Scope

The inspectors reviewed completed work and inspected the installation of safety-related direct current system magnetic, reversing motor starter 2-STR-46-56A-S, Nutherm model 72507. The inspectors reviewed the starter receipt inspection report included in requisition 25402-011-MRA-EC00-00001, "Procure Direct Current, Magnetic, Reversing Starter, Thermal Overloads, and Enclosure," Rev. 1, under purchase order 212934, Item#1, to verify receipt inspection parameters. The inspectors reviewed the Nutherm International, Inc., starter unit certificate of qualification, CC-11949-1, Rev. 0, to verify compliance with engineering specifications. The inspectors reviewed WO 09-954322-000 to understand the scope of work for the installation of the starter. The inspectors reviewed Nutherm qualification report TVA-11949R, Rev. 1, to confirm qualifications for each component that make up the starter unit, including safety functions, environmental conditions, and seismic integrity. In addition, the inspectors interviewed the receipt inspectors to inquire on the methods used to perform the receipt inspection. The inspectors reviewed 25402-011-MRA-EC00-00001, Rev. 0 and Rev. 1, material requisition documents that covered the design basis, document submittal requirements, supplier QA program requirements based on American National Standards Institute

(ANSI) N45.2 1997 edition, and drawing 1023-52523-33 dimensional outline and electric schematic, to verify compliance with TVA drawing 2-45W600-46-6, Rev. 3, wiring diagrams feedwater pump and turbines schematic diagrams. The inspectors conducted a walkdown to inspect the starter installation and its feeder conduit, number 2SG938S, a 2 inch flexible seal-tight conduit with an external grounding conductor. The inspectors observed the starter was installed in accordance with design, construction specifications, and work procedures. The unit was in the correct location but was not wired up at the time of the inspection. The enclosure for the starter was properly mounted and secured. The starter was protected from hostile environments, such as high pressure piping, rotating equipment, and other structures or components non-seismically supported. The starter was provided with a temporary hand written identification tag.

The following sample was inspected:

- IP 51053 Section 02.02.e - 1 sample

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that the portion of the installation performed to date for the starter in this scope was adequate.

### **C.1.9 Instrument Components and Systems – Work Observation (IP 52053)**

a. Inspection Scope

The inspectors reviewed a selection of components associated with instrument air system used for safety-related control components of the emergency gas treatment system. The inspectors reviewed and evaluated receiving inspection activities pertaining to the material requisition and purchase order used to acquire the solenoid valves and pressure regulators required for WO 10-951171-002. The inspectors conducted interviews and reviewed documents to verify that documentation relative to quality requirements of the components such as functional and qualification testing were as specified, that receipt inspection attributes were identified, that component identification was maintained, and that non-conforming components were controlled. The inspectors reviewed documents and interviewed receipt inspection staff to verify that training and qualifications were adequate to perform the receipt inspections.

The inspectors conducted walkdowns of areas where safety-related instrument air system solenoid valves were stored. The storage unit contained ASCO Red Hat solenoid valves (QA-1, 3 way 1/4", 125 VDC) documented in purchase order 13945. A total of 23 valves were stored at racks DA-08-003-000, DA-08-039-000, DA-10 039-000, DA-10-051-000, and DA-08-051-000. The inspectors verified proper identification, control of environmental conditions, as prescribed by engineering instructions, and that components were stored in the proper storage level designation in accordance with ANSI N45.2.2. Additionally, the inspectors conducted interviews to verify storage monitoring activities were performed in accordance with procedures and an adequate

number of qualified personnel were available to perform the required receipt inspections and storage functions.

The inspectors reviewed and evaluated completed work associated with WO 10-951171-002 for the installation of components for this portion of the instrument air system. The inspectors performed walkdowns and document reviews to verify that the location, configuration and installation of instrument air system pressure regulators 2-PREG-065-004, 2-PREG-065-005, solenoid valves 2-FSV-065-004-A, 2-FSV-065-005-A and associated sense lines were in accordance with the latest construction specifications, work instructions and drawings. The inspectors also performed walkdowns to verify that the type of solenoid valve and pressure regulator used were as specified, that components were correctly and permanently identified, that installed equipment was adequately protected from adjacent construction activities and that instrument components maintained physical independence between redundant parts as designed. The inspectors conducted walkdowns to verify whether safety-related systems were adequately separated from normal plant control systems.

The following samples were inspected:

- IP 52053 Section 02.02.a - 4 samples
- IP 52053 Section 02.02.b – 23 samples
- IP 52053 Section 02.02.d – 4 samples

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The solenoid valves and pressure regulators covered under the scope of this inspection were adequately installed.

**C.1.10 Electrical Cable – Records Review (IP 51065)**

a. Inspection Scope

The inspectors reviewed cable testing records for cables outside containment to confirm that required tests were performed, approved technical procedures were followed, test equipment was operated by qualified personnel, equipment calibration was current, and that test data results were properly documented. The inspectors reviewed MAI-3.3, Cable Terminating, Splicing, and Testing for Cables Rated Up to 15,000 Volts, Rev. 30, Appendix H, to identify required testing by cable type. The records reviewed were taken from completed WO forms and cable termination data sheets. The records covered cable/wire identification, mark number, from-to locations, required tests with expected minimum test readings, test voltages, termination inspection activities with

QC personnel review initials and dates, and test results including test equipment number, calibration due date, and continuity check. The test records reviewed included:

- 2PL3147B (WHB-1/WJE-50 – 600V)
- 2PM1541K (WVA-50 – 300V)
- 2PM1661K (WVA-50 - 300V)
- 2PV833D (WDE-52 – 600V)
- 2PV834E (WDE-52 – 600V)
- 2PV835F (WDE-52 – 600V)
- 2PV836G (WDE-52 – 600V)
- 2B22 (WDK-52 – 600V)
- 2V806B (WHH-52 – 600V)
- 2V807 (WHH-52 – 600)
- 2V814B (WHH-52 – 600V)
- 2V815B (WHH-52 – 600V)
- 2PV440G (WDH-5 – 600V)
- 2PV336F (WDH-55 – 600V)
- 2PV228E (WDH-5 – 600V)
- 2PV109D (WDH-55 – 600V)
- 2B444G ( WDN-52 – 600V)
- 2PV829G (WHB-52 – 600V)
- 2B443F (WDN-52 – 600V)
- 2PV830G (WDH-55 – 600V)

The following samples were inspected:

- IP 51065 Section 02.02.d - 20 samples

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that cable testing records were adequate. All test records were for low voltage (600 volts) cables located outside of containment.

### **C.1.11 Electrical Cable – Records Review (IP 51065)**

a. Inspection Scope

The inspectors reviewed documentation that established power and instrument cable raceways were properly filled to account for thermal and mass loading. The inspectors reviewed class 1E cable ampacity calculations for control (120 volts), low voltage (600 volts), and medium voltage (5, 8, and 15 kV) cables. The inspectors reviewed TVA electrical design standard DS-E12.6.3, “Auxiliary and Control Power Cable Sizing, up to 15,000 volts,” Rev. 10, to ensure the applicant adequately established cable sizing basis from nationally recognized standards such as Insulated Cable Engineers Association and National Electrical Code and to verify thermal limits applied in sizing cables. The

inspectors reviewed weight (mass) loading calculations and software tracking of individual conduit and cable tray weight loading maintained in the integrated cable & raceway design system (ICRDS). The inspectors reviewed the evaluation of cable tray weight limit increases for engineering document construction release (EDCR) 55229 covered in calculation WCG-2-715, Rev. 0, to verify the process used for qualifying cable trays and supports for loads in excess of the existing reduced weight limits. The inspectors reviewed a number of the ICRDS raceway standard reports to assess adequacy of weight and cable sizing determination. ICRDS reports reviewed included the following:

- 0-3TRY-292-1/2-A (18X4 Tray)
- 0-3TRY-292-2151/2192-A (18X4 Tray)
- 0-3TRY-292-306/2239-B (18X4 Tray)
- 0-3TRY-292-1916/1917-B (18X4 SBOT)
- 0-4TRY-292-1935/1940-A (12X4 Tray)
- 0-4TRY-292-2318/2325-A (18X4 Tray)
- 0-4TRY-292-2416/2514-B (18X4 Tray)
- 0-4TRY-292-2481/2482-B (18X4 Tray)
- 0-3TRY-292-2361/2362-B (18X4 Tray)
- 0-4TRY-000-2368/2393-A (18X4 Tray)
- Conduit 2M4641A (3")
- Conduit 2PLC1B (1.5")
- Conduit 2PLC00262B (.75")
- Conduit 2PLC00282B (1"), 2PLC00288B (1")
- Conduit 2VC00811B (.75")
- Conduit 2VC01400B (1.5")

The inspectors reviewed exception request and approval form for exceptions EX-WB-DC-30-22-74 and EX-WB-DC-30-22-63 that covered cable trays filled to 60 percent of cross sectional area inside the raceway and conduits filled beyond the 40 percent limit, respectively. The cable trays in these exceptions were in the auxiliary building with a cable tray size of 18 inches X 4 inches and the following designations:

- 2345/2346-B (18X4 Tray)
- 2346/2347-B (18X4 Tray)
- 2347/2348-B(18X4 Tray)
- 2348/2349-B (18X4 Tray)
- 2321/2322-B (18X4 Tray)
- 2322/2361-B (18X4 Tray)
- 2343/2344-B (18X4 Tray)
- 2343/2361-B (18X4 Tray)
- 2344/2345-B(18X4 Tray)

The conduits in these exceptions were:

- Conduit 2PLC2372B (3")
- Conduit 2PM7277B (1.5")
- Conduit 2PM6361F (3")
- Conduit 2PM6362F (3")

The inspectors reviewed weight (mass) loading calculations to verify the process used to qualify cable trays and supports for loads in excess of approved weight limits.

The following samples were inspected:

- IP 51065 Section 02.03 - 19 cable tray samples and 10 conduit samples.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that cable thermal and conduit and cable tray weight loading were adequately sized and properly documented for the samples selected for inspection.

### **C.1.12 Electrical Cable – Records Review (IP 51065)**

a. Inspection Scope

The inspectors reviewed records associated with the training and qualification of five quality control inspectors and five field engineers to verify that the system for personnel qualification records was adequate and maintained current. The inspectors conducted interviews and reviewed records to verify whether inspection personnel were qualified in accordance with ANSI N45.2.6. The inspectors conducted interviews and reviewed records to verify that personnel involved with cable installation and personnel assigned to conduct special tests had records that reflected an effective indoctrination and training program that ensured suitable proficiency and skills to perform assigned duties were achieved and maintained. The inspectors also reviewed records to verify that sufficient and reliable data was available to reasonably support qualification and to verify that actions were taken to authenticate the record material. Documents reviewed included employee training reports, training requirement matrices, experience evaluations, certificates of qualification, cable test records and work order pre-job briefing registers.

The following samples were inspected:

- IP 51065 Section 02.04 - 5 samples for inspectors and craftsmen

b. Observations and Findings

No findings were identified.

c. Conclusions

Records of personnel qualifications were adequate. The records reviewed reflected that an effective training and indoctrination program was in place that ensured proficiency was maintained for field engineers tasked with conducting special tests.

### **C.1.13 Electrical Cable – Records Review (IP 51065)**

#### a. Inspection Scope

The inspectors reviewed records associated with five design and five field changes to verify that timely reviews were conducted by qualified personnel, the appropriate type of change documents were used, and whether design changes were subject to adequate design control. The inspectors reviewed records to verify whether non-conformance reports were prepared for instances where non-conformances to design requirements were resolved through the design change process.

The following samples were inspected:

- IP 51065 Section 02.06 - 5 samples for design and field changes

Documents reviewed are listed in the attachment.

#### b. Observations and Findings

No findings were identified.

#### c. Conclusions

The inspectors determined that change control records were adequate.

## **F.1 Fire Protection**

### **F.1.1 Fire Protection (IP 64051)**

#### a. Inspection Scope

The inspectors accompanied fire protection personnel during a periodic inspection of construction areas to determine whether construction activities and areas met procedure requirements. The inspectors took a limited set of field-verifiable attributes from preventive maintenance guidance into the field and evaluated 10 fire suppression devices. The inspectors reviewed labeling, accessibility, cartridge weight, extinguisher agent, and material condition of fire extinguishers, to determine whether any evidence of deterioration was present, extinguisher agent was free of contamination, and cartridge weight met the preventive maintenance specifications. The inspectors reviewed preventative maintenance instructions to determine whether records of these 10 fire suppression devices met procedure inspection requirements.

The inspectors observed three construction activities using ignition sources to determine whether fire prevention procedure requirements were met. This included the handling and use of flammable materials and the use of combustible materials relative to locations of flammable ignition sources. Specifically, the inspectors observed hot work activities related to:

- WO 112973131, 2-CCU-067-0075B Lower compartment coolers 2B pipe welding;

- WO 110926665, Unit 2 pipe chase sensing line welding 2-SenI-062-0343A & 0342A; and
- WO 114007787, Post weld heat treatment steam piping.

The following fire suppression devices were observed and associated records were reviewed:

- AB-35
- U2-FW-158
- U2-FW-69
- U2-FW-117
- U2-FW-119
- U2-FW-5
- U2-FW-22
- U2-FW-25
- U2-FW-09
- U2-FW-88

The following samples were inspected:

- IP 64051 Section 02.07 – 10 samples
- IP 64051 Section 02.08 – 3 samples

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The periodic inspections performed by fire protection personnel of construction activities and construction areas met procedure requirements. The applicant's firefighting staff was adequately maintaining fire prevention equipment for the purposes of suppressing fires within the auxiliary building and reactor building. The applicant implemented adequate fire protection measures and controls to support Unit 2 construction activities and minimize impact on Unit 1 operation activities.

**P.1 Pre-Operational Activities**

**P.1.1 (Discussed) Preoperational Testing Quality Assurance (IP 35301)**

a. Inspection Scope

Background: The objective of this IP was to confirm that 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 (NQA) Plan, TVA-NQA-PLN89-A; Regulatory Guide 1.68, "Initial Test Programs for Water Cooled Nuclear Power Plants,"



Rev. 2; 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 were previously performed and documented in NRC Integrated Inspection Report 05000391/2011603 (ADAMS Accession No.ML111370702), Section P.1.1.

Inspection Activities: This inspection specifically focused on the QA audit functions that would be performed during the conduct of preoperational testing. IP 35301, Section 02.03, Audits, subpart 'b.1' requires verification by direct questioning of 25 percent of the personnel assigned responsibility for audit functions that they understand the defined requirements. The inspectors interviewed two certified lead auditors, representing 100 percent of the individuals assigned for lead audit functions for Watts Bar 2. These interviews were conducted to determine the scheduled plans for future audits and to verify the individuals who had responsibility for leading the audits understood the defined requirements.

This satisfied the required inspection for IP 35301, Section 02.03.b.1.

b. Observations and Findings

No findings were identified.

c. Conclusion

The QA audit functions have been established for preoperational testing.

**P.1.2 (Closed) Overall Preoperational Test Program Review (IP 70301)**

a. Inspection Scope

Background: The purpose of this inspection was to verify that the applicant had established adequate administrative controls over preoperational testing in accordance with FSAR commitments and regulatory requirements prior to the start of the preoperational test phase. Requirements for the preoperational test program are contained in the FSAR Chapter 14; The TVA NQA Plan TVA-NQA-PLN89-A; Regulatory Guide 1.68, "Initial Test Programs for Water Cooled Nuclear Power Plants," Rev. 2; 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 were previously performed and documented in NRC Integrated Inspection Report 05000391/2011603 (ADAMS Accession No. ML111370702), Section P.1.2.

Inspection Activities: This inspection specifically focused on IP 70301, Section 02.01, Test Program, subpart 'b.' which requires verification that the applicant's test program includes requirements for testing consistent with FSAR commitments; and Section

02.03, Test Program Administration, subpart 'd.' which requires verification that formal methods be established to control scheduling of test activities. The inspectors reviewed the applicant's Primavera schedule to verify the preoperational tests had been scheduled and sequenced to support the preoperational testing phase. The inspectors conducted interviews with the startup manager to verify administrative controls were in place to ensure the preoperational test schedule would be routinely updated and maintained. The inspectors reviewed Startup Manual Procedure (SMP)-8.0, Administration of Preoperational Test Instructions, Rev. 9, and the applicant's preoperational test matrix to verify the following:

- tests to be performed have been identified and sequenced;
- test objectives established;
- test summaries written;
- testing prerequisites identified; and
- test acceptance criteria identified.

b. Observations and Findings

No findings were identified.

c. Conclusion

Based on the inspections performed per IP 71301 and documented above and in NRC Integrated Inspection Report 05000391/2011603, Section P.1.2, the NRC has ascertained that the applicant's administrative controls have been developed in accordance with the FSAR commitments and regulatory requirements. This IP is considered closed. If major changes to the applicant's instructions and procedures are identified through observation of preoperational testing activities, the NRC may re-inspect those changes as necessary to satisfy the requirements in this procedure.

**P.1.3 (Discussed) Preoperational Test Program Implementation (IP 70302)**

a. Inspection Scope

Background: The objective of this IP was to confirm the applicant has implemented administrative controls over the preoperational testing program. This will be an ongoing inspection throughout the preoperational testing phase.

Inspection Activities: This inspection specifically focused on IP 70302, Sections 02.01, Test Program; 02.02, Test Organization; and 02.03, Document Control. Inspectors conducted interviews with the startup manager to verify knowledge of the general test program and associated responsibilities and reviewed the preoperational testing schedule. The following five tests were selected at random to verify that they have been scheduled to be completed as part of the preoperational test program:

- 2-PTI-015-01, Steam Generator Blowdown;
- 2-PTI-031B-01, Incore Instrument Room Ventilation and Chillers;
- 2-PTI-068-04, Pressurizer Relief Tank;
- 2-PTI-072-01, Containment Spray Pump/Valve Logic Test; and

- 2-PTI-228-01, Emergency Lighting.

This satisfied the inspection requirements of Section 02.01 of IP 70302.

The inspectors interviewed three key personnel within the test organization (Nuclear Steam Supply Systems (NSSS) supervisor, NSSS test engineer, and the startup maintenance and craft manager) to verify they met the specified qualification requirements. The interviews were conducted to verify there were consistent expectations between these key personnel and the startup manager, with specific focus on the following:

- responsibilities of key test personnel;
- method and responsibility for appointing test personnel;
- lines of authority and responsibility; and
- organizational interfaces for organizations involved in the test program.

This satisfied the inspection requirements of Section 02.02 of IP 70302.

Additionally, the inspectors selected the following three recently approved test procedures (approved on February 13, 2013) to verify they were approved in accordance with administrative procedures:

- 2-PTI-068-04;
- 2-PTI-015-01; and
- 2-PTI-072-01.

This satisfied the inspection requirements of Section 02.03.a of IP 70302.

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspections performed have demonstrated that the applicant has implemented controls for the administration of the preoperational test program. Additional inspection is required per IP 70302 once preoperational testing is sufficiently underway on safety-related systems.

#### IV. OTHER ACTIVITIES

##### OA.1.1 (Discussed) Construction Deficiency Report (CDR) 50-391/86-08: Incorrect Tubing Configuration on Containment Isolation Valve Actuators (IPs 52053 and 52055)

a. Inspection Scope

Background:

The applicant identified that containment isolation valves 2-FCV-30-10 and 2-FCV-30-40 did not meet the closing time requirements as specified in WBN FSAR Section 6.2.4.

This deficiency of valves 2-FCV-30-10 and 2-FCV-30-40 not meeting their closing times was documented in non-conformance report (NCR) WBN 6328. The applicant issued significant condition report (SCR) WBN MEB 8546 for WBN2 to identify all WBN system 30 (building ventilation) containment isolation valves that have a speed control valve installed in the exhaust port of the quick exhaust valve. The speed control valves are intended to control opening times only and must be installed in the supply air line, however, speed control valves were actually installed in the exhaust port of quick exhaust valves. Speed control valves installed in this configuration could change the closure time of system 30 containment isolation valves or result in failure of the actuator to close the valve.

The applicant determined this deficiency was the result of the following combination of causes:

- Insufficient tubing configuration details on vendor drawings to support field work on the air actuator's supply and exhaust air lines;
- Insufficient details to reflect the correct installation of a quick exhaust valve on single- and double-cylinder air actuators;
- Failure to require vendor drawings and documents, used for source inspection, to accurately reflect the proper configuration of valves/actuators; and
- Failure to request clarification to design requirements prior to initiating.

This condition resulted in affected containment isolation valves not meeting their closing time requirements during a design basis accident, and was documented as CDR 50-391/86-08. The applicant issued PER 143540 to track and resolve CDR 50-391/86-08.

#### Inspection Activities:

The inspectors performed a partial review of EDCR 54923 and associated WOs to verify field changes would, when implemented, correct the deficiencies identified with affected system 30 containment isolation valves. However, the WOs were still in the planning process and no field work had been completed as of the date of this inspection period.

#### b. Observations and Findings

No findings were identified.

#### c. Conclusions

The inspector did not the complete review of EDCR 54923 and associated WOs, therefore, further review of these documents is needed. In addition, the inspection of field work is needed to satisfy closure of CDR 50-391/86-08 since the inspectors were not able to conduct an adequate review of completed work documents and observe field installation on affected containment isolation valves. Therefore, CDR 50-391/86-08 will remain open.

**OA.1.2 (Closed) CDR 50-391/81-71: Failure to Erect Platforms, Ladders, & Stairs in accordance with Applicable Drawings; and CDR 50-391/82-51: Undocumented Minor Modifications to Structural and Miscellaneous Steel (IP 35007)**

a. Inspection Scope

Background:

Construction deficiency reports 50-391/81-71 and 50-391/82-51 were issued in the early 1980s to address miscellaneous structural steel items whose configuration was not in strict compliance with drawings and weld quality that did not consistently meet requirements.

Corrective action for Unit 1 to address weld quality was to inspect a statistical sample of more than 18000 inches of weld. Weld quality was then accepted for use-as-is with a greater than 96 percent confidence. For the configuration aspect, the applicant performed 100 percent inspection of all affected structures. Structures found not in strict conformance to the drawings were either reworked or the drawings were revised. For Unit 2, insufficient documentation was available to show that configuration inspections and rework was completed. To justify closure, the applicant selected a statistical sample of drawings within the scope and inspected the items to verify there were no significant deviations from the drawings.

Inspection Activities:

The inspectors reviewed the final closure packages for these two CDRs to verify that the existing structural items would perform their safety function. Calculations CDQ0020002012000121, CDQ0020002012000122, and CDQ0020002012000123, which established the total population of drawings, a statistical sample of 50 of those drawings to inspect, and the results of those inspections were included in the closure packages and reviewed by the inspectors to verify adequate closure.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that the applicant's sampling and reinspection gave adequate assurance that the configuration of structural and miscellaneous steel at WBN 2 will perform its safety function. The inspectors had previously inspected certain aspects of these CDRs, documented in NRC Integrated Inspection Report 05000391/2012610 Section OA.1.4 (ADAMS Accession No. ML13035A201). Based on the results of these inspections, CDR 50-391/81-71 and CDR 50-391/82-51 are closed.

**OA.1.3 (Closed) Violation (VIO) 50-391/86-25-01: Failure to Follow Procedures, Instructions, and Drawings in the Area of Separation Between Safety Train A and Train B Instrument Lines (IPs 52051 and 52055)**

a. Inspection Scope

Background:

Violation (VIO) 391/86-25-01 was issued because installed instrument sensing lines connected to pressure switches for the turbine driven auxiliary feedwater pumps failed to meet the minimum 18-inch separation criteria for redundant safety trains. VIO 391/86-25-01 identified specific examples of installed instrument lines which violated the specified separation requirements. The applicant failed to follow procedures, instructions, and drawings that depicted separation criteria between safety-related instrument sensing lines. The applicant issued WBP880634PER to address sensing line separation violations found on design output drawings. The applicant issued design change notices P-01570-A, P-03101-B, P-03473-A, P-03474-B, P-04928-A, and F-04929-A to relocate lines that did not meet the required minimum separation distance. The applicant's extent of condition review for the identified separation violations was covered under this PER. The applicant implemented corrective actions under significant condition adverse report NCR6172SCA, which encompassed an inspection of all applicable instrument line installation acceptance criteria.

The applicant issued PER 143705 for WBN Unit 2 to track and resolve VIO 391/86-25-01, URI 391/86-25-02, CDR 391/85-49, and the instrument line corrective action plan (CAP). The separation requirements were shown on TVA drawing 47W600-0-4, "Electrical Instruments and Controls", which outlined the instrument lines separation criteria requirements between safety-related instrument trains. The applicant determined that the cause of the deficiencies was a failure by construction and QC personnel to correctly interpret the drawing requirements and lack of clarity in the applicable drawing notes. The instrument sensing lines separation criteria requirements originally specified on TVA drawing 47W600-0-4 are now specified in engineering specification N3E-934, "Instrument and Instrument Line Installation and Inspection."

Inspection Activities:

All of the above referenced documents have been closed, indicating completion of the required corrective actions. The inspectors reviewed the applicant's engineering complete closure package, corrective action documents, and recurrence controls, which were found to be acceptable. The inspectors determined that WOs and EDCRs were being developed to implement specification N3E-934 that adequately specified the requirements for instrument sensing lines separation criteria. The inspectors reviewed the corrective actions accomplished by PER 143705 and concluded they were acceptable.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based upon the review of the applicant's engineering specification N3E-934 and corrective action documents the inspectors concluded that the scope and effectiveness of the applicant's corrective actions were the same as Unit 1, and are in compliance with all applicable requirements. Based on these actions, VIO 50-391/86-25-01 is closed.

**OA.1.4 (Closed) Unresolved Item (URI) 391/86-25-02: Review of Instrument Line Separation Documentation Required by QCP-3.13-2 (IP 52055)**

a. Inspection Scope

Background:

The NRC issued URI 50-391/86-25-02 to review the inspection records and field work for instrument line installations to assure that the required separation inspections were correctly performed and documented.

The applicant issued PER 143705 to track and resolve VIO 391/86-25-01, URI 391/86-25-02, CDR 391/85-49, and the Instrument Line CAP. The separation requirements were originally shown on TVA drawing 47W600-0-4, "Electrical Instruments and Controls", which outlined instrument line separation criteria requirements between safety-related instrument trains. The applicant specified the requirements for instrument line separation inspection and documentation in Watts Bar Quality Control Procedure (QCP), QCP-3.13-2, "Instrument Line Train and Protection Set Line Separation".

Inspection Activities:

The inspectors reviewed multiple applicant documents associated with instrument lines separation, including the applicant's engineering complete closure package, and found that the separation criteria and requirements were relocated from the original documents into other TVA documents. The original instrument line separation inspection and documentation requirements were specified in Watts Bar QCP 3.13-2, Rev. 2. The corrective actions of SCAR WBP880578SCA, Rev. 4, cancelled the instrument line separation inspection and documentation requirements in Rev. 7 of QCP 3.13-2. Engineering change notice 6772 removed the instrument lines separation criteria originally specified on drawing 47W600-0-4, and relocated these requirements into engineering document ER-WBN-EEB-001, "Instrument and Instrument Line Installation and Inspection." The applicant subsequently superseded document ER-WBN-EEB-001 and put the requirements for these inspections into engineering specification N3E-934, "Instrument and Instrument Line Installation and Inspection." Currently the applicant's instrument line separation inspection and documentation requirements are located in engineering specification N3E-934, Rev. 8.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based upon the review of the applicant's engineering specification N3E-934, Rev. 8, WOs, and additional documentation, the inspectors concluded that the scope and effectiveness of the applicant's corrective actions were the same as Unit 1, are in compliance with all applicable requirements, and are adequate to address this item. Based on these actions, URI 50-391/86-25-02 is closed.

## **V. MANAGEMENT MEETINGS**

### **V.1 Exit Meeting Summary**

An exit meeting was conducted on April 11, 2013, to present inspection results to Mr. Hruby, General Manager, 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**

J. Adair, TVA - Engineering  
A. Bangalore, Bechtel - Engineering  
D. Beckley, Bechtel - Engineering  
D. Charlton, TVA – Licensing  
J. Cockrell, TVA - Licensing  
A. Hart, Bechtel – Construction Supervisor  
R. Hruby, TVA – General Manager  
M. McGrath, TVA – Licensing  
D. McNeil, TVA - Project Manager Construction  
J. Mitchell, Bechtel – Project Field Procurement Manager  
D. Myers, TVA - Quality Assurance Program Manager  
J. O’Dell, TVA - Regulatory Compliance  
G. Scott, TVA – Licensing  
E. Taylor, Bechtel – Mechanical Field Engineer  
L. Thompson, Bechtel - Procurement Engineering Group  
N. Welch, TVA - Startup Manager  
O. J. Zeringue, TVA - General Manager Engineering and Construction WBN Unit 2

### **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 49063	Piping - Work Observation
IP 50073	Mechanical Components - Work Observation
IP 50100	Heating, Ventilating, and Air Conditioning Systems
IP 51053	Electrical Components and Systems - Work Observation
IP 51065	Electrical Cable – Records Review
IP 52051	Instrument Components and Systems - Procedure Review
IP 52053	Instrument Components and Systems – Work Observation
IP 52055	Instrument Components and Systems - Records Review
IP 53053	Containment Penetrations (Mechanical) Work Observation
IP 64051	Procedures - Fire Prevention/Protection
IP 70301	Overall Preoperational Test Program Review
IP 70302	Preoperational Test Program Implementation

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

None

### Closed

70301	IP	Overall Preoperational Test Program Review (Section P.1.2)
391/81-71	CDR	Failure to Erect Platforms, Ladders, & Stairs in accordance with Applicable Drawings (Section OA.1.2)
391/82-51	CDR	Undocumented Minor Modifications to Structural and Miscellaneous Steel (Section OA.1.2)
391/86-25-01	VIO	Failure to Follow Procedures, Instructions, and Drawings in the Area of Separation Between Safety Train A and Train B Instrument Lines (Section OA.1.3)
391/86-25-02	URI	Review of Instrument Line Separation Documentation Required by QCP-3.13-2 (Section OA.1.4)

### Discussed

35301	IP	Preoperational Testing Quality Assurance (Section P.1.1)
70302	IP	Preoperational Test Program Implementation (Section P.1.3)
391/86-08	CDR	Incorrect Tubing Configuration on Containment Isolation Valve Actuators (Section OA.1.1)

## LIST OF DOCUMENTS REVIEWED

### I. QUALITY ASSURANCE (QA) OVERSIGHT ACTIVITIES

#### Q.1.1 Identification and Resolution of Construction Problems

##### Drawings

FSK-M-1424, Rework Sense Line 2-SENL-068-429A

##### PERs

PER 479961, Stud/Nut Damage During Actuator Reinstallation

PER 170933, Re-review of U2 TVA Produced Radiographs

PER 520790, Zone of Influence Procedural Requirements Are Not Being Implemented

##### Miscellaneous

DCN 51934, Replace 1-FCV-62-89 and 1-FCV-62-93, Rev. A

EDCR 52945, Various Modifications of System 062, Chemical and Volume Control System, Rev. B

##### Work Orders

WO 09-952395-022, EDCR 52945: Replace Valves 2-FCV-62-89 and 2-FCV-62-93

WO 113210978, CMM Sys 062, PER 479961 and 665549, Replace Bonnet to Operator Studs and Nuts

WO 09-953848-000, ISI SYS 074 RHR Class B Piping Welds

WO 08-957278-005, EDCR 52637 Install 8" Manual Gate Valves 2-HCV-074-0036 and 2-ISV-074-542

WO 08-957278-003, Install 8" Swing Check Valve 2-CKV-074-0544 IAW EDCR 52637

WO 09-954097-001, CCI EDCR 53614: Install/Inspect Sense Line from WBN-2-RTV-068-0429A to Instrument 2-PT-068-0066.

WO 113690893, CCM Sys 062 PER 520790

### II. MANAGEMENT OVERSIGHT AND CONTROLS

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

##### Drawing

FSK-M-5628, Replace 1-1/2" Piping to Regain Traceability, Rev. 0

##### PERs

PER 547884, Traceability Issues, 5/3/2012

PER 692589, Unexpected Failure of 2-LI-70-63A, 3/7/2013

PER 688407, Hand-switch Bumped Out of Position While Working, 2/26/2013

##### Miscellaneous

N3M-868, Field Fabrication, Assembly, Examination and Tests for Piping Systems, Rev. 3 thru Rev. Notice 9

##### Work Orders

WO 111069768, Install/Inspect 2-FT-067-0061A on Panel 2-L-193

### **C.1.2 Electrical Components – Work Observation and Construction Refurbishment Process**

#### Miscellaneous

PEG Pkg CQA446A, Procurement Data Sheet Associated with Farraz Shawmut or Mersen (Part No 64033J) Fuse Blocks, Rev. 2  
 PEG Pkg CQA446A-X, Updated Testing Criteria for CQA446A IAW PER 403095, Rev. 1  
 PEG Pkg G5920-2-049, Update to CC's for Fuse Blocks (Mild Environment), Rev. 6  
 PER 403095, Inadequate Commercial Grade Dedication, 7/14/2011  
 PER 678060, Fuse Blocks Failed Dedication Testing, 2/5/2013

### **C.1.3 Mechanical Components – Work Observation and Construction Refurbishment Process**

#### Work Orders

WO 112498303, Hydrostatic Test, HTX-62-66, Seal Water HX  
 WO 112456842, WBN-2-HTX-062-0124 Refurbishment, Let Down HX  
 WO 112800284, WBN-2-HTX-074-0031-B-2B RHR HX Bolting  
 WO 112550297, WBN-2-HTX-062-0121, Excess Let Down HX Bolting

#### Miscellaneous

WBN-VTD-W120-2760, Westinghouse Instruction Manual for Auxiliary HX, Rev. 8  
 MRR-32716, Material Receiving Report for PO 428813, 8/20/2012  
 COC 163881, Certification of Conformance for PO 428813, 8/15/2012  
 CMTR H180955, RHR Bolting Material, Rev. 0  
 MRR-34734, Material Receiving Report for PO 513302, 2/18/2013  
 COC 181961, Certification of Conformance for PO 513302, 2/18/2013  
 RFI 1290, Use of Bolting Material for the excess let down HX, 6/5/2012  
 WBT-D-4007, Westinghouse response letter to RFI 1290, 6/12/2012  
 MRR-33878, Material Receiving Report for PO 479838, 11/29/2012  
 COC 181961, Certification of Conformance for PO 91028-93, 11/26/2012

#### Field Change Requests

FCR 58363-A AA-02, 6/1/2012  
 FCR 56641-A-AA-04, 10/24/2012

#### Drawings

2-062-47W809-1-2-B01A, Attachment 1, Seal Water HX Test Boundary Map, Rev. 0  
 2-47W803-2, Flow Diagram Auxiliary Feed water, Rev. 13

#### Data Sheets

2-062-47W809-1-2-B01A, Seal Water HX Hydro Test, Rev. 0  
 WO 112800284, 25402-00-GPP-0000-N3529 Bolting Torque Data Sheet, 2/25/2013  
 WO 114211849, 25402-00-GPP-0000-N3529 Bolting Torque Data Sheet, 3/11/2013  
 WO 112550297, 25402-00-GPP-0000-N3529 Bolting Torque Data Sheet, 3/7/2013

#### M&TE

E73254 Pressure Gauge, 8/20/2013  
 E48167 Pressure Gauge, 8/20/2013  
 E46538 Torque Wrench, 12/14/2013  
 E04480 Torque Wrench, 6/20/2013  
 E00020 Torque Wrench, 7/17/2013  
 E44966 Torque Wrench, 11/5/2013

Dial Indicator E44183, 12/7/13  
 E46756 Torque Wrench Pressure Gauge, 5/7/2013  
 E46756, Torque Wrench, 5/7/2013  
 E 43727, Torque Wrench, 3/20/2013  
 E43767, Torque Wrench Pressure Gauge, 3/20/2013

#### **C.1.4 Piping – Work Observation**

##### Work Orders

WO 113593130, System 003, AFW, Hydrolaser flushing AFW Piping

#### **C.1.5 Construction Activities –HVAC Cooling Coil Piping Installation Observations**

##### Work Orders

WO 114294993, Hydrostatic Construction Tests for lower compartment coils

##### Data Sheets

2-067-47W845-3-LCC-35, Pressure Test Data Sheet, 2/20/2013  
 2-067-47W845-3-LCC-36, Pressure Test Data Sheet, 2/20/2013  
 2-067-47W845-3-LCC-39, Pressure Test Data Sheet, 2/20/2013  
 2-067-47W845-3-LCC-40, Pressure Test Data Sheet, 2/20/2013

##### M&TE

E43955, Pressure Gauge, 4/26/2013  
 E47994, Pressure Gauge, 6/17/2013  
 E36619, Thermometer, 2/6/2013

#### **C.1.6 Construction Activities –Containment Penetrations (Mechanical) Work Observation**

##### Work Orders

WO 11151676, Remove and install seal to facilitate sense lines MK# 117 and MK #118

##### Data Sheets

R2S117 Penetration Seal Installation Data Sheet, 3/19/2013  
 R2S118 Penetration Seal Installation Data Sheet, 3/20/2013  
 Elastomeric Material Batch Data Sheet, 3/18/2013

##### Miscellaneous

Calibration of material weight/volume cup to determine density data sheet, 2/16/2011  
 100760, Certification of Qualification Level II Coatings and Seals, 1/24/2011

#### **C.1.7 Electrical Components and Systems – Work Observation**

##### Miscellaneous

25402-011-MRI-ERD0-00001, Rev. 0, Material Receiving Instruction (MRI) under PO: 493762, item #1 dated 1/22/2013 for 1" rigid steel conduits and under PO: 501628, items #1 & #2 dated 2/6/2013 for 1 ½" and 2" rigid steel conduits

#### **C.1.9 Instrument Components and Systems – Work Observation**

##### Drawing

Control Diagram EGT System Drawing # 2-47W610-65-1 Rev.4, dated 10/20/2008

EDCRs

EDCR 53534, Rev. A, dated 1/7/2010  
 EDCR 54636, Rev. A, dated 1/29/2010

MRs

MR 25402-011-MRA-JV04-00005, Rev. 3, dated 8/19/2010  
 MR 25402-011-MRA-JV05-00012, Rev. 0, dated 11/6/2009

MRRs

MRR 11154 (PO 13495), dated 4/22/2010  
 MRR 10928 (PO 51490), dated 3/31/2010  
 MRR 18898 (PO 131447), dated 10/26/2010

Work Order

WO 113750955, Sys 065 WBN-2-FSV-0005 Replace Pressure Regulator and Solenoid Valve

**C.1.11 Electrical Cable – Records Review**Calculations

EDQ00299920080006, Rev. 18, dated 12/20/2012 for Unit 2 Class 1E V3 Cable Ampacity  
 EDQ00299920080002, Rev. 17, dated 6/24/2011 for Unit 2 Class 1E V4 Cable Ampacity  
 EDQ00299920080001, Rev. 8, dated 12/7/2012 for Unit 2 V5 Cable Ampacity

Miscellaneous

WCG-2-715, Rev. 0, dated 4/2/2010 for Evaluation of Cable Trays and Supports Weight Limit Increases for EDCR 55229.

**C.1.13 Electrical Cable – Records Review**DCNs

DCN 52602, Rev. A, dated 9/29/2010  
 DCN 53804, Rev. A, dated 4/21/2010

EDCRs

EDCR 52427, Rev. A, dated 10/21/2009  
 EDCR 53217, Rev. A, dated 5/28/2010  
 EDCR 55232, Rev. A, dated 4/23/2010

FCRs

FCR 55589, Rev. A, dated 4/16/2010  
 FCR 56164, Rev. A, dated 7/12/2010  
 FCR 56629, Rev. A, dated 9/23/2010  
 FCR 57388, Rev. A, dated 2/2/2011  
 FCR 57637, Rev. A, dated 3/4/2011  
 FCR 58364, Rev. A, dated 7/29/2011

**F.1.1 Fire Protection**Work Orders

WO 112939108 Data Sheet,WBN0-FPS-510-EXT/INSP, File 02, page 13.  
 WO 113698893 Data Sheet,WBN0-FPS-510-EXT/INSP, File 02, pages 12 and 15.  
 WO 113425204 Data Sheet,WBN0-FPS-510-EXT/INSP, File 02, page 13

Preventive Maintenance Instruction/Fire Suppression Records

WBN0-FPS-510-EXT/INSP, File 02, Rev. 1

WBN0-0-FPS-510-0001-C, File 02, Unit 0, Rev. 11

M&TE

E45289, Scale, 9/5/2013

**OA.1.2 Construction Deficiency Report (CDR) 391/81-71: Failure to Erect Platforms, Ladders, & Stairs in accordance with Applicable Drawings and CDR 391/82-51: Undocumented Minor Modifications to Structural and Miscellaneous Steel**Closure Packages

PP-19 for CDR 391/81-71, T02 130221 002

PP-19 for CDR 391/82-51, T02 130221 002

Calculations

CDQ0020002012000121 Rev. 0

CDQ0020002012000122 Rev. 0

CDQ0020002012000123 Rev. 0

**OA.1.3 Violation (VIO) 391/86-25-01: Failure to Follow Procedures, Instructions, and Drawings in the Area of Separation Between Safety Train A and Train B Instrument Lines**PERs

PER 143705, Instrument Line Separation Documentation, and Failure to Follow Procedures, Instructions, Drawings, in Separation between Safety Trains, June 6, 2012

Drawings

47W600-0-4, Electrical Instruments and Controls, Rev. 30, October 14, 1975

2-47W600-0-7, Electrical Instruments and Controls, Rev. 1, September 25, 2008

2-47W600-0-8, Electrical Instruments and Controls, Rev. 1, September 25, 2008

Miscellaneous

TVA Watts Bar Nuclear Plant Site-Specific Engineering Specification N3E-934, Instrument and Instrument Line Installation and Inspection, Rev. 8, December 18, 2003

**OA.1.4 Unresolved Item (URI) 391/86-25-02: Review of Instrument Line Separation Documentation Required by QCP-3.13-2**PERs

PER 143705, Instrument Line Separation Documentation, and Failure to Follow Procedures, Instructions, Drawings, in Separation between Safety Trains, June 6, 2012

Drawings

47W600-0-4, Electrical Instruments and Controls, Rev. 30, October 14, 1975

2-47W600-0-7, Electrical Instruments and Controls, Rev. 1, September 25, 2008

2-47W600-0-8, Electrical Instruments and Controls, Rev. 1, September 25, 2008

Miscellaneous

TVA Engineering Requirements Specification No. ER-WBN-EEB-001, Instrument and Instrument Line Installation and Inspection, Rev. 0, January 28, 1987

TVA Quality Control Procedure QCP-3.13-2, Instrument Line Train Protection Set Line Separation, Rev. 6, September 18, 1987  
 TVA Quality Control Procedure QCP-3.13-2, Instrument Line Train Protection Set Line Separation, Rev. 7, June 21, 1991  
 TVA Watts Bar Nuclear Plant Site-Specific Engineering Specification N3E-934, Instrument and Instrument Line Installation and Inspection, Rev. 8, December 18, 2003

### LIST OF ACRONYMS

AC	Alternating Current
ADAMS	Agencywide Documents Access and Management System
AFW	Auxiliary Feedwater
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
B&PV	Boiler & Pressure Vessel
CAP	Corrective Action Plan
CDR	Construction Deficiency Report
CFR	<i>Code of Federal Regulations</i>
EDCR	Engineering Document Construction Release
ERCW	Emergency Raw Cooling Water
FCR	Field Change Request
FCV	Flow Control Valve
FSAR	Final Safety Analysis Report
HVAC	heating, ventilation, and air conditioning
ICRDS	Integrated Cable & Raceway Design System
IP	Inspection Procedure (NRC)
MAI	Modification/Addition Instruction
M&TE	measuring and test equipment
NCR	Non-Conformance Report
No.	number
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation, Office of (NRC)
PER	Problem Evaluation Report
PO	Purchase Order
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Procedure
Rev.	Revision
RHR	residual heat removal
SCAR	Significant Corrective Action Report
SCR	Significant Condition Report
TVA	Tennessee Valley Authority
URI	Unresolved Item
VIO	Violation
WBN	Watts Bar Nuclear Plant
WO	Work Order