



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
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ATLANTA, GEORGIA 30303-1257

February 4, 2013

Mr. Michael D. Skaggs  
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**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2012610**

Dear Mr. Skaggs:

On December 31, 2012, 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 January 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 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/**

Eric Michel, Acting Chief  
Construction Projects Branch 3  
Division of Construction Projects

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

Enclosure: Inspection Report 05000391/2012610 w/Attachment

cc w/encl: (See next page)

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

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**/RA/**

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cc w/encl: (See next page)

\* Previous Concurrence

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Letter to Michael D. Skaggs from Eric Michel dated February 4, 2013.

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2012610

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2012610

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: Spring City, TN 37381

Dates: November 18 – December 31, 2012

Inspectors:

- T. Nazario, Senior Resident Inspector, Construction Projects Branch (CPB) 3, Division of Construction Projects (DCP) Region II (RII)
- D. Failla, Resident Inspector, CPB3, DCP, RII
- E. Patterson, Resident Inspector, CPB3, DCP, RII
- C. Jones, Senior Construction Inspector, Construction Inspection Branch (CIB) 1, Division of Construction Inspection (DCI), RII, Sections QA.1.3, QA.1.4, QA.1.7
- G. Crespo, Senior Construction Inspector, CIB1, DCI, RII Sections QA.1.3, QA.1.5, QA.1.6, C.1.2
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- J. Vasquez, Construction Inspector, CIB2, DCI, RII Section OA.1.1
- D. Harmon, Construction Inspector, CIB3, DCI, RII Section OA.1.4

Approved by: Eric Michel, Acting 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 seven-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 a construction deficiency report (CDR) had been appropriately addressed for WBN Unit 2. This item is closed.
- Other areas inspected were adequate with no findings identified. These areas included quality assurance, various electrical systems and components; mechanical systems and components; NRC inspection procedures (IPs); CDRs; non-cited violations, 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 PER 637891, written due to a deficiency in stress calculation 06002500601, Revision (Rev.) 004, to verify that appropriate actions had been implemented. The inspectors interviewed applicant personnel responsible for structural support analysis and also reviewed calculations associated with spring supports located on the main steam line fed from loop 4 steam generator. The inspectors reviewed calculation 06002500604, Rev. 2 associated with support 2-01A-427, located in the Unit 2 auxiliary building, to verify that the supports would operate within their range and ensure that the spring's performance would not be affected by the different loads.

In addition, level B PER 584243, "Adverse Trend in Number of Loose Bolting and Clamps Found in the Field after Completion," was reviewed by the inspectors to verify adequate corrective actions. The trend PER was initiated based on 16 PERs identified that involved loose bolting or clamps found in the field after final quality control (QC) acceptance and/or field verification without proper documentation. This inspection included a review of the common cause analysis, associated background information, completed and planned corrective actions, and discussions with various personnel.

###### b. Observations and Findings

No findings were identified. Relative to trend PER 584243, the analyses associated with the issues were thorough and the applicant's corrective actions performed to date were appropriate to the circumstances. Training materials were thorough and adequately covered the necessary information, and the work order (WO) process had been improved.

###### c. Conclusions

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

**Q.1.2 Audit of Applicant's Surveillance of Contractor QA/QC Activities (IP 35020)****a. Inspection Scope**

The inspectors reviewed TVA's contracts to determine the requirements imposed on TVA's contractors to comply with approved QA programs and maintain periodic assessments of the program implementation. The inspectors reviewed the schedule for TVA projected oversight activities dated September 10, 2012, for years 2012 and 2013, to assess plans and aspects covered by the oversight team. The inspectors reviewed Nuclear Assurance (NA) – Oversight Reports to assess the attainment of overall contractor surveillance objectives. The inspectors reviewed information on previously identified deficiencies contained in WB2CCP-CAR-001, dated December 6, 2007, including the review of planned corrective actions and associated PER 138533, to determine corrective action effectiveness. The inspectors reviewed planning for surveillance reports to verify that the proper planning was scoped and that the contractors included in the planning attended the entrance and exit meetings. The inspectors reviewed qualification records for three individuals, assigned to perform surveillance activities, to verify actual training and experience for the individuals selected. The review extended to select audit reports to verify surveillance of Bechtel Power Corporation's program for the control of quality required by TVA, American Society of Mechanical Engineers (ASME) Section III program implementation, and the corrective action program. Documents reviewed are listed in the Attachment.

**b. Observations and Findings**

No findings were identified. The applicant's oversight process covered engineering activities, corrective action programs, project procedures, design changes, staff training, competency of walk-down teams, Unit 1/Unit 2 interface points and coordination, ASME Section III QA related activities, procurement, and document control. The audit reports addressed ASME Section III activities by Bechtel, Westinghouse/PCI, and TVA's QA Manual. In addition, the audit reports addressed previous report findings, the evaluation of corrective actions, and identification of any new areas of concern.

**c. Conclusions**

Based on the review of the available documentation, the inspectors concluded that sufficient evidence exists to satisfy the intent of this inspection procedure.

**Q.1.3 Licensee Management of QA Activities (IP 35060)****a. Inspection Scope**

**Background:** Historical NRC assessments of the readiness of the applicant and their engineering, procurement, and construction (EPC) contractor to conduct construction activities were documented in several inspections that examined the status and effectiveness of QA program activities, primarily involving design, procurement, and construction activities. Based upon the results reported in those inspections, integrated inspection report (IIR) 05000391/2009602 (Agencywide Documents Access and Management System (ADAMS) Accession number (No.) ML091210420) was issued in April 2009 to document that the requirements for IP 35060 had been completed from a construction readiness standpoint.

Inspection Activities: The inspectors interviewed senior management responsible for the QA program and reviewed the program and policy change history to evaluate QA program interfaces and the ongoing status of the program. The applicant's assessments of the overall effectiveness of QA program management were reviewed for adequacy. Screenings and dispositions for applicable NRC bulletins and information notices were evaluated for adequacy. Reportability screenings for conditions adverse to quality, defects, and nonconforming items were reviewed to evaluate compliance to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55(e).

The inspectors evaluated related inspection history since April 2009 to evaluate the ongoing adequacy of the management and implementation of the corporate QA program, especially in the areas of design and procurement. Specifically, results were evaluated from the October 2009 inspection of design activities documented in NRC IIR 05000391/2009604 (ADAMS Accession No. ML093030479), and the August 2010 inspection of procurement receiving and storage in NRC IIR 05000391/2010603 (ADAMS Accession No. ML102170465). Related inspections of design change control using IP 37055, "Onsite Design Activities," are discussed in Section QA.1.7 of this inspection report.

The inspectors reviewed applicability screenings and dispositions for NRC generic communications to verify that generic issues with nuclear plant design, procurement, and construction were evaluated and were addressed by corrective actions, when found applicable to Watts Bar 2. The applicant's response to the following NRC generic communications, related to design and procurement, were reviewed:

Bulletin 2011-01	Mitigating Strategies
Bulletin 2012-01	Design Vulnerability In Electric Power System
Information Notice 2010-23	Malfunctions of Emergency Diesel Generator Speed Switch Circuits
Information Notice 2010-25	Inadequate Electrical Connections
Information Notice 2010-27	Ventilation System Preventive Maintenance and Design Issues
Information Notice 2011-01	Commercial-Grade Dedication Issues Identified During NRC Inspections
Information Notice 2011-19	Licensee Event Reports Containing Information Pertaining to Defects in Basic Components
Information Notice 2012-06	Ineffective Use of Vendor Technical Recommendations
Information Notice 2012-11	Age-Related Capacitor Degradation
Information Notice 2012-12	HVAC Design Control Issues Challenge Safety System Function
Information Notice 2012-17	Inappropriate Use Of Certified Material Test Report Yield Stress And Age-Hardened Concrete Compressive Strength In Design Calculations

Documents reviewed are listed in the Attachment.

b. Observations and Findings

An unresolved item (URI) was identified. The review of changes to the QA program and policy, and interviews with QA program management, identified that QA program changes have been implemented since April 2009; however, none of the changes implemented resulted in reductions in the level of commitment for the applicant's and EPC contractor's QA programs. The review of QA audits and assessments of QA activities determined that periodic audits have been conducted that evaluated the full scope of QA activities at the Watts Bar Unit 2 construction completion project. The inspectors' review of 50.55(e) reportability screenings, as documented in a sample of 10 PERs, identified the following URI:

Introduction: The inspectors identified a URI associated with the adequacy and implementation of procedures to identify and evaluate significant breakdowns in any portion of a QA program in accordance with 10 CFR 50.55(e).

Description: The inspectors' review of the 10 CFR 50.55(e) screening reviews, performed for PER 378571, determined that a QA surveillance, performed by the applicant's EPC contractor, had identified programmatic failures to install required design-specified features required to correct nonconforming configurations for safety-related piping supports that had been installed at-risk. Specifically, the auditors determined that an inadequate procedure resulted in failures to implement followup actions for "red-line" field changes that had been conditionally approved by design (i.e., "approved with changes"). The "red line" process was used to document deviations from designs which were installed at-risk. "Red-line" changes were then submitted to engineering for approval after the work was completed. "Red-line" changes that were not acceptable to engineering would receive approvals that were conditional, pending implementation of additional configuration changes and quality verifications. As described in PER 378571, "red-line" changes that had received "approvals with changes" were inappropriately closed and documented as fully implemented even though the followup had not been performed.

The inspectors determined that sufficient information was provided in the PER to indicate that a "significant breakdown" had occurred in the process for control of field changes, as directed by procedure 25402-000-GPP-0000-N3105, "Field Change Requests (FCR)." The deficiency in the procedure was significant because it resulted in installation of nonconforming safety-related structures and components. The deficiency represented a breakdown in the design control program, because the field change component did not provide for the installation of safety-related design features when the features were specified in "approvals with changes."

Documentation provided with PER 378571 showed that the deficient condition extended to all (100%) of the category of field changes that were referred to as "red-line rollup FCRs" that had been "approved with changes." Required corrective actions included implementing a revision to the FCR procedure, retraining of design and construction personnel on the proper process for completing "red-line" rollup FCRs that had been approved with changes, and processing of WOs to correct the unacceptable installations in seven safety-related systems.

Although a documented reportability evaluation was attached to the PER, the evaluation only addressed the physical nonconformances reflected in the hardware installations.

The evaluation did not address the breakdown in the field change component of the design control program and did not meet the requirement to evaluate and report any significant breakdown in any portion of the QA program, which could be associated with a substantial safety hazard as prescribed by 10 CFR 50.55(e)(3)(i) and 10 CFR 50.55(e)(4)(iii).

Additional reportability reviews were performed by the applicant's EPC contractor after a review for extent of condition determined that a similar lack of follow-up extended to all "red-line" submittals which had received "approvals with changes." Deviations requiring follow-up engineering evaluations, configuration changes, and quality verifications were identified in 60 FCRs affecting piping supports in seven safety-related systems. The additional nonconforming configurations were reviewed to determine potential reportability of the affected hardware; however, none of the additional evaluations addressed the programmatic issue with the field change component of the design control program.

The applicant issued PER 654428 to address this concern. The inspectors will review the applicant's resolution of this issue to evaluate if the applicant had determined the appropriate conclusion of reportability. This issue was identified as URI 05000391/2012610-01, "Discrepancies in Determining Reportability Under 50.55(e)."

c. Conclusion

One example of a URI was identified for discrepancies in determining reportability under 10 CFR 50.55(e). Based on the review of the available documentation, the inspectors concluded that sufficient evidence exists to satisfy the intent of the periodic review of this inspection procedure.

**Q.1.4 In-Depth QA Inspection of Performance (IP 35061)**

a. Inspection Scope

Background: Historical NRC inspections have been conducted to verify that QA and QC oversight over construction activities met applicable requirements, were commensurate with the level of activities, and implemented adequate corrective actions. Based upon the results reported in those inspections, NRC IIR 05000391/2009602 (ADAMS Accession No. ML091210420) was issued in April 2009 to document that the requirements for IP 35061 had been completed from a construction readiness standpoint.

Inspection Activities: The inspectors reviewed a sample of work instructions and field drawings, contained in work control documents, and conducted field observations to verify that activities were controlled in accordance with procedural and drawing requirements and that the content of the documents described adequate methods, critical points, and reflected design intent. To evaluate QC staffing and program performance, the inspectors interviewed personnel responsible for QC program activities, reviewed staff qualifications, QC staffing levels, QC reports, and performance trends for reports of nonconforming items. Results from internal audits of QA and QC were reviewed to verify the applicant was properly evaluating program performance.

The inspectors evaluated related inspection history since the April 2009 inspection report to evaluate the ongoing adequacy of QA and QC oversight, and the effectiveness of corrective actions to address identified issues. Specifically, results were evaluated from the inspection of quality programs' performance that was documented in NRC IIR 05000391/2010605 (ADAMS Accession No. ML110410680). Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

Based on the review of the available documentation, the inspectors concluded that sufficient evidence exists to satisfy the intent of the periodic review of this inspection procedure.

**Q.1.5 Procurement, Receiving, and Storage (IP 35065)**

a. Inspection Scope

Background: Historical NRC inspections have been conducted to verify that QA program attributes were correctly translated into procedural requirements. NRC IIRs 05000391/2008006 (ADAMS Accession No. ML081210735), 05000391/2008009 (ADAMS Accession No. ML083050404), and 05000391/2008010 (ADAMS Accession No. ML090291033) documented that the requirements for IP 35065, "Procedures, Receiving, and Storage" were found to be acceptable.

Inspection Activities: The inspectors performed record reviews, conducted walk-downs, and interviewed responsible personnel to determine whether equipment procurement specifications included applicable QA and technical requirements identified in the safety analysis report (SAR), and whether receipt inspections and storage activities were conducted in compliance with QA program requirements.

Procurement

The inspectors reviewed TVA audit NGDC1201, "QA Program Verification – Design Control and Procurement Document Control," dated March 13, 2012 – August 9, 2012, to determine the adequacy of the applicant's oversight of their contractors' procurement activities.

The inspectors reviewed the TVA procurement specification SS-E12.6.01, "5-15kV Cable, Ethylene-Propylene Rubber Insulated," Rev. 5, and Bechtel technical specification WM-ER-4043, "Welding Filler Metal," Rev. 0, to determine whether specified design parameters were in accordance to those listed in the SAR, applicable technical requirements were properly identified, and QA requirements were appropriately included. The procurement specifications were also reviewed for the inclusion of environmental qualification requirements.

Purchase order (PO) 118671, "Okonite Reactor Coolant Pump (RCP) Power Cable," dated June 21, 2010, and PO 458157, "Weldstar Welding Electrodes," dated September

19, 2012, were reviewed to determine whether documentation and item acceptance were specified. The inspectors reviewed these POs to ensure the requirements of 10 CFR 21 were sufficiently imposed on the suppliers.

The inspectors reviewed TVA's approved suppliers list to determine whether the suppliers for PO's 118671 and 458157 had an approved status at the time of purchase. The inspectors noted that audit reports 2010V-18, "Nuclear Procurement Issues Committee (NUPIC) Joint Audit of The Okonite Company," dated December 16, 2010, and 344-7 "Weldstar Company Audit," dated January 26, 2010, approved these suppliers to be placed on the approved suppliers list. The inspectors also noted that each supplier, Okonite and Weldstar, have restrictions requiring the need for source surveillance prior to shipment to the site. The inspectors reviewed 25402-D11-YQA-EWG2-30001, "Okonite Company Quality Surveillance Report," dated December 6, 2010, to ensure source surveillance requirements were fulfilled. The inspectors also evaluated the implementation for the protection, handling, and control of the procurement documents reviewed.

### Receiving

During a walk-down of receipt inspection facilities and interviews with responsible personnel, the inspectors examined the adequacy of environmental conditions, assurance of material protection from damage, access control, segregation of nonconforming items, labeling, and identification. The inspectors reviewed material receiving instruction (MRI) and material receiving report (MRR) forms to ensure inspection and documentation of receiving activities were performed in accordance with Bechtel procedure 25402-000-GPP-N6104, "Materials Receiving," Rev. 8. Measuring and Test Equipment (M&TE) logs were reviewed to ensure proper tools were used and available. The inspectors also reviewed the qualification records of two receipt inspectors to ensure staff were adequately trained.

The inspectors reviewed MRRs 22145, "RCP Cable," dated January 24, 2011, and 33147, "Welding Electrodes," dated September 27, 2012, to determine whether the certificate of conformance or certified material test report for the items received were in compliance with acceptance requirements specified in the procurement specification, contained additional supporting information, including a reference to the PO, and were signed by an appropriate member of the supplier's QA organization. The inspectors also reviewed MRI 25402-011-MRI-EWG2-00003, Rev. 0, and MRI 25402-000-MRI-NWCO-00132, Rev. 0, included in PO 11871 and PO 458157, to ensure receipt inspection was documented as the requirement for the acceptance of the items.

Additionally, the inspectors performed an independent verification for the following POs and MRRs by comparing the requirements contained in the PO with the test, material, and inspection data contained in the certificate of conformance/certified material test report to ensure specific procurement requirements were met for the purchased material or equipment:

- PO 62855, "6" Gate Valve," dated 1/11/2010 and MRR 28201, "6" Gate Valve," dated 9/8/2011
- PO 41823, "Orifice Plates," dated 11/10/2009 and MRR 10433, "Orifice Plates," dated 3/18/2010



- PO 425903, "Conduit Support Assemblies," dated 9/17/2012 and MRR 33100, "Conduit Support Assemblies," dated 9/21/2012
- PO 75148, "Neutron Flux Monitoring System," dated 7/14/2009 and MRR 26541, "Neutron Flux Monitoring System," dated 6/21/2011

### Storage

The inspectors reviewed Bechtel procedure 25402-PRO-0007, "Field Material Storage Control," Rev. 5, to determine whether storage activities, conducted for safety-related items, were adequately established. The inspectors conducted a walkdown of storage facilities to observe whether requirements for Class B, C, and D storage levels were satisfied including protection from damage, resistance to fire and weather, paved flooring, drainage, and environmental conditions. The inspectors evaluated procedures for access control to storage areas and identification and control of items while in storage.

The inspectors reviewed a sample of storage inspection reports, including those listed below, to determine whether storage type and inspection requirements were properly identified, applicant inspection of storage facilities and activities were conducted, and specified storage conditions were met. The inspectors evaluated the use of temperature monitors, proper stacking or cribbing of items, the absence of physical damage, identification and marking of items, overall cleanliness, the use of caps and covers, separation of stainless steel from carbon steel, and the use of QC hold tags for nonconforming items.

- Report #12-1309, "Storage and Maintenance Surveillance," dated 10/1/2012
- Report #12-1310, "Storage and Maintenance Surveillance," dated 10/1/2012
- Report #12-1311, "Storage and Maintenance Surveillance," dated 10/1/2012
- Report #12-1316, "Storage and Maintenance Surveillance," dated 9/28/2012
- Report #12-1317, "Storage and Maintenance Surveillance," dated 9/28/2012
- Report #12-1318, "Storage and Maintenance Surveillance," dated 9/28/2012

The inspectors also reviewed 25402-000-GPP-0000-N6204, "Field Material Control and Traceability," Rev. 18, to ensure in-place/in-plant storage requirements were adequately established. The inspectors reviewed a list of WOs to ensure preventive maintenance is being performed on safety-related equipment stored in-place including safety injection, residual heat removal (RHR), thermal barrier, and containment spray pumps and motors. Documents reviewed are listed in the Attachment.

#### b. Observations and Findings

No findings were identified. The inspectors noted that the POs included procurement data sheets and MRIs that specified documentation and acceptance requirements, including required information for the certificate of conformance and/or the need to provide a certified material test report.

c. Conclusions

Based on the review of the available documentation, the inspectors concluded that sufficient evidence exists to satisfy the intent of the periodic review of this inspection procedure.

**Q.1.6 QA Program Evaluation of Engineering Organization (IP 35960)**

a. Inspection Scope

The inspectors reviewed the applicant's document TVA-NQA-PLN89-A, "TVA Nuclear Quality Assurance Program," Rev. 27, to verify the QA program provided a policy statement directing that activities affecting quality be accomplished in a planned and systematic manner with the goal of achieving compliance with pre-established quality objectives and acceptance criteria. The inspectors reviewed the organizational structure to verify direct and independent access to top management for the implementation and enforcement of QA programs. The inspectors conducted interviews with responsible engineering staff for the electrical discipline and reviewed training records for one of the two electrical engineers interviewed and an instrument and controls engineer. The interviews reviewed the established process for interdisciplinary coordination and the review of checklists for the review of design documents. The inspectors reviewed procedure 25402-000-GPP-0000-N3105, "Field Change Request," Rev. 14, to review QC aspects of the engineering procedures. The inspectors reviewed samples of QC inspections for the adequacy of safety-related components in compliance with installation instructions found in completed WOs.

The inspectors reviewed Supplier Audit Report, 25402-000-YAA-2012-00001, dated August 23, 2012, to identify the effectiveness and scope of internal evaluations of Bechtel's organization in maintaining compliance with QA program requirements, such as 10 CFR 50 Appendix B; 10 CFR Part 21; American National Standard Institute (ANSI) N45.2: 1971; ASME NQA-1: 2008-09a; and Bechtel Power Corporation BQAM – Rev 7 & 8. The inspectors reviewed NGDC PP-20, "Watts Bar Nuclear Plant Unit 2 Licensing Basis Preservation," Rev. 1, to determine structured coordination with Unit 1 operation requirements while Unit 2 is under construction and the screening processes for potential degradation of systems and components due to aging or lack of preventive maintenance during the time when Unit 2 construction was suspended. The inspectors reviewed instructions for 25402-3DP-G04G-00081, "Engineering Document Construction Release (EDCR)," Rev. 15, to assess the control of engineering documents including staff assignments and responsibilities. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified. The inspectors determined the scope and contents of the audits and surveillance reports provided sufficient evidence to support adequate assessment of the engineering organization on training, corrective actions, and design control. Adverse conditions were identified by the applicant and placed into the corrective action program.

c. Conclusions

Based on the review of the available documentation, the inspectors concluded that sufficient evidence exists to satisfy the intent of the review of this inspection procedure.

**Q.1.7 Onsite Design Activities (IP 37055)**

a. Inspection Scope

Background: In April 2009, during the resumption of the construction completion project for Watts Bar Unit 2, NRC inspectors performed an inspection, documented in NRC IIR 05000391/2009602 (ADAMS Accession No. ML091210420), to determine whether the onsite design activities performed by the applicant and their EPC contractor were conducted in compliance with the technical and QA requirements described in the facility SAR. The inspectors documented that the inspection status of IP 37055 was complete, except that an additional two inspection samples were needed to complete Section 02.06, Installation of Onsite Design.

Inspection Activities: The inspectors evaluated the history of changes to engineering procedures implemented since April 2009 to verify continuing compliance to the SAR. In addition, the inspectors evaluated related corrective action program records and inspection history since April 2009, to evaluate the ongoing adequacy of controls for onsite design, and whether controls for installation of design had been sufficiently verified. Specifically, results from the August 2010 inspection documented in IIR 05000391/2010603 (ADAMS Accession No. ML102170465) and the November 2011 inspection documented in IIR 05000391/2011608 (ADAMS Accession No. ML11311A082) were evaluated. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspectors were not able to satisfy the periodic inspection intent of IP 37055. Additionally, two inspection samples remain required to satisfy the requirements for inspection of Section 02.06 of IP 37055.

**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 bi-weekly 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 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 selected 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 selected 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 five activities during the quarter as documented in Section C.1.1 of IIR 05000391/2012609 (ADAMS Accession No. ML12356A073). This included construction work locations to verify that controls to protect the operating unit provided an adequate level of protection and had been properly implemented.

Specific work activities that the applicant had screened out as not affecting Unit 1 included, but were not limited to, piping activities, instrument work, and refurbishment activities on the RHR heat exchanger, as discussed in this report.

b. Observations and Findings

No findings were identified.

c. Conclusions

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 and Systems – Work Observation (IP 51053)**

a. Inspection Scope

The inspectors inspected in-process replacement of safety-related circuit breakers feeding hydrogen igniter circuits (WO 09-953602-000). The circuit breakers replaced were General Electric type TED 1240 15ML rated for 18,000 amps interrupting capability. The inspectors reviewed completed work inside panel 2DPL-268-0001-A with a total of 16 breakers installed and an additional two breakers waiting to be installed. The inspectors reviewed WO 09-953602-000 to verify that instructions included were adequate to replace the lugs at the output to the breakers to allow the connection of a #2 American Wire Gauge (AWG) insulated copper wire. The inspectors reviewed the clearances of connecting straps to the phase and neutral conductors and the type and ratings of the new breakers to verify that the ampere rating and interrupting rating were in compliance with nationally accepted standards from National Electrical Manufacturer Association standard AB1-1975 edition, for molded case circuit breakers and ANSI / Underwriter Laboratories Inc. (UL) panelboards (ANSI/UL 67). The inspectors reviewed activities to verify that main bus supports were adequate for the voltage and bus size used, that breakers were installed in the proper panel, that circuit breakers replaced were properly identified with manufacturer name, model number, ampere rating, voltage, and short circuit interrupting rating, and that circuit breaker mounting hardware and supports were a proper match to the existing panelboard supports. Additionally, the inspectors observed installation activities to ensure that the installation staff maintained a safe distance in front of the panelboard and provided barrier tape around the work area.

The following sample was inspected:

- IP 51053 Section 02.02e - one sample

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that the circuit breaker installation met requirements.

**C.1.3 Piping – Work Observation (IP 49063)**

a. Inspection Scope

The inspectors observed construction component hydrostatic tests for the 2B reactor coolant pump (RCP) cooling coil to verify the test was 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 test were qualified and knowledgeable of the test procedure requirements. Also, the inspectors reviewed M&TE calibration records for two pressure gauges to verify that M&TE was labeled to indicate the due date, or interval of the next calibration, and were 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 2B RCP cooling coil construction component hydrostatic test was completed and the test acceptance criteria were met in accordance with applicable procedures.

**C.1.4 Heating, Ventilation, and Air Conditioning (HVAC), Piping, and Upper Containment Cooler System Pipe Supports – Work Observations (IPs 50100, 49063, and 50090)**

a. Inspection Scope

The inspectors observed the installation of three supports for ductwork associated with the lower containment coolers and control rod drive mechanism HVAC. The inspectors reviewed the associated WOs, weld travelers, and welder qualifications. The inspectors observed the work activities to verify the HVAC system and supports were installed in accordance with procedure MAI-4.3, "Modification/Addition Instruction HVAC Duct Systems," Rev. 9, welding was completed in accordance with Bechtel general welding standards, approved drawings were available and in use, and appropriate QC reviews were completed for the welding procedures and welder qualifications. The inspectors interviewed the HVAC supervisor, a field engineer, and three welders. In addition, the inspectors observed field engineering inspections for completed lower containment

cooling ductwork risers to verify personnel were following approved procedures, field installations were installed in accordance with supplier instructions, and personnel engaged in the welding of HVAC supports were qualified.

In addition, the inspectors observed construction component hydrostatic tests for two HVAC lower containment cooling coils (LCC-18 and LCC-23) to verify the tests were completed in accordance with 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 test were qualified and knowledgeable of the test procedure requirements. Also, the inspectors reviewed M&TE calibration records for two pressure gauges to verify the M&TE was labeled to indicate the due date, or interval of the next calibration, and were uniquely identified to provide traceability to its calibration data. The inspectors also reviewed the equipment supplier factory hydrostatic test results to verify the tests were completed in accordance with the PO and that the tests had the required QC reviews.

The inspectors conducted inspections of as-installed pipe supports associated with the essential raw cooling water piping connected to the HVAC upper containment cooling coolers. Specifically, the inspectors performed the following to verify the pipe support stress calculations and equipment loads applied on the piping and equipment nozzles were evaluated in accordance with WB-DC-40-31.13, "Seismic/Structural Qualification of Seismic Category I(L) Electrical and Mechanical Equipment," Rev. 8, and WB-DC-40-31.7, "Analysis of Category I and I(L) Piping Systems," Rev. 23. The inspectors:

- walked down a sample of pipe supports for the upper containment coolers
- reviewed pipe stress and vendor equipment seismic calculations for upper containment coolers 2A, 2B, and 2C
- reviewed three hanger walkdown packages, and reviewed associated piping isometric drawings

Documents reviewed are listed in the Attachment.

The following samples were inspected:

- IP 50100 Section 02.04.a – five samples
- IP 50100 Section 02.04.b – three samples

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the ductwork supports were installed in accordance with the approved procedures and the HVAC cooling coil construction hydrostatic tests were completed in accordance with the approved procedures and test acceptance criteria. In addition, the inspectors determined the pipe supports were modeled and installed in accordance with the design specifications.

### **C.1.5 Mechanical Components – Work Observation and Construction Refurbishment Process (IPs 50073 and 37002)**

#### **a. Inspection Scope**

The inspectors observed weld clad repairs to steam generator 1 hot leg side, associated with non-conformance report (NCR) 902741-15. This was inspected to verify whether the clad repair areas were welded in accordance with the weld traveler and the ASME Boiler and Pressure Vessel (B&PV) Code, Section III, 2007 edition. In addition, the inspectors observed the passive refurbishment inspections and engineering evaluation associated with the reassembly of the RHR 2B heat exchanger to verify the appropriate inspections were conducted in accordance with procedure 25402-00-GPP-000-T1216, "Watts Bar Unit 2 Completion Project Refurbishment Program," Rev. 9, and Bechtel procedure 25402-3DP-G04G-0090, "Engineering Evaluation for Commodity Refurbishment," Rev. 8. Documents reviewed are listed in the Attachment.

#### **b. Observations and Findings**

No findings were identified.

#### **c. Conclusions**

The observed refurbishment activities on Steam Generator 1 were conducted in accordance with procedures and ASME B&PV Code 2007 edition. The RHR 2B heat exchanger refurbishment evaluations were conducted in accordance with the applicable procedures.

### **C.1.6 Reactor Vessel and Internals Work Observation (IP 50053)**

#### **a. Inspection Scope**

The inspectors conducted inspections of the reactor pressure vessel (RPV) and reactor vessel internals storage, preservation, housekeeping, and protection activities to determine whether requirements, work procedures, and inspection (quality control) procedures were being met. These activities are controlled by procedure 25402-000-GPP-0000-N2102, "Housekeeping," Revision 8. During the inspection period, the inspectors entered the RPV to observe the condition of the RPV. In addition, the inspectors observed the engineering inspections for the reactor coolant hot and cold leg pipe plug installations to verify the installation was completed in accordance with approved instructions (WO 11963388). The inspectors also inspected the RPV to verify cleanliness requirements were being met and that it was protected from foreign objects and construction damage. The inspectors observed the use of platforms and scaffolding inside the vessel to verify the scaffolding was treated to prevent the spread of accidental fires. The core barrel and internals were inspected to verify storage locations were adequate and controls were in place to protect from construction damage. Access controls were inspected to verify all entries into the RPV were controlled and the entry logs documented each entry into the RPV.

The following samples were inspected:

- IP 50053 Section 02.01.c - one sample

- IP 50053 Section 02.02.a - one sample
- IP 50053 Section 02.03.b - one sample
- IP 50053 Section 02.03.c - one sample

b. Observations and Findings

No findings were identified.

c. Conclusions

Adequate controls were in place to protect the reactor vessel and internals.

### **C.1.7 Instrument Components and Systems – Work Observation (IP 52053)**

a. Inspection Scope

The inspectors observed the pneumatic re-test of the instrumentation control air system (System 32) from isolation valve 2-ISV-032-3790/3791 to 2-ISV-032-0451 to verify the testing was performed in accordance with procedure 25402-000-GPP-0000-N3506, "Pressure Testing of Piping, Tubing and Components," Rev. 8, and adequately addressed the corrective actions from PER 615032 regarding inaccurate test pressure requirement specifications. This pneumatic test was associated with the reactor coolant system instrumentation air system (System 68). The inspectors reviewed the WO, test procedure, and test data sheets to verify that the approved procedures were used to perform the test and that the test personnel executed the test in accordance with the applicable procedures. The inspectors reviewed the training records for the test director and lead QC inspector to verify the personnel completing and verifying the test quality were qualified and knowledgeable of the test procedure requirements. In addition, the inspectors inspected the test setup and reviewed the calibration records for the test M&TE to determine if the test equipment was identified, traceable, calibrated, and properly installed. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The instrumentation pneumatic test was completed in accordance with the approved procedures and the test acceptance criteria were met.

## **F.1 Fire Protection**

### **F.1.1 Procedures – Fire Prevention/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 preventative maintenance guidance into the field and evaluated 10 fire suppression devices. The inspectors reviewed labeling, accessibility, and material condition of fire hoses and fire extinguishers to determine whether any evidence of deterioration was present. 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, to include 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 113414338, Chemical Volume Control System Valve Isolation line; WO 110869865, Reactor Building Structure; WO 112772781, Lower Containment Cooling Unit Flange Weld. Documents reviewed are listed in the Attachment.

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

- AB-1
- AB-3
- AB-4
- AB-18
- U2-FW-85
- 0-ISV-26-663
- 0-ISV-26-691
- 1-ISV-26-668
- U2-FW-16
- U2-FW-34

The following samples were inspected:

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

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, reactor building, shop fabrication facilities, and the control building. The applicant implemented adequate fire protection measures and controls to support Unit 2 construction activities and minimize impact on Unit 1 operation activities.

#### IV. OTHER ACTIVITIES

##### OA.1.1 (Discussed) Construction Deficiency Report (CDR) 391/87-07: Unqualified RCP motor coatings (IP 35007)

###### a. Inspection Scope

Background: CDR 391/87-07 was developed to resolve a concern with the adequacy of the RCP coatings. The coating system used by Westinghouse on RCP motors for both units were not qualified by testing in accordance with ANSI N5.9, ANSI N5.12, and N101.2. Reviews of testing performed by Westinghouse on the coating application gave inconclusive results in 1986, but tests performed in 1984 indicated the system would fail by delaminating under loss of coolant accident (LOCA) conditions. Corrective actions, based on the original RCP motors, called for the pump motors to be reworked to replace the coating.

For Unit 1, the applicant decided to install a wire screen catch system instead of the recoating. In NRC Inspection Report 50-390/95-45 (ADAMS Accession No. ML072680891) issued on September 3, 1994, TVA introduced a calculation to demonstrate acceptable level of debris.

For Unit 2, different corrective actions were developed. The RCP motors were removed and remanufactured by Westinghouse. As part of the corrective actions, the Unit 2 RCP motors have been recoated with Level 1 coatings. Westinghouse confirms that the RCP Motors were coated with Keeler-Long 4500 Level 1 coatings in accordance with TVA General Engineering Specification G-55.

Inspection Activities: The inspectors reviewed CDR 391/87-07 associated with the RCP coatings to verify this activity was addressed in accordance with TVA General Engineering Specification G-55 and industry standards ANSI N5.12, ANSI N101.2, ASTM D1475, and ASTM D562. In addition, the inspectors interviewed applicant personnel and performed a visual inspection of the RCP's motor casings to evaluate corrective action implementation and to determine the quality conditions of the coatings.

###### b. Observations and Findings

No findings were identified.

###### c. Conclusions

The inspectors reviewed CDR 391/87-07 and concluded that there is still documentation under development that requires inspection. Therefore, additional efforts will be required to close this issue.

##### OA.1.2 (Discussed) Non-Cited Violation (NCV) 05000391/2012612-02, Failure to Correct Longstanding Corrective Action Program Deficiencies (IP 92702)

###### a. Inspection Scope

Background: This issue involved the fact that corrective actions identified via the corrective action program had not been completed for an extended period. Some of

these involved procedures, processes, and personnel. The problem was documented in PER 522107. The applicant's actions included improved management of the backlogged corrective actions and various changes to reduce the number of items required to be tracked in the corrective action program. This included allowing the WO process to fix hardware problems.

Inspection Activities: The inspectors reviewed the current backlog status; the QA manual and procedure changes; training materials for the process changes; Employee Concerns Pulsing Survey result; QA audit (25402-WBN-AR-12-0005, Rev. 0, Corrective Action and Nonconformances); a self-assessment of the corrective action program (WBN2-CAP-12-1); and current corrective action program metrics. Additionally, the inspectors observed Project Review Committee (PRC) meetings; Construction Completion Management Review Committee (CCMRC) meetings; and interviewed responsible personnel.

b. Observations and Findings

No findings were identified. Backlog improvements were previously inspected (see NRC IR 05000391/2012608 (ADAMS Accession No. ML12319A368 Section OA.1.1)) and determined to be adequate. The applicant continued to maintain control of the backlog. The assessment activities were thorough with appropriate objectives to assess the process. Appropriate additional corrective actions were initiated as a result of the assessments.

c. Conclusions

The applicant continued to provide adequate control of the backlog. The process changes were an improvement to the corrective action program and management oversight of the corrective action program was exhibited.

**OA.1.3 (Discussed) CDR 391/86-24, Inadequate Flexibility of 3/8-inch Tubing Attached to the Steel Containment Vessel (IP 35007)**

a. Inspection Scope

Background: The subject deficiency was initially reported to the NRC on January 29, 1986, in accordance with 10 CFR 50.55(e) as significant condition report WBN CEB 8576. The NRC documented the deficiency as CDR 50-390/86-28 for Unit 1 and CDR 50-391/86-24 for Unit 2.

As stated in TVA's final report issued on June 27, 1986, the significant condition report was written to identify a design deficiency where design personnel failed to identify that steel containment vessel (SCV) penetrations include a stub piece of approximately 16 to 18 inches; therefore, during construction, the first tubing support beyond the SCV penetration was not located at the correct distance. Design instructions issued in 1979 required that the first tubing support beyond the SCV penetration (inside and outside of the vessel) be located 30 to 40 inches from the penetration.

Design personnel did not consider a 16 to 18-inch stub piece on SCV penetrations when issuing drawings. Therefore, when tubing and tubing supports were installed in accordance with the drawings, the first tubing support could have had as little as 12

inches of tubing between the penetration and support. Such installations were much less flexible than intended.

TVA determined that some of the installations for Unit 1 were acceptable as-is, some required the removal of supports, and some required relocating supports. Drawing details that were misinterpreted were changed or deleted.

For Unit 2, the following actions have been taken:

- Typical drawings series 47A050, 051, 052, 054 associated with instrumentation and controls were revised to correct minor discrepancies and make notes less confusing to the craft, inspection, and field support by engineering change notice (ECN) 6047.

Remaining Unit 2 Actions:

- Implement EDCR's 53917, 53919, and 53927 to install of 3/8-inch tubing through SCV penetrations and installation of tube supports
- Complete pipe stress analysis and resultant pipe support design calculations that will be issued at the completion of support/tubing installation.

Inspection Activities: The inspectors reviewed notes on typical drawing series 47A050, 051, 052, 054 to determine whether the drawing notes had been revised in accordance with design instructions. The inspectors reviewed calculations to support design instructions to determine whether the calculations were adequate. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

The drawings and drawing notes the inspector reviewed were revised to meet design instructions. Additional inspection activities are still required prior to closure of CDR 50-391/86-24. Specifically, the inspectors will review the applicant's field implementation.

**OA.1.4 (Discussed) CDRs 81-71 & 82-51: Undocumented Minor Modifications to Structural and Miscellaneous Steel (IP 35007)**

a. Inspection Scope

Background: Construction deficiency reports 81-71 and 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 18,000 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, the applicant credited the corrective actions that were used for Unit 1.

Inspection Activities: The inspectors held discussions with the responsible applicant staff to discuss their justifications for closure and reviewed documentation to verify that historical work and statistical analysis were applicable and sufficient to close these CDRs for Unit 2. The inspectors also selected a sample of structures and walked them down to verify that the configurations met the drawings. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that the applicant's use of the historical statistical analysis was adequate to accept Unit 2 weld quality because it was applicable to both units; however, further inspection is required in the area of structural configuration before closing these CDRs.

**OA 1.5 (Closed) CDR 391/83-05: Incorrect Use of Category I(L) Supports on Pipes Near Water Chillers (IP 35007)**

a. Inspection Scope

Background:

The deficiency was initially reported to the NRC on January 17, 1983, as NCR SWP8265 in accordance with 10 CFR 50.55(e). The issue was documented as CDR 390/83-05 for Unit 1 and CDR 391/83-05 for Unit 2.

The CDR concerned category I(L) piping supports over safety-related equipment. The piping for the primary water make-up, high-pressure fire protection, and demineralized water systems, shown on TVA drawing 47W491-6, in the vicinity of the safety related main control room water chillers A-A and B-B and shutdown board room water chillers A-A and B-B, were required to be supported by category I(L) supports for pressure boundary integrity and position retention. The piping systems over the safety related equipment were designed for positive retention only, and did not meet TVA Electrical Design Standard DS-E1.3.1, "Protection of Electrical Equipment that is Susceptible to Failure from Fluid Spray and Condensation," which required water lines not to be routed over safety-related electrical equipment; or, that measures be taken to prevent damage to safety-related electrical equipment when water lines are routed above it. The deficiency involved three areas: (1) inadequate procedures or guidelines to aid piping system designers in properly identifying piping systems that must be supported for pressure boundary integrity to protect safety related equipment; (2) incorrect drawings, that did not identify piping systems around the safety related chillers; and (3) a lack of knowledge of the established design criteria.

The applicant issued the project engineering procedure WBP-EP-43.24 (dated March 3, 1984), "Piping Analysis Techniques – Selection" and WB-DC-40-31.7, Rev. 5, "Analysis of Category I & I(L) Piping Systems," to provide guidance to design personnel for proper use of the equipment drawings and established design criteria associated with identifying which non-safety-related systems are required to be analyzed and supported for pressure boundary retention. The applicant revised drawing 47W200-100, "Seismic Compartmentation for Protection of IEEE Class IE Equipment" to identify all areas of the category I structures containing non-safety-related piping which is not supported for pressure boundary integrity. The drawings also included identifying Class IE equipment and added notes to the drawings to indicate what action is required to protect the equipment from water spray. All design work to install spray shields to protect the chillers from overhead water spray associated with ECN 3837 and ENC were completed. After a review of the drawings, design specifications, and ECNs for Unit 1, the inspectors determined that CDR 390/83-05 was adequately resolved for Unit 1 as documented in NRC Inspection Report 50-390/84-76 (ADAMS Accession No. ML082321533).

This deficiency was completed for Unit 2 by PER 172618.

Inspection Activities: To address Unit 2 actions the inspectors performed the following:

- Reviewed PER 172618 to verify the corrective actions were implemented for Unit 2
- Reviewed ECN 5092 to determine if the design change provided water spray protection for systems routed in the vicinity of the shutdown boardroom, main control room water chillers, and their associated chilled water circulating pumps for A-A and B-B chillers.
- Reviewed seismic compartmentation drawing 47W200-100 and 102 to verify seismic equipment classification was identified.
- Walked down AA and BB chiller equipment areas to verify the spray shields were installed in accordance with the ECN.
- Interviewed design engineers and reviewed the updated procedure 0-TI-280, "Implementation and Control of Seismic Compartmentation," Rev. 0, which had superseded WBP-EP-43.24, to verify the design personnel understood the design criteria for identifying and updating design documents for nonsafety-related systems which are required to be analyzed and supported for pressure boundary retention.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on these actions and review of the final closure package, the inspectors determined that the applicant resolved CDR 391/83-05 for Unit 2. This item is closed for Unit 2.

## **V. MANAGEMENT MEETINGS**

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

An exit meeting was conducted on January 11, 2013, to present inspection results to Mr. Hruby, General Manager, and other members of his staff. The inspectors identified that no proprietary information had been received during the inspection and none would be used in the inspection report. The areas inspected were described, inspection activities, and discussed the inspection results. The applicant acknowledged the observations provided with no dissenting comments.

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### **Applicant personnel**

J. Adair, TVA Engineering  
H. Baldner, TVA – Regulatory Compliance  
A. Bangalore, Bechtel – Electrical Engineer  
R. Baron, TVA – Sr. QA Manager  
D. Beckley, Bechtel – Electrical Engineer  
M. Bonomo, Bechtel Civil Engineering  
D. Crowder, Bechtel – Field Engineering  
M. Drulard, Bechtel – Construction  
R. Evans, Bechtel – Engineering Procurement  
R. Hruby, TVA – General Manager  
R. James, Bechtel Civil Engineering  
W. Jones, Bechtel – QC Receipt  
T. Krach, Bechtel Warehouse Supervisor  
J. Martin, Bechtel – Quality Manager  
M. McGrath, TVA – Construction Oversight  
J. McLemore, Bechtel – Field Engineering  
T. Metzler, TVA – Regulatory Compliance  
J. Mitchell, Bechtel – Project Field Procurement Manager  
D. Myers, TVA – Sr. Program Manager  
J. O'Dell, TVA Regulatory Compliance  
R. Partridge, Bechtel – Engineering Procurement  
G. Scott, TVA – Licensing  
T. Shipley, Bechtel – Construction  
R. Yager, Bechtel – Engineering Procurement Manager



### INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction
IP 35020	Audit of Applicant's Surveillance of Contractor QA/QC Activities
IP 35060	Licensee Management of QA Activities
IP 35061	In-Depth QA Inspection of Performance
IP 35065	Procurement, Receiving, and Storage
IP 35960	QA Program Evaluation of Engineering Organization
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 37055	Onsite Design Activities
IP 49063	Piping - Work Observation
IP 50053	Reactor Vessel and Internals Work Observation
IP 50073	Mechanical Components - Work Observation
IP 50090	Pipe Support and Restrain Systems
IP 50100	Heating, Ventilating, and Air Conditioning Systems
IP 51053	Reactor Vessel and Internals Work Observation
IP 52053	Instrument Components and Systems - Work Observation
IP 64051	Procedures - Fire Prevention/Protection
IP 92702	Followup on Corrective Actions for Violations and Deviations

### LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened

05000391/2012610-01	URI	Discrepancies in Determining Reportability Under 50.55(e) (Section Q.1.3)
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#### Closed

391/83-05	CDR	Incorrect Use of Category I(L) Supports on Pipes Near Water Chillers (Section OA.1.5)
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#### Discussed

05000391/2012612-02	NCV	Failure to Correct Longstanding Corrective Action Program Deficiencies (Section OA.1.2)
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391/86-24	CDR	Inadequate Flexibility of 3/8-inch Tubing Attached to the Steel Containment Vessel (Section OA.1.3)
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391/81-71	CDR	Failure to Erect Platforms, Ladders, and Stairs in Accordance with Applicable Drawings (Section OA.1.4)
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391/82-51	CDR	Undocumented Minor Modifications to Structural and Miscellaneous Steel (Section OA.1.4)
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**LIST OF DOCUMENTS REVIEWED****II. MANAGEMENT OVERSIGHT AND CONTROLS****Q.1.2 Audit of Applicant's Surveillance of Contractor Quality Assurance QA/ QC Activities**

Nuclear Assurance (NA) – Oversight Report NA-WB-08-001, dated February 14, 2008 covering period of November 1, 2007 to January 31, 2008.

Nuclear Assurance (NA) – Oversight Report NA-WB-08-013, dated September 16, 2008 covering period of January - July 2008.

Watts Bar Nuclear Plant (WBN) Unit 2 – QA Oversight Report NGDC-WB-11-016, dated January 31, 2012 covering period of September - December 2011.

Watts Bar Nuclear Plant (WBN) Unit 2 – QA Oversight Report NC-WB-12-004, dated April 23, 2012 covering period of January - March 2012.

Watts Bar Nuclear Plant (WBN) Unit 2 – QA Oversight Report NC-WB-12-009, dated August 8, 2012 covering period of April - June 2012.

Watts Bar Nuclear Plant (WBN) Unit 2 – QA Oversight Report NC-WB-12-013, dated November 13, 2012 covering period of July - September 2012.

TVA Watts Bar Nuclear Plant (WBN) – TVA Contract 65419 – Unit 2 Construction Completion Project – TVA Audit 2008V-10 dated 6/25/2008.

TVA Watts Bar Nuclear Plant, Unit 2 Quality Assurance (QA) Audit – NGDC0901 – ASME Section III Activities, dated 1/7/2010.

TVA Watts Bar Nuclear Plant (WBN) Unit 2 Quality Assurance (QA) Audit – NGDC1003– ASME Section III and Preserve Inspection (PSI) Activities, dated 2/2/2011.

Watts Bar Nuclear Plant Construction Completion Project – Assessment Report NGDC-WB-10-005 Corrective Action Program, dated 7/19/2010.

Watts Bar Nuclear Plant Construction Completion Project – Assessment Report NGDC1003, dated February 2, 2011

TVA Watts Bar Nuclear Plant, Unit 2 Quality Assurance (QA) Audit – NGDC0901, dated January 7, 2010

Watts Bar Nuclear Plant Construction Completion Project – Assessment Report NGDC-WB-10-005, dated July 20, 2010

**Q.1.3 Licensee Management of QA Activities**Miscellaneous

TVA-NQA-PLN89-A, Rev. 27, Nuclear Quality Assurance Plan  
 Bechtel project Nuclear Quality assurance Manual rev. 009  
 TVA Response to NRC Bulletin 2012-01, Design Vulnerability in Electric Power System  
 (ADAMS Accession No. ML12312A167)  
 WBN-ENG-F-12-0006, Commercial Grade Item Acceptance and Dedication Process,  
 dated 8/30/2012

PERS

PER 290058  
 PER 307449  
 PER 378571  
 PER 394793  
 PER 486735  
 PER 494353  
 PER 495021  
 PER 495629  
 PER 591016  
 PER 622436

**Q.1.4 In Depth QA Inspection of Performance**Procedures

EDPI G04G-00081, Rev. 15, EDCRs  
 EDPI G04-00062, Rev. 17, Field Change Request  
 NGDC-PP-20, Rev. 1, Licensing Basis Preservation

Miscellaneous

PER 394793, Adverse trend for deficiencies in processing red-line changes.  
 WO 111520537 Install pressure transmitters and drain valves.  
 WO 110707181 Replace root valve 2-RTV-062-0323A and rework sense lines  
 2-SENL-026-0322A & 0323A

**Q.1.5 Procurement, Receiving, and Storage**Procedures

25402-000-GPP-N6104, "Materials Receiving," Rev. 8  
 25402-000-GPP-0000-N6204, "Field Material Control and Traceability," Rev. 18  
 25402-PRO-0007, "Field Material Storage Control, Rev. 5

QA Documents

NGDC1201, "QA Program Verification – Design Control and Procurement Document  
 Control," dated 3/13/2012 – 8/9/2012  
 25402-D11-YQA-EWG2-30001, Okonite Company Quality Surveillance Report, dated  
 12/6/2010  
 Report #12-1309, "Storage and Maintenance Surveillance," dated 10/1/2012

Report #12-1310, "Storage and Maintenance Surveillance," dated 10/1/2012  
 Report #12-1311, "Storage and Maintenance Surveillance," dated 10/1/2012  
 Report #12-1316, "Storage and Maintenance Surveillance," dated 9/28/2012  
 Report #12-1317, "Storage and Maintenance Surveillance," dated 9/28/2012  
 Report #12-1318, "Storage and Maintenance Surveillance," dated 9/28/2012  
 Audit 2010V-18, Nuclear Procurement Issues Committee (NUPIC) Joint Audit of The  
 Okonite Company, dated 12/16/2010  
 Audit 344-7, Weldstar Company Audit, dated 1/26/2010

### Specifications

TVA Specification SS-E12.6.01, "5-15kV Cable, Ethylene-Propylene Rubber Insulated,"  
 Rev. 5  
 Bechtel Technical Specification WM-ER-4043, "Welding Filler Metal," Rev. 0  
 TVA Specification SS-E18.10.02, Environmental Qualification Requirements for Safety-  
 Related Electrical Cable, Rev. 2, Attachment 1

### Procurement Documents

PO 118671, "RCP Power Cables," dated 6/21/2010  
 PO 458147, "Welding Electrodes," dated 9/19/2012  
 PO 62855, "6" Gate Valve," dated 1/11/2010  
 PO 41823, "Orifice Plates," dated 11/10/2009  
 PO 425903, "Conduit Support Assemblies," dated 9/17/2012  
 PO 75148, "Neutron Flux Monitoring System," dated 7/14/2009  
 25402-011-MRI-EWG2-00003, Rev. 0  
 25402-000-MRI-NWCO-00132, Rev. 0  
 MRR 28201, "6" Gate Valve," dated 9/8/2011  
 MRR 10433, "Orifice Plates," dated 3/18/2010  
 MRR 33100, "Conduit Support Assemblies," dated 9/21/2012  
 MRR 26541, "Neutron Flux Monitoring System," dated 6/21/2011

### Miscellaneous

TVA Contract #65419, "Contract for Engineering and Construction and Procurement  
 Work for Watts Bar Nuclear Unit 2 – Bechtel Power Corporation," dated 10/19/2010  
 TVA Contract 65717, "Contract for Engineering and Construction and Procurement Work  
 for Watts Bar Nuclear Unit 2 – Westinghouse Electric Company," dated 12/19/2007

## **Q.1.6 QA Program Evaluation of Engineering Organization**

Training Audit Report No. 25402-WBN-AR-11-0001, Rev. 0 dated 4/13/2011 – Internal  
 Audit

Corrective Action and Non-conformances Audit Report No. 25402-WBN-AR-11-0002,  
 Rev 0 dated 5/1/2011 – Internal Audit.

ASME Internal Audit Report No. 25402-WBN-AR-11-0003, Rev 0 dated 5/23/2012.  
 Audit covers areas of the Bechtel BQAM following 10 CFR 50 Appendix B with the  
 exception of Criterion II, V, VI, IX, X, and XVIII, which are covered under separate audit  
 reports.

Design Control Audit Report No. 25402-WBN-AR-11-0003 Corrected, Rev 0 dated 8/19/2011 Internal Audit.

Audit for 10 CFR 50 App B report No. 25402-WBN-AR-11-0004, Rev 000 dated 10/8/2012.

Corrective Action and Non-conformance Internal Audit Report No. 25402-WBN-AR-11-0005, Rev 0, dated 11/1/2012.

Audit for 10 CFR 50 App B report No. 25402-WBN-AR-11-0005 Corrected, dated 10/19/2011.

Access Authorization Internal Audit Report No. 25402-WBN-AR-11-0006, Rev 0 dated 9/26/2011.

Supplemental Audit of Corrective Action and Non-conformances No. 25402-WBN-AR-11-0008, Rev 1 dated 1/30/2012 Internal Audit.

Internal audit report QSM-GAP-12-001, Rev 000 dated 2/6/2012 to verify project's compliance to project procedures.

TVA-ECC-2012 Supplier Audit Report No. 51120-600-YAA-2012-00015 dated 7/19/2012 covering Initial qualification and audit assessment of TVA Engineering Configuration Control (ECC – Knoxville) group.

Field Change Request procedure 25402-000-GPP-0000-N3105, Rev 14 dated 8/27/2012

Engineering Department Procedure Instruction Engineering Document Construction Release (EDCR) 25402-3DP-G04G-00081, Rev. 15 dated 11/15/2012

### **Q.1.7 Onsite Design Activities**

#### Miscellaneous

PER 628404  
 EDPI G04G-00081, EDCRs  
 CCPP GPP-0000-N3105, Field Change Requests  
 EDPI G04-00062, Field Change Request  
 NPG-SPP-09.3, Plant Modifications and Engineering Change Control  
 NGDC-PP-20, Licensing Basis Preservation

### **C.1.3 Piping – Work Observation**

#### Work Order

WO 114030072, RCP Cooling Coil Hydrostatic Test

#### Test Data Sheet

2-067-47W845-3-RCPC-2, 12/7/12

#### M&TE

E47994 Pressure gauge, 5/16/2013  
 E48167 Pressure gauge, 4/10/2013

#### **C.1.4 Heating, Ventilation, and Air Conditioning (HVAC), Piping, and Upper Containment Cooler System Pipe Supports – Work Observations**

##### Work Orders

WO 11823208, SYS (30) CRDM HVAC Tee Connection  
 WO 110800545, SYS (30) Vertical Duct Riser Support 113-1677  
 WO 111171244, SYS (30) Loop 1 Duct Transverse Joint Weld  
 WO 1112814448, SYS (30) Loop 4 Vertical Duct Riser  
 WO 111281393, SYS (30) Loop 1 Vertical Duct Riser  
 WO 114121037, Lower Containment Cooling Coil Hydrostatic Test

##### Weld Travelers

Weld Traveler WR-5C, 12/11/12  
 Weld Traveler WR-5C, 1/26/11

##### Drawings

Weld Map, WM-M-2934, Rev 1  
 Weld Map, WM-M-1650, Rev 0  
 DRA 54289-038, HVAC Support, Rev 7  
 FSK –M-5595, Connection Map for LCC 120633, Rev 0  
 FSK –M-5590, Connection Map for LCC 120624, Rev 0  
 2-47W450-351, ERCW Return Line from Upper Containment Vent Cooler 2B, Rev. 1  
 2-47W450-353, ERCW Return Line from Upper Containment Vent Cooler 2C, Rev. 0  
 2-47W450-346, ERCW Supply Line to Upper Containment Vent Cooler 2A, Rev. 0

##### Welder Performance Qualification Test Records

ID JB4573, GMAW Sheet Metal, 5/12/12  
 ID JB4573, SMAW, 1/31/11  
 ID JB0148, GMAW Sheet Metal, 5/29/12  
 ID JB0148, SMAW, 5/10/12  
 ID FM9231, GMAW Sheet Metal, 5/29/12  
 ID FM9231, SMAW, 5/29/12

##### Welding Procedure Specifications

P1-M (Sheet), Rev 0  
 P1-A-LH (STR), Rev 1

##### Field Change Request

60361-AA-09, 12/12/12

##### Test Data Sheets

2-067-47W845-3-LCC-23, SN 120633, PO 327349, 7/6/12  
 2-067-47W845-3-LCC-18, SN 120624, PO 327349, 7/18/12  
 2-067-47W845-3-LCC-23, Pressure Test Data Sheet, 12/13/12  
 2-067-47W845-3-LCC-18, Pressure Test Data Sheet, 12/13/12

##### M&TE

E47999 Pressure gauge, 2/17/2013  
 E48131 Pressure gauge, 5/15/2013

Calculations

N3-67-A85R ERCW Supply from In-Line Anchor for Upper Containment Cooler 2A, Rev 4

N3-67-A84R ERCW Return Line from Upper Containment Cooler 2C, Rev 5

N3-67-A81R ERCW Return Line from Upper Containment Cooler 2B, Rev 3

WCG-ACQ-0771, Vendor Seismic Loads, Rev 0.

Walk Down Packages

WBN2-PD-067-1592-12, Stress Problem N3-67-A85R Hanger No. 47A450-26-78, Rev 0

WBN2-PD-067-1592-01, Stress Problem N3-67-A85R Hanger No. 47A450-26-145, Rev 0

WBN2-PD-067-1592-00, Stress Problem N3-67-A85R Hanger No. 47A450-26-144, Rev 0

**C.1.5 Mechanical Components – Work Observation and Construction Refurbishment Process**Work Orders

WO 113295239, SG1 Hot leg Side Cladding Repair

WO 112800284, RHR 2B HX Eddy Current Testing

NDE Reports

PT-902741-029 11/27/12

Weld Traveler

PCI Weld Traveler 902741-SG1-02 Rev.0

**C.1.7 Instrument Components and Systems – Work Observation**Work Order

WO 111314215 Perform Pressure Test of ASME System 032, Control Air, Piping

Drawing

2-47W848-10, Mechanical Flow Diagram Control Air, Rev. 7

Test Data Sheet

2-032-47W848-10-2-B6, Control Air Retest #1, Rev. 2

M&TE

E43594 Pressure gauge, 2/17/13

E44059 Pressure gauge, 2/17/13

E36625 Thermometer, 2/10/13

**F.1.1 Procedures – Fire Prevention/Protection**Procedures

TI-211, Fire Protection, Rev.5

WBN0-FOR-26-5, 18 Month Inspection of Fire Hose Stations in Accessible Areas, Rev. 6

Preventive Maintenance Instruction/Fire Suppression Records

WBN0-FPS-510-0001-C, File 01, Rev. 10, page 4

WBN0-FPS-510-EXT/INSP, File 01, Rev. 0, page 5 and 7

#### IV. OTHER ACTIVITIES

##### **OA.1.3 CDR 391/86-24, Inadequate Flexibility of 3/8-inch Tubing Attached to the Steel Containment Vessel**

###### Drawings

47A051-1A, Mechanical Category I Support Instrument Sensing Lines, rev.7  
 47A051-1B, Mechanical Category I Support Instrument Sensing Lines, rev.10  
 47A052-1, Mechanical Category I Support Instr. Sampling Lines, rev.6  
 47A052-1G, Mechanical Category I Support Instr. Sampling Lines, rev.2  
 47A052-55, Mechanical Category I Support Instr. Sampling Lines, rev.1  
 47A052-56, Mechanical Category I Support Instr. Sampling Lines, rev.2  
 47A054-1, Mechanical Seismic Category 1 Sprt. Control Air Lines, rev.6  
 47A054-1B, Mechanical Seismic Category 1 Sprt. Control Air Lines, rev.5  
 47A061-1, Mechanical Seismic Cat. 1&1L Instrument Supports, rev.4

###### Calculations

CEBMA2007, Stress Qualification and Support Loads for 3/8" diameter Tubing Penetration at Steel Containment Vessel, rev.1

###### Corrective Action Documents

SSP-3.04, Item Number SCRWBNCB8576SCA, rev.0  
 PER 144971, Flexibility of Tubing Attached to the SCV  
 NGDC PP-19-2, PER 144971 Engineering Completion Package  
 ECN 6047

##### **OA.1.4 CDRs 81-71 & 82-51: Undocumented Minor Modifications to Structural and Miscellaneous Steel (IP 35007)**

###### Closure Packages

PP-19 for CDR 391/81-71, T02 120409 002  
 PP-19 for CDR 391/82-51, T02 120409 001

###### Drawings

48W1226-14 Rev. 2, Floor EI 737.0 Motor Driven AFW Pump LCV Pipe Rupture Protection Barrier  
 48W904-1 Rev. 13, Miscellaneous Steel Steam Generator Access Platforms  
 48N906 Rev. 25, Miscellaneous Steel S.G., R.C. Pump & Press. Rel. Tk. Access Platform Sh-2  
 48W904-4 Rev. 5, Miscellaneous Steel Lower Ice Condenser Access Platform EI 745.0  
 48N1254 Rev. 4, Miscellaneous Steel Blowout Panels & Frames EI 814.75  
 48N407 Rev. 13, Structural Steel Containment Vessel Inspection Platforms  
 48N1289 Rev. 6, Miscellaneous Steel Main Steam and Feedwater Support Plates Outside A.B.  
 48N949 Rev. 14, Miscellaneous Steel Equipment Support Sheet 2  
 48N950 Rev. 9, Miscellaneous Steel Equipment Support Sheet 3

###### FCRs

NP-767

###### Corrective Action Documents

PER 608744  
 SR 607653



**LIST OF ACRONYMS**

ADAMS	Agencywide Documents Access and Management System
ASME	American Society of Mechanical Engineers
B&PV	Boiler & Pressure Vessel
CCMRC	Construction Completion Management Review Committee
CDR	Construction Deficiency Report
CFR	<i>Code of Federal Regulations</i>
ECN	Engineering Change Notice
EDCR	Engineering Document Construction Release
EPC	engineering, procurement, and construction
ERCW	essential raw cooling water
IIR	Integrated Inspection Report
IP	Inspection Procedure (NRC)
M&TE	measuring and test equipment
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
PER	Problem Evaluation Report
PO	purchase order
PRC	Project Review Committee
QA	Quality Assurance
QC	Quality Control
Rev.	Revision
RPV	reactor pressure vessel
SAR	Safety Analysis Report
SCR	Significant Condition Report
SCV	steel containment vessel
TVA	Tennessee Valley Authority
WBN	Watts Bar Nuclear Plant
WO	Work Order