



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

June 29, 2011

Mr. Ashok S. Bhatnagar  
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**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2011604**

Dear Mr. Bhatnagar:

On May 21, 2011, 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 June 6, 2011, with Mr. David Stinson 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, with the conditions of your construction permit, and with fulfillment of Unit 2 regulatory framework commitments. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

During this inspection period, your evaluations and methodologies to address issues associated with a number of Corrective Action Programs (CAPs) and Special Programs (SPs) were reviewed by the NRC staff.

Based on the results of this inspection, this report documents two NRC-identified findings which were determined to involve violations of NRC requirements. However, because these findings were Severity Level IV violations and were entered into your corrective action program, the NRC is treating them as non-cited violations consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest the non-cited violations in the enclosed report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTENTION: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Senior Resident Inspector at the Watts Bar Unit 2 Nuclear Plant.

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).

Sincerely,

**/RA/**

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

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

Enclosure: Inspection Report 05000391/2011604 w/attachment

cc w/encl: (See next page)

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Letter to Ashok S. Bhatnagar from Robert C. Haag dated June 29, 2011.

SUBJECT: WBN NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2011604

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2011604

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: 1260 Nuclear Plant Rd  
Spring City TN 37381

Dates: April 3 – May 21, 2011

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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, fire protection, and follow-up of other activities. The inspection program for Unit 2 construction activities is described in NRC Inspection Manual Chapter 2517. Information regarding the WBN Unit 2 Construction Project and NRC inspections can be found at <http://www.nrc.gov/reactors/plant-specific-items/watts-bar.html>.

### Inspection Results

- A Severity Level (SL) IV non-cited violation (NCV) of 10 *Code of Federal Regulations* (CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action" was identified for inadequate measures to assure that conditions adverse to quality were identified and corrected. Specifically, a nonconformance identified by quality control (QC) and associated with anchor bolt spacing on a pipe support was not corrected. (Section C.1.7)
- A SL IV NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was identified for the failure to include all material requirements for swing check valves into design specifications. Specifically, the design specifications failed to include the material requirements for internal bolting, shafts, and pins for swing check valves. (Section OA.1.6)
- The inspectors concluded that concerns pertaining to several Three Mile Island (TMI) action items, Bulletins (BL), Generic Letters (GL), and construction deficiency reports have been appropriately addressed for WBN Unit 2. These items are closed.
- Quality assurance requirements for preoperational testing were established and were being met for this stage of the preoperational test program. TVA has established adequate programmatic controls for preoperational testing. These controls were in accordance with applicable commitments and regulatory requirements.
- Other areas inspected were adequate with no findings of significance identified. These areas included various Unit 2 Corrective Action Programs (CAPs)/Special Programs (SPs); electrical systems and components; mechanical systems and components; nuclear welding; structural concrete; nondestructive examination (NDE), and in-service inspection activities; refurbishment; environmental activities; and fire protection.

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## REPORT DETAILS

### Summary of Plant Status

During the current inspection period, TVA performed construction completion activities on safety-related systems and continued engineering design activities.

### I. QUALITY ASSURANCE (QA) PROGRAM

#### Q.1 QA Oversight Activities

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

###### a. Inspection Scope

During this inspection period, the inspectors reviewed problem evaluation reports (PERs), as part of TVA's corrective action program, to verify that issues being identified under the corrective action program were being properly identified, addressed, and resolved by TVA. The inspectors also reviewed corrective actions associated with PER 369689 related to QC inspection functions. The inspectors observed a stand-down on May 16, 2011, where project expectations, concerning interaction with QC inspectors, were discussed.

###### b. Observations and Findings

No findings of significance were identified.

###### c. Conclusions

Generally, the PERs reviewed were properly identified, addressed, and resolved.

##### Q.1.2 Safety Conscious Work Environment (IP 35007)

###### a. Inspection Scope

On May 18, 2011, the inspectors observed a Bechtel safety conscious work environment (SCWE) workshop given to managers. During the training session the following subjects were discussed:

- When and how to communicate concerns related to nuclear and industrial safety
- Process to address concerns
- Managers' responsibilities

The inspectors also reviewed existing program requirements and recent safety-related concerns identified by the applicant's and contractor's employee concerns program (ECP). The inspectors also verified that significant problems were documented under the corrective action program and were being properly identified, addressed, and resolved by TVA.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors did not identify any issues or concerns regarding the ability of the applicant to provide a SCWE.

## II. MANAGEMENT OVERSIGHT AND CONTROLS

### C.1 Construction Activities

#### C.1.1 Magnetic Particle (MP) Examination of Safety-Related Welds (IP 57070)

a. Inspection Scope

The inspectors observed ongoing MT examination activities and reviewed records for historic thermocouple locations.

Specific MT examinations observed included the following:

<u>Report</u>	<u>Weld ID</u>	<u>Component</u>
MT-171	2-001A-D009-02	32-inch Pipe/Fitting, Class II, System 001/ Main Steam
MT-184	2-001A-D003-04	32-inch Pipe/Fitting, Class II, System 001/ Main Steam

The ongoing MT examinations mentioned above were observed to determine whether they were being conducted by properly qualified personnel and in accordance with applicable procedures, codes, and standards. The inspectors reviewed the work packages to verify that they specified the appropriate NDE procedure to be used and that a copy of the procedure was available in the area in which the work was being performed. The inspectors reviewed procedure MT-ASME, "Bechtel Nondestructive Examination Standard Magnetic Particle Examination," Revision (Rev).5. The inspectors observed activities to verify that the required equipment and materials were available at the work stations and that weld numbers were confirmed to be those specified in the work packages. The inspectors reviewed relevant indications to verify that they were evaluated and reported in accordance with procedural requirements. The inspectors reviewed MT Examination Reports MT-171 and MT-184 to verify compliance with procedural requirements. Documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 57070 Section 02.02 – two samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the MT examination activities observed, and the records reviewed, met applicable American Society of Mechanical Engineers (ASME) Code and regulatory requirements.

**C.1.2 Coatings for Pipe Support and Restraint System (IPs 50090, 50073, and 37002)**

a. Inspection Scope

The inspectors observed work activities associated with the construction inspection and refurbishment of pipe support coatings in coating service level (CSL)-1 areas of the containment building. The inspectors verified proper qualification, storage, handling, and control of safety-related coating materials/systems. The inspectors assessed whether personnel were adequately qualified for the roles they performed. The inspectors assessed whether existing CSL-1 coatings were inspected and repaired or maintained in accordance with applicable procedures and specifications. The inspectors also observed the application of coatings in CSL-1 areas to verify that they were adequately documented per the applicable procedures. Documents reviewed are listed in the attachment.

The following areas were inspected:

- CSL-1 coatings on pipe supports 2-47A465-247-012, 2-47A465-247-013, 2-47A465-247-014, and 2-47A465-247-015

The following sample was inspected:

- IP 37002 Section 02.02.d – one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Inspected refurbishment activities associated with pipe support coatings in CSL-1 areas were adequate.

**C.1.3 Unit 1 and Unit 2 Construction Activity Interface Controls**

a. Inspection Scope

The inspectors independently assessed 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 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 selected construction work locations to verify controls, to protect the operating unit, provided an adequate level of protection and had been properly implemented.

Specific work activities observed included:

- Work Order (WO) 112210337 associated with 120V vital alternating current board WBN-2-BD-235-4-G
- WO 112021342 associated with wrapping of cables as identified in NRC inspection report (IR) 05000391/2011606

The inspectors also reviewed and inspected activities that the licensee had screened out as not affecting Unit 1. These included, but were not limited to, the following:

- WO 111735249 associated with charging pump lift and movement

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Adequate management oversight and controls were in place to identify construction activities, which could potentially impact the operating unit, and an adequate level of protection had been implemented.

**C.1.4 Safety-Related Piping - Work Observation (IP 49063)**

a. Inspection Scope

The inspectors observed fit-up and welding activities on WBN-2-PIPE-072 associated with the replacement of the missing drain valve 2-DRV-072-0539 with a new drain valve 2-DRV-072-0505. Observed activities were associated with the resolution of Boundary Interface Transmittal 1438. Documents reviewed are listed in the attachment.

The following area was inspected:

- New drain valve installation for 2-DRV-072-0505 under WO 111182521

The following sample was inspected:

- IP 49063 Section 02.01 – one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Piping work was performed consistent with codes, standards, and plant procedures.

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

a. Inspection Scope

The inspectors observed work activities associated with construction refurbishment of safety-related check valve WBN-2-CKV-062-0563 under WO 08-953901-006. Documents reviewed are listed in the attachment. The inspectors observed the following activities:

- Storage, handling and protection
- Installation which included verification that tolerances/clearances were met; appropriate drawings and work procedures were available; and holdpoints were observed.

The following sample was inspected:

- IP 50073, 02.02.c – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Field refurbishment of safety-related piping system active mechanical components was performed per the approved refurbishment program and procedures.

**C.1.6 Electrical Cable – Work Observation (IPs 51063 and 37002)**

a. Inspection Scope

The inspectors assessed whether activities relative to safety-related electrical cable systems were being controlled and accomplished in accordance with NRC requirements, safety analysis report (SAR) commitments, and applicant procedures. This was accomplished by inspecting the supervision of work and independent evaluation of work in progress, and completed work. The inspectors reviewed the splicing of cable 1PP550-A, 6.9 kilovolt (kV) power supply to the 1A-A charging pump, in two locations as well as the stress cone installation at the motor terminals.

The following sample was inspected: IP 51063 02.01.d – one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that adequate measures were in place to ensure the applicant was prepared for splice/termination and that procedures were adequate and followed during the splicing and terminating operations, with appropriate QC oversight.

**C.1.7 Pipe Support and Restraint Systems (IPs 50090, 46071, and TI 2512/023)**

a. Inspection Scope

The inspectors reviewed drawings, procedures, and instructions, pertaining to pipe support and restraint systems, to determine if they had been evaluated and approved by appropriate applicant personnel. The inspectors also conducted interviews with personnel engaged in pipe support installation and performed work observations to confirm adequate performance of work in progress and completed work. The inspectors assessed whether personnel had the latest revisions of applicable drawings, and whether modifications to supports had been approved by appropriate personnel. The inspectors witnessed portions of the installation activities on the following supports:

Pipe Support Identification Number	Drawing Revision Authorization (DRA)	Support Type
2-47A465-247-14	53123-055, Rev. 0	Rigid Support
47A406-14-13	52484B	Rigid Support
2-62A315	2-62A315-1, Rev. 904	Rigid Support
2-03A-456-1	52894-053, Rev. 0, 52894-054, Rev. 0, 52894-055, Rev. 0, 52894-053, Rev. 0	Rigid Support
2-47A432-2-1	52538-318, Rev. 0	Rigid Support
2-62A198-1	52481-070, Rev. 0, 52481-071, Rev. 0	Rigid Support
2-63-261-1	52498-079, Rev. 0	Dynamic Support
47A464-20-19	52527-083, Rev. 1	Rigid Support
2-03A203-1	52430-019, Rev. 0, 52430-020, Rev. 0	Rigid Support

The inspectors conducted walkdowns of the following installed safety-related pipe supports to verify their compliance with NRC requirements and applicant commitments:

Pipe Support Identification Number	Drawing Revision Authorization (DRA)	Support Type
2-47A462-11-135	52518-003, Rev. 1, 52518-001, Rev. 0	Rigid Support
2-47A450-25-355	52503-019, Rev. 1, 52796-180, Rev. 1	Rigid Support
2-47A450-26-301	52897-002, Rev.1, 52897-001, Rev.1, 54903-165, Rev. 0	Rigid Support
2-47A462-11-140	52519-005, Rev. 1	Rigid Support
2-47A462-11-150	52519-015, Rev. 1	Rigid Support
47A450-31-34	52504-001, Rev. 1	Rigid Support
47A450-31-36	52504-003, Rev. 1	Rigid Support
2-47A450-266-1	52505-008, Rev. 0	Rigid Support
247A462-11-136	52519-001, Rev. 1	Rigid Support
2-47A450-26-298	52897-010, Rev. 2, 52573-001, Rev. 1	Component Support
47A437-4-47	52536-059, Rev. 0, 52536-060, Rev. 0	Rigid Support

Specifically, the inspectors performed a visual inspection to verify adequate support clearances and installation and the absence of deformation and corrosion. Independent measurements were also performed to determine whether the installed configuration of pipe supports was consistent with final as-built drawings. Documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 50090 Section 02.02.a – 1 sample
- IP 50090 Section 02.03.b – 9 samples of pipe supports
- IP 50090 Section 02.03.d – 13 samples of rigid pipe supports, including three small bore line supports
- IP 50090 Section 02.03.e – 1 sample
- IP 50090 Section 02.03.f – 11 samples of pipe support as-builts, and 12 samples of pipe anchor as-builts
- IP 46071 Section 02.03 – 12 samples

b. Observations and Findings

The inspectors identified the following non-cited violation (NCV):

Introduction: On April 26, 2011, the inspectors identified a violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for inadequate measures to assure that conditions adverse to quality were identified and corrected. Specifically, a nonconformance identified by QC and associated with anchor bolt spacing on a pipe support was not corrected.

Description: On April 20, 2011, the inspectors performed a walkdown of newly installed pipe supports to determine whether the as-installed configurations matched those specified by the applicable DRAs. The inspectors identified an example where the

configuration did not meet the minimum spacing requirements for a wedge bolt anchor installed in the baseplate of support 2-47A465-247-014 for the safety-related reactor coolant system (RCS). Specifically, the inspectors identified that pipe support 2-47A465-247-014, as shown in DRA 53123-055, required a 5½-inch spacing between a ¾-inch wedge bolt and a ¼-inch expansion shell anchor (SSD/SDI anchors), and the as-built configuration measured had a 4-inch spacing. This did not meet the minimum spacing requirements, specified in Modification and Addition Instruction (MAI)-5.1B, "Wedge Bolt Anchor Installation," Rev 19. During the inspection, the applicant informed the inspectors that the spacing discrepancy had been previously addressed in the corrective action program and documented in PER 229082.

On April 26, 2011, the inspectors reviewed PER 229082, "Anchor Bolt Spacing Violation," and discovered that the PER and associated actions were closed and archived on September 8, 2010. PER 229082 was initiated on May 8, 2010, to document discrepancies identified between MAI-5.1B, Table 6.2.3D and the installed conditions of support 2-47A465-247-014 as noted in WO 09-952202-011, engineering document construction release (EDCR) 53123, and DRA 53123-055. During that time, QC rejected the installed configuration for the support due to a 4-inch spacing between a ¾-inch wedge bolt and a ¼-inch SSD/SDI anchor, when 5½-inch spacing was required per MAI-5.1B Table 6.2.3D. The corrective action plan specified in PER 229082 was misleading and included rework of support 2-47A465-247-014 to obtain the proper gap; however, the anchor bolt spacing was never addressed or corrected. On May 2, 2011, the applicant issued PER 364388 to document the inappropriate closure of PER 229082.

This finding was determined to be more than minor because it represented an improper or uncontrolled work practice that could impact the quality or safety of a safety-related pipe support, in that the failure to appropriately disposition the non-conforming condition led to the inadvertent use of anchor bolts that did not meet the required spacing requirements. The finding was of very low safety significance because the engineering evaluation and reanalysis of the as-built pipe support determined it to be acceptable. No cross-cutting aspect was identified.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as deficiencies, deviations, defective materials, and nonconformances are promptly identified and corrected.

Contrary to the above, corrective actions documented in PER 229082 failed to assure that a nonconformance identified by QC, specifically an anchor bolt spacing violation, was corrected. The PER was closed inappropriately after inadequate corrective actions had been completed without correcting the as-built nonconforming configuration. This finding was determined to be a SL IV violation using Section 6.5 of the Enforcement Policy. Because this SL IV violation was entered into the corrective action program as PER 364388, this violation is being treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000391/2011604-01: Failure to Correct a Nonconformance.

c. Conclusions

The inspected activities associated with NCV 05000391/2011604-01 discussed above were not performed in accordance with applicant procedures and NRC regulations;

however, other activities observed were performed in accordance with applicable procedures.

### **C.1.8 Containment Penetrations (Mechanical) - Work Observation (IP 53053)**

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

Background: The purpose of this IP was to confirm adequate installation of mechanical penetrations. This IP covers material certification, method of assembly, protection, installation activities, nondestructive examination, and inspection as well as a semi-annual requirement to observe installation and confirm adequacy of documents used for installation. A reconstitution of historic Unit 2 inspection results identified that inspection requirements were not met and that only minimal samples were noted. Because of this, it was recommended that inspection efforts look at a minimum of three penetrations, if possible. A majority of the mechanical containment penetrations were previously installed prior to initial suspension of the Unit 2 construction effort.

Inspection Activities: The inspectors observed construction activities associated with the installation of anchor sleeves for mechanical containment penetrations of the safety injection (SI) system. The inspectors reviewed the work instructions, design drawings, and material traceability and transfer records to ensure that the work was planned to occur with the proper materials on the proper component. The inspectors also reviewed work instructions, nondestructive examination (NDE) acceptance documents, and personnel qualification records to ensure that the work was performed in accordance with accepted procedures, by qualified personnel, and ultimately accepted by the QC organization. Additional documents reviewed are included in the attachment.

The following work was inspected:

- Penetration X-20A , SI System Pump Discharge, Anchor Sleeve
- Penetration X-20B , SI System Pump Discharge, Anchor Sleeve

The following sample was inspected:

- IP 53053 Section 02.01 - 2 samples

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

No findings of significance were identified.

#### **c. Conclusions**

Work associated with containment mechanical penetrations X-20A and X-20B was performed per the associated WO and test package instructions.

### **C.1.9 Nuclear Welding General Inspection Procedure (IP 55050)**

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

Background: The welding CAP was initiated in the mid-1980s to address several welding related issues. Sub-Issue 2, "Radiographs for ASME Piping Welds," was

initiated when radiographs showing rejectable indications were found to have been accepted by the film interpreter.

The corrective actions on Unit 1 consisted of a complete review of all radiographs (representing over 2700 welds), 350 of which were subsequently rejected and repaired.

For Unit 2 a complete review of all historical radiographs and records was performed resulting in 282 welds and their radiographs being rejected for indications or unacceptable film quality. Approximately 80 of the 282 welds were found rejectable and required repair or cut-out. These Unit 2 actions are controlled under PER 170933.

Inspection Activities: NRC's Integrated Inspection Report (IIR) 0500391/2010603, Section C.1.15, documents the programmatic inspection of Bechtel's welding program.

The inspectors reviewed field weld records and observed piping internal welds to verify Bechtel's control of production welding activities on the SI piping system. The inspectors reviewed the historical radiographs that were rejected due to an unacceptable flaw size for one of the historical welds joining the elbow fitting and pipes. The original welds to the existing elbow fitting were both cut-out. The welding inspection was performed for the new replacement elbow fitting and adjoining pipe sections. This safety-related welding was inspected to verify compliance with the requirements of the ASME Section III, Subsection NC code for Class 2 (TVA Class B) components.

The inspectors reviewed Bechtel records and observed the two completed stainless steel welds to the new elbow fitting, identified as field weld numbers (FW-No.) 23 and 26, documented as 2-063A-D124-23 Cut out # and Repair # (C0R0) and 2-063A-D124-26 C0R0. These two welds join a new replacement 8-inch diameter long radius 90 degree elbow fitting with two pipe sections. The internal root pass of completed welds was accepted by Bechtel's QC for both open-butt joints and was accessible for inspection by the NRC.

The inspectors reviewed Bechtel's weld map FSK-M-3009 to verify that weld records correspond with assigned field weld numbers.

The inspectors reviewed Bechtel's field welding checklists (Form WR-5) for FW-No. 23 and 26 to verify these records met the requirements of Bechtel's WD-1 welding standard for documentation of welds. The inspectors also reviewed the contents of form WR-5 to determine if the recorded welding procedure, pipefitter-welder qualifications, and certified material test report (CMTR) with traceable heat numbers for the new elbow fitting, adjoining pipe sections, weld filler metals, and QC hold points met the requirements of Bechtel's Special Process Manual (SPM) and General Welding Standard, (GWS) 1 and ASME code of record. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observation and review of associated records for two pipe field welds that join a new replacement fitting with two pipe sections met the requirements of 10 CFR Part 50, Appendix B; Bechtel's Quality Assurance and SPM; and the applicant's quality assurance manual for the code of record.

**C.1.10 Reactor Vessels Internals (Welding) Observation of Welding and Associated Activities (IP 55093)**

a. Inspection Scope

The inspectors reviewed field weld records and observed reactor pressure vessel (RPV) internal welds to verify Bechtel's control of production welding activities beneath the upper head of the reactor vessel. The inspection was performed for fillet welds joining the 3-inch diameter portion of the conical shape funnel guides and the thermal sleeve tubes. This safety-related nonpressure boundary welding was inspected to verify compliance to the requirements of the ANSI B31.1 code of record.

The inspectors reviewed Bechtel records and observed six completed stainless steel weld locations identified and documented as FW-Nos. 7, 11, 14, 32, 37, and 48. These typical fillet welds consisted of 1/8-inch leg size with lengths ranging between 2 and 2½-inches for two locations spaced 150° to 180° apart. The smooth weld area surfaces were free of deleterious materials and aligned as indicated on the Bechtel's DRA 54835-003.

The inspectors reviewed Bechtel's weld map WM-M-007 to verify that weld records corresponded with 6 of the 57 assigned field weld identification numbers.

The inspectors reviewed Bechtel's miscellaneous and structural field welding checklists (Form WR-5C) for FW-Nos. 1 through 48 to verify these records met the requirements of Bechtel's WD-1 welding standard for documentation of welds. The inspectors reviewed the contents of the WR-5C for the above six field welds to determine whether the recorded welding procedure, weld joint alignment, welder qualifications, control of weld filler metals, QC hold points, and final weld dimensions and surface appearance met the requirements of Bechtel's SPM and GWS-1 general welding standard, and the ANSI code of record.

Visual examination (VT) of the completed fillet welds was performed in accordance with Bechtel's Nondestructive Examination Standard Visual Examination, VT – ANSI B31.1 1973. This Bechtel NDE-VT standard for visual examination of welds was reviewed for compliance to the applicable requirements of ANSI B31.1, Chapters V and VI. Documents reviewed are listed in the attachment.

The inspectors performed the following samples:

- IP 55093 02.01 – six samples
- IP 55093 02.02 – six samples
- IP 55093 02.03 – two samples
- IP 55093 02.04 – six samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observation of six field welds and review of associated weld records of 48 field welds met the requirements of 10 CFR Part 50, Appendix B; Bechtel's quality assurance and special processes manuals; and TVA's quality assurance manual for the code of record.

**C.1.11 Nuclear Welding General Inspection Procedure (IP 55050)**

a. Inspection Scope

The inspectors reviewed Westinghouse Electric Corporation (WEC) Drawing No. 1546E86 for the steam generator upper internal drain lines to verify the adequacy of welding symbols associated with these lines. A September 15, 1986, revision to the drawing changed the welding symbols from full penetrations welds to partial penetration welds for 6-inch and 4-inch diameter schedule 40 pipes. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The revision to the drawing met the requirements of 10 CFR Part 50, Appendix B, and TVA's quality assurance manual.

**IV. OTHER ACTIVITIES**

**OA.1.1 (Discussed) Instrument Line CAP (TI 2512/026, IPs 49063 and 49065)**

a. Inspection Scope

The inspectors reviewed the applicant's implementation plan for the Unit 2 instrument line CAP and discussed the plan with the CAP owner to determine if the plan for Unit 2 was consistent with the Unit 1 approach. The inspectors reviewed procedures for installing instrument lines to determine if appropriate recurrence controls remained in place. The inspectors reviewed the applicant's actions to verify the proper slope of instrument lines. The inspectors reviewed drawings and specifications to identify the scope of instrument lines with associated slope requirements. From that review, the inspectors selected 150 instruments to determine if their associated lines were included in the applicant's scope for slope verification and whether the slope verification criteria provided in the associated EDCRs was consistent with engineering specifications.

The inspectors walked down accessible portions of 16 safety-related instrument lines from the process pipe connection to the instrument panel in the essential raw cooling

water (ERCW) system that were installed under EDCR 53630 and WO 110692086 to determine if the completed installation conformed to:

- Applicable construction/installation specifications;
- QC inspection requirements;
- Work performance procedures; and,
- Applicable field drawings contained in the WO

Specifically, the inspectors measured the instrument lines to determine if they were properly sloped and supported, the correct pipe size, and if the actual field configuration matched the isometric drawings. The inspectors reviewed the completed WO to determine if welding was performed in accordance with ASME Section III requirements.

The inspectors reviewed 13 related audits to determine if:

- The audits were reported in sufficient detail to permit a meaningful assessment by those responsible for corrective action, final disposition, and trending;
- The applicant had taken proper follow-up action on identified deficiencies; and,
- Any trends existed which could indicate inadequate corrective actions.

Specific documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 49063 Section 02.02 - one sample
- IP 49063 Section 02.03 - one sample
- IP 49065 Section 02.03 - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The instrument sensing line CAP activities observed were adequate and completed in accordance with applicable drawings and specifications. The inspectors did not identify any discrepancies between actions planned for Unit 2 and actions committed to in the September 26, 2008 regulatory framework letter. Based on this limited review and the outstanding actions by the applicant, no additional conclusion is warranted for this inspection.

**OA.1.2 (Discussed) Environmental Qualification (EQ) SP (TI 2512/036)**

a. Inspection Scope

The inspectors reviewed the applicant's program of 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants," by examining various EQ documents, drawings, and procedures associated with WBN Unit 2. Additionally, the inspectors reviewed several open items associated with the EQ

program that were identified in Supplemental Safety Evaluation Report (SSER) 22 for WBN Unit 2, specifically open items 18, 19, 20, 23, and 24 of Appendix HH of SSER 22.

The inspectors reviewed 25402-3DP-GEE-00001, "WBN Unit 2 Equipment Environmental Qualification Program," Rev. 1, to verify the definition of a harsh environment was in compliance with 10 CFR 50.49. The inspectors selected a sample of ERCW system EQ components from calculation EDQ002999-20090011, "Appendix A - WBN Unit 2, List of 10CFR50.49 Components by System." Specifically, the inspectors selected Motor Operated Valves (MOVs), 2-MVOP-067- 0091B, 0096B, 0099A, and 0104A from the list and visually inspected the MOVs to verify the components were located in the area identified in the calculation. The inspectors reviewed the associated environmental data drawings 2-47E235-41 and 42 to verify the harsh environmental data was identified.

The inspectors reviewed procurement packages for cables (PO103131-MRA-EWG2-00002, EWE-2-00034, WB2-09-0230) and Namco limit switches (PO 26088) to verify that the EQ requirements were included.

The inspectors reviewed the following sections of the EQ binder for Namco EC290 series connectors, WBNEQ-CSC-005, to verify qualification was adequately documented including periodic maintenance requirements to maintain qualification and a positive statement that the documentation had been reviewed and approved and that the equipment was determined to be qualified for its application:

- Tab B, Checklist for Environmental Qualification
- Tab C, Analyses and Justification

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the samples associated with the EQ SP were in compliance with requirements. EQ activities are still in process and will require further inspection.

**OA.1.3 (Discussed) SSER 22 Appendix HH: Open Item 20**

a. Inspection Scope

The inspectors reviewed Open Item 20 in SSER 22, Appendix HH for WBN Unit 2 which is identified as follows:

*Resolve whether or not routine maintenance activities should result in increasing the EQ of the 6.9 kilovolt motors to Category I status in accordance with 10 CFR 50.49.*

The inspectors interviewed the EQ program owners to determine the basis of maintaining the 6.9 kV motors as EQ Category II as opposed to upgrading the motors to

EQ Category I requirements in accordance with 10 CFR 50.49(l). The inspectors reviewed calculation SS-E18.10.01, "Environmental Qualification Requirements for Safety Related Electrical Equipment" to evaluate the applicant's EQ assessment of the motors.

b. Observations and Findings

The inspectors determined that the impact of the layup period on the 6.9 kV Westinghouse motors was adequately addressed. The inspectors were unable to confirm the applicant was properly addressing the 10 CFR 50.49(l) upgrade requirements as a result of refurbishment/maintenance activities performed on these motors.

c. Conclusions

Further inspection will be required to verify the applicant is addressing the 10 CFR 50.49(l) upgrade requirements as a result of refurbishment/maintenance activities performed on the 6.9 kV motors. Therefore, SSER22 Appendix HH open item 20 remains open.

**OA.1.4 (Discussed) SSER 22 Appendix HH: Open Item 23**

a. Inspection Scope

The inspectors reviewed Open Item 23 in SSER 22, Appendix HH for WBN Unit 2 which is identified as follows:

*Resolve whether or not TVA's reasoning for not upgrading the main steam isolation valve solenoid valves to Category I is a sound reason to the contrary, as specified in 10 CFR 50.49(l).*

10 CFR 50.49(l) requires replacement EQ components to be qualified to Category I requirements unless there are sound reasons to the contrary. The inspectors conducted interviews with the EQ program owners to evaluate the applicant's basis for not upgrading the main steam isolation valve solenoid valve to Category I requirements.

b. Observations and Findings

An interview with the EQ program owners identified that the applicant has submitted a service requisition for EQ testing to qualify the main steam isolation valve solenoid valve to EQ Category I requirements. The persons interviewed stated that all other EQ components being replaced or refurbished at WBN Unit 2 are being upgraded to the Category I requirements. The inspectors reviewed the service requisition 25402-011-SRA-NEE0-00002 and confirmed that the EQ requirements were identified.

c. Conclusions

Further inspection will be required to verify the adequacy and results of the environmental qualification test report for the main steam isolation valve solenoid valves. Therefore, SSER22 Appendix HH open item 23 remains open.

**OA.1.5 (Discussed) SSER 22 Appendix HH: Open Item 24**a. Inspection Scope

The inspectors reviewed Open Item 24 in SSER 22, Appendix HH for WBN Unit 2 which is identified as follows:

*The NRC staff requires supporting documentation from TVA to justify its establishment of a mild environment threshold for total integrated dose of less than  $1 \times 10^3$  rads for electronic components such as semiconductors or electronic components containing organic material.*

The inspectors reviewed calculation 72186 RDM, "A Review of Electronic Components in a Radiation Environment of  $\geq 5 \times 10^4$  rads", to determine the adequacy of the radiation threshold for electronic components such as semiconductors or electronic components containing organic material.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Further inspection will be required to verify the adequacy of the applicant's radiation threshold for electronic components that are more sensitive to the effects of radiation. Therefore, SSER22 Appendix HH Open Item 24 remains open.

**OA.1.6 (Discussed) NRC BL 89-02: Stress Corrosion Cracking of High-Hardness Type 410 Stainless Steel Internal Preloaded Bolting in Anchor Darling Model S350W Swing Check Valves or Valves of Similar Design (IP 50073)**a. Inspection Scope

The inspectors observed maintenance and reviewed documents related to the applicant's implementation of BL 89-02 at Watts Bar Unit 2. The inspectors observed work on one check valve, 2-CKV-067-0580C, under WO 08-953588-000 to determine if:

- Appropriate drawings and work procedures were available to the installers;
- Installation requirements, construction drawings, specifications, and work procedures were technically adequate and of the latest approved issue;
- Appropriate replacement parts were specified;
- The applicant properly pre-planned the work; and,
- The applicant performed the work in accordance with the work instructions.

During an in-office review, the inspectors reviewed the applicant's final closure report for the BL to determine if the licensee adequately addressed all of the issues discussed in the BL. To determine this, the inspectors:

- Reviewed the applicant's efforts to identify all applicable safety-related check valves with either internal pins, shafts, or bolting made of materials susceptible to stress corrosion cracking;

- Reviewed corrective actions taken or planned to determine if they were consistent with the actions taken for Unit 1;
- Reviewed documentation to determine if recurrence controls remained in place; and,
- Reviewed issues entered into the corrective action program to determine if appropriate corrective actions were either taken or planned.

During the in-office review, the inspectors randomly sampled four safety-related check valves and reviewed procurement documents and vendor drawings for each valve. The inspectors identified the materials of construction of the internal pins, shafts, and bolting for each valve to determine if any materials susceptible to stress corrosion cracking were used and to evaluate the adequacy of the applicant's scope of review. Documents reviewed are listed in the attachment.

The following sample was inspected:

- IP 50073 Section 02.02c - one (safety-related check valve outside the reactor coolant pressure boundary

b. Observations and Findings

Introduction: The inspectors identified a SL IV NCV of 10CFR50, Appendix B, Criterion III, "Design Control," for the failure to include all material requirements for swing check valves into design specifications.

Description: During their BL 89-02 review for Unit 1, the applicant determined that the material requirements for internal bolting also applied to internal shafts and pins and that one of the prohibited materials for these parts was high-hardness American Society of Testing and Materials (ASTM) A276-410T. The applicant intended to use various specifications to provide material requirements for Unit 2 swing check valves but failed to incorporate the material requirements for internal bolting, shafts, and pins into all of the specifications. One of the specifications that failed to include these requirements was WBNP-DS-501433-0904.

As part of the refurbishment program, the applicant procured new swing check valves for 2-CKV-070-0679, Component Cooling System Thermal Barrier Supply Check Valve, and 2-CKV-003-0873, Auxiliary Feedwater Loop 1 Check Valve. The applicant used WBNP-DS-501433-0904 to provide the procurement material requirements for both valves. Because the specification did not provide the hinge pin material requirements, the manufacturers used their standard material, high-hardness ASTM A276-410T for both valves.

The applicant discovered the improper hinge pin material for 2-CKV-070-0679 on or about December 21, 2010, and later installed an appropriate hinge pin but failed to enter the issue into their corrective action program. This failure contributed to the applicant improperly approving submittal drawing 09-56866-02 for 2-CKV-003-0873 on February 15, 2011, which identified the hinge pin material as "A276-410T." During subsequent BL 89-02 reviews, the applicant identified the improper hinge pin material for this valve on or about April 5, 2011. The applicant contacted the manufacturer to modify the hinge pin material.

On April 13, 2011, the applicant discussed the final results of their BL 89-02 review with the inspectors. The inspectors learned that the applicant did not enter either hinge pin deficiency into their corrective action program and were not planning to do so at the time. The inspectors questioned if the design specifications properly specified the material requirements for their swing check valves. As a result of the inspectors' questions, the applicant determined that at least three design specifications, including WBNP-DS-501433-0904, failed to provide all material requirements for swing check valves.

The applicant entered these issues into their corrective action program as PER 356559 to review and correct the cause of the deficient design specifications, the extent of condition, and the failure to initiate a timely PER to document conditions adverse to quality.

This issue was NRC-identified because the applicant failed to identify the inadequate design specifications and failed to enter the issues into their corrective action program until after questioned by the inspectors. The finding was more than minor because it represented an inadequate process that, if left uncorrected, could adversely affect the quality of the fabrication, construction, testing, analysis, or records of a safety-related structures, systems, and components. Specifically, design specifications failed to include all material requirements for swing check valves. The finding is of very low safety significance because the incorrect material was not included in permanently installed safety-related equipment.

The apparent cause of this finding has a cross-cutting aspect related to ineffective implementation of a corrective action program with a low threshold for identifying issues. (P.1(a)). Specifically, the failure to enter the hinge pin deficiency into the corrective action program in December 2010 contributed to the failure to take comprehensive corrective actions that could have prevented the improper vendor submittal drawing approval in February 2011.

Enforcement: Appendix B, Criterion III, "Design Control" of 10 CFR Part 50, states, in part, that: "Measures shall be established to assure that applicable regulatory requirements and the design basis... are correctly translated into specifications, drawings, procedures, and instructions."

Contrary to the above, prior to April 5, 2011, the applicant failed to correctly translate all design basis requirements into specification WBNP-DS-501433-0904. Because this was a SL IV violation and the violation was entered into the applicant's corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy, 05000391/2011604-02, "Failure to Maintain Adequate Design Specifications."

c. Conclusions

With the exception of NCV 05000391/2011604-02, applicant actions taken or planned were adequate to ensure the commitments made for BL 89-02 have been met and conformed to applicable regulatory requirements. BL 89-02 remains open pending review of all completed actions related to the bulletin.

**OA.1.7 (Closed) NRC Bulletin (BL) 80-18: Maintenance of Adequate Minimum Flow thru Centrifugal Charging Pumps (CCPs) Following Secondary Side High Energy Line Rupture (IP 92717)**

a. Inspection Scope

Background: BL 80-18 notified licensees that, under certain conditions, the CCPs could be damaged due to a lack of minimum flow before SI termination criteria were met. The particular circumstances that could result in damage involved unavailability of the pressurizer power operated relief valves (PORVs), with operation of one or more CCPs repressurizing the reactor during a safety injection, following a secondary system high energy line break. Since the SI signal automatically isolates the CCP mini-flow return line, the flow through the CCPs is determined by the individual pump characteristic head vs. flow curve, the pressurizer safety valve setpoint, and the flow resistances and pressure losses in the piping and in the reactor core. That minimum flow might not be adequate to ensure pump cooling, and resulting pump damage could violate design criteria before current SI termination criteria were met. The applicant accomplished the necessary actions for BL 80-18 for Unit 1 and the results were verified in IR 50-390/82-41, dated January 12, 1982, and IR 50-390/85-60, dated December 6, 1985.

Inspection Activities: The inspectors reviewed historical documentation to verify that the proposed actions for Unit 2 were consistent with those completed on Unit 1. Specifically, the inspectors reviewed commitment closure document NCO080008044 which outlined the method for Unit 2 completion of BL 80-18 actions. These actions consist of implementation of EDCR 52328, to remove the automatic closure signals to valves in the CCP mini-flow recirculation line, and procedural changes to emergency operating instructions and system operator instructions, that will maintain the valves in the proper position to protect the CCPs from the scenario identified in BL 80-18. Specific documents reviewed are listed in the attachment to this report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the proposed actions are consistent with those implemented for Unit 1 and would satisfy the applicable requirements in BL 80-18. Therefore, inspection efforts associated with BL 80-18 are complete and closed.

**OA.1.8 (Closed) NRC BL 80-20: Failure of Westinghouse Type W-2 Spring Return to Normal Control Switches (IP 92717)**

a. Inspection Scope

Background: BL 80-20 notified licensees that, even though the subject switches were in the proper position, loss of continuity through the neutral position contact could remain undetected until the equipment associated with the switch were called upon to operate. This condition would be equivalent to bypassing the system associated with the switch. Recommendations were to re-wire the switch to alleviate this issue. Expected actions were to identify where these switches were installed in safety-related applications and

re-wire or replace the switches. In a letter to the NRC dated June 2, 1982, TVA identified 67, Unit 1 and Unit 2, safety-related switches in need of modification and subsequently addressed them in Calculation E27885081201 and associated design packages. Additionally, in a letter to the NRC dated August 31, 1989, TVA identified an additional six switches ( four for Unit 1 and two for Unit 2) affected by BL 80-20 and committed to correct these prior to fuel load of the respective unit. Calculation E27885081201 was revised and the additional six switches were appropriately modified. The results of TVA's actions for BL 80-20 were verified in IR 50-390,391/94-35.

Inspection Activities: The inspectors reviewed historical documentation to verify that the required actions were completed. Specifically, the inspectors reviewed commitment closure document NCO850423004 which outlined the method for completion of BL 80-20 actions. As mentioned above, Calculation E27885081201 was the governing document for the classification and correction of applicable switches. The inspectors reviewed the calculation to verify that switches were appropriately screened for safety significance and also reviewed the justification for either repair or replacement. Additionally, the inspectors sampled various affected switches by reviewing the schematic diagrams and switch contact developments to ensure that the repairs were appropriately performed and documented. Additional field inspection of main control room equipment installation was performed as documented in NRC IIR 05000391/2010605 (Section OA.1.4). Specific documents reviewed are listed in the attachment to this report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the actions were consistent with those implemented for Unit 1 and satisfy the applicable requirements in BL 80-20. Therefore, inspection efforts associated with BL 80-20 are complete and closed.

**OA.1.9 (Closed) NRC Generic Letter (GL) 93-04: Rod Control System Failure and Withdrawal of Rod Control Cluster Assemblies (IP 92717)**

a. Inspection Scope

Background: GL 93-04 notified licensees about a single failure vulnerability within the Westinghouse solid state rod control system that could cause an inadvertent withdrawal of control rods in a sequence resulting in a power distribution not considered in the design basis analyses. The Westinghouse owners group (WOG) met and published documents validating the NRC concern and proposing methodologies to correct the issue. NRC letter to TVA dated December 9, 1994, identified that the NRC approved of the WOG approach to resolve the concern and reiterated TVA's commitment to resolve the issue for Watts Bar Unit 1 prior to initial criticality. Watts Bar Unit 1 subsequently modified the rod control system logic (design change notice [DCN] W-34191-A) by making current order timing adjustments to prevent any uncontrolled asymmetric rod withdrawal in the event of a system failure. SER Supplement 16, dated September 1995, indicated that the NRC staff was satisfied with TVA's commitments to resolve the concerns surrounding GL 93-04 and closed the issue for Unit 1.

Inspection Activities: The inspectors reviewed historical documentation to verify that the required actions for Unit 1 were completed. Additionally, the inspectors reviewed commitment closure document NCO930239004, which outlined the method for completion of GL 93-04 actions on Unit 2. This methodology consisted of contracting Westinghouse, the designer of both Unit 1 and Unit 2 systems, to refurbish the Unit 2 rod control system to be functionally the same as that in use on Unit 1. The inspectors reviewed the contract order to Westinghouse, communications between Westinghouse and TVA regarding system board upgrades and compatibility, EDCR 52324, and applicable WOs to verify that the Unit 2 rod control system will be functionally identical to that of Unit 1 and satisfy the requirements of GL 93-04. Specific documents reviewed are listed in the attachment to this report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the proposed actions are consistent with those implemented for Unit 1 and would satisfy the applicable requirements in GL 93-04. Therefore, inspection efforts associated with GL 93-04 are complete and closed.

**OA.1.10 (Closed) Inspection of 10 CFR Part 21 and 10 CFR50.55(e) Programs for Reporting Defects and Noncompliance (IP 36100)**

a. Inspection Scope

The purpose of this IP was to verify that Watts Bar Unit 2 had established a program and procedures to effectively implement 10 CFR Part 21 and 10 CFR50.55(e) requirements for reporting defects and failures associated with a substantial safety hazard. Reconstitution of this IP was determined to be unnecessary because the programs, instructions, and procedures were common during initial construction of both units, and the Unit 1 reconstitution effort documented in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix C, "Organization and Administration," confirmed adequate reviews were completed. However, a sample of new procedures, in the area of reporting requirements, covered by this IP, were inspected and the results are documented in this report. This program was initially inspected at the beginning of resuming the WBN2 construction project and is documented in IIR 05000391/2008009, Section E.1.3.

The inspectors reviewed the applicant's process for identifying and evaluating deviations and failures. This consisted of reviewing corrective action program procedures to ensure that measures existed for review and timely processing of potential deviations. The inspectors reviewed QA audit results focused on defect identification and evaluation and also reviewed a sample of completed deviation evaluations, that did not result in the identification of a defect or failure to comply, to ensure that items were properly documented, screened, and evaluated.

The inspectors reviewed WBN2 procedure NGDC PP-13, "NRC Reporting Requirements", to ensure that the applicant's program identified the proper time frames for directors or responsible officers to notify the NRC of identified defects. The

procedure was also reviewed to verify that guidance was provided on what information was necessary when providing a submittal to the NRC. While no notifications of defect have occurred, the inspectors reviewed the available documentation to ensure that the procedure provided guidance regarding a potential significant breakdown of the 10 CFR Part 50 Appendix B QA program.

The inspectors reviewed a number of procurement documents to ensure that each applicable procurement document specified the proper applicability to 10 CFR Part 21 and identified the length of time the records were to be maintained. These aspects are also routinely reviewed by inspectors when implementing the receipt, storage, and installations sections of applicable IPs.

The inspectors reviewed documentation to ensure that proper posting requirements were prescribed and witnessed the presence of current postings at conspicuous locations to ensure that they contained the information required by 10 CFR 21.6 and 10 CFR 50.55(e)(2).

The following samples were inspected during this inspection period:

- IP 36100 Section 02.01 – one sample
- IP 36100 Section 02.02 – one sample
- IP 36100 Section 02.03 – one sample
- IP 36100 Section 02.04 – one sample
- IP 36100 Section 02.05 – one sample

Specific documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified. A number of qualified programs and procedures are implemented to satisfy the requirements of IP 36100. Many of these programs receive routine inspection and have not been identified as being deficient in procedure or process.

c. Conclusions

The procedures and records reviewed during this inspection period, associated with defect and noncompliance reportability, were found to conform to the applicable regulatory requirements. This IP is considered closed; however, if major changes to the applicant's instructions and procedures are identified through observation of future work activities, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

**OA.1.11 (Closed) TMI Action Item II.F.1.2.d, Verify Installation of Containment Pressure Monitors (IP 92717)**

a. Inspection Scope

Background: As a result of the accident at TMI-2, the NRC created a number of action items designed to improve a plant's ability to minimize accident occurrence and accident

consequences. These TMI action items were initially outlined in NUREG-0660, "NRC Action Plan Developed as a Result of the TMI-2 Accident" and later clarified in NUREG-0737, "Clarification of TMI Action Plan Requirements."

TMI Action Item II.F.1.2.d was created to ensure that a mechanism existed to measure and continuously monitor primary containment pressure from the MCR. Regulatory Guide 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants" was referenced as the guide for the design and qualification of the containment pressure monitor. Subsequently, Watts Bar Unit 1 installed the required equipment, and it was discussed in NUREG-0847, "Safety Evaluation Report related to the operation of Watts Bar Nuclear Plant, Units 1 and 2," Supplement 5. This Safety Evaluation Report identified, in part, that "The staff has verified that the applicant has installed these monitors (see Inspection Report 50-390/84-59, dated November 7, 1984)."

Inspection Activities: Based on the information provided in the background section, the objective of this inspection was to gather and evaluate sufficient information to make a determination as to whether TVA had adequately addressed TMI Action Item II.F.1.2.d for WBN2. The inspection focused on a review of various documents describing the methodology the applicant has initiated to satisfy the TMI action item. Differences between the Unit 1 completion and Unit 2 resolution were identified by the applicant and reviewed by the inspectors. Primarily, these differences are a result of the applicant taking advantage of improved equipment through obsolescence of original equipment.

The projected equipment meets NRC regulatory requirements and satisfies the intent of the TMI action item regarding containment pressure monitoring. The justification for the change from Unit 1 equipment, applicable regulatory requirements, work instructions, purchase memorandum forms, and procurement specifications were all reviewed to verify that the intent of the TMI action item was satisfied. Additional field inspection of MCR equipment installation was performed as documented in NRC IIR 05000391/2010605, Section OA.1.4. Specific documents reviewed are listed in the Attachment to this report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions associated with TMI Action Item II.F.1.2.d to verify the adequacy of the applicant's actions. The inspectors concluded that the applicant's efforts were sufficient to satisfy the intent of the respective TMI action item. TMI Action Item II.F.1.2.d is considered closed.

**OA.1.12 (Closed) TMI Action Item II.F.1.2.f, Verify Installation of Containment Hydrogen Accident Monitoring Equipment (IP 92717)**

a. Inspection Scope

Background: As a result of the accident at TMI-2, the NRC created a number of action items designed to improve a plant's ability to minimize accident occurrence and accident consequences. These TMI action items were initially outlined in NUREG-0660, "NRC

Action Plan Developed as a Result of the TMI-2 Accident” and later clarified in NUREG-0737, “Clarification of TMI Action Plan Requirements.”

TMI Action Items II.F.1.2.f was created to ensure that a mechanism existed to measure and continuously monitor primary containment hydrogen concentration from the MCR. Regulatory Guide 1.97, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants” was referenced as the guide for the design and qualification of the containment hydrogen monitor. Subsequently, Watts Bar Unit 1 installed the required equipment and it was discussed in NUREG-0847, “Safety Evaluation Report related to the operation of Watts Bar Nuclear Plant, Units 1 and 2,” Supplement 5. This Safety Evaluation Report identified that “The staff has verified that the applicant has installed these monitors (see Inspection Report 50-390/84-85, dated January 8, 1985).” Additionally, IR 50-390/95-74 “verified that the hydrogen monitoring system had been tested under the preoperational test program and that there were no deficiencies or open conditions associated with the hydrogen monitoring system.”

Inspection Activities: Based on the information provided in the background section, the objective of this inspection was to gather and evaluate sufficient information to make a determination as to whether TVA had adequately addressed TMI Action Item II.F.1.2.f for WBN2. The inspection focused on a review of various documents describing the methodology the applicant has initiated to satisfy the TMI action item. Differences between the Unit 1 completion and Unit 2 resolution were identified by the applicant and reviewed by the inspectors. Primarily, these differences are a result of the applicant taking advantage of updated NRC requirements on equipment quality, quantity, and operation. The projected equipment meets NRC regulatory requirements and satisfies the intent of the TMI action item regarding hydrogen concentration monitoring. The justification for the change from Unit 1 equipment, applicable regulatory requirements, work instructions, material requisition forms, and procurement specifications were all reviewed to verify that the intent of the TMI action item was satisfied. Additional field inspection of MCR equipment installation was performed as documented in NRC IIR 05000391/2010605, Section OA.1.4. Specific documents reviewed are listed in the attachment to this report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions associated with TMI Action Item II.F.1.2.f to verify the adequacy of the applicant’s actions. The inspectors concluded that the applicant’s efforts were sufficient to satisfy the intent of the respective TMI action item. TMI Action Item II.F.1.2.f is considered closed.

**OA.1.13 (Closed) Geotechnical/Foundation Activities Procedure Review (IP 45051)**

a. Inspection Scope

The purpose of this IP was to determine if the Watts Bar Unit 2 geotechnical/foundation requirements in the SAR were adequately addressed in the construction specifications and work procedures. A review, called the reconstitution process, of historical NRC

inspection reports was completed to determine the status of previously performed inspections in satisfying the requirements specified in the construction inspection procedures. This review was documented in NRC's IIR 05000391/2009602.

Reconstitution of this IP was determined to be unnecessary because the geotechnical/foundation programs, instructions and procedures were common during initial construction of both units, and Unit 1 reconstitution effort confirmed adequate reviews were completed. Unit 1 reconstitution effort was documented in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix E, "Geotechnical/Foundation Activities."

The majority of the geotechnical/foundation activities were completed during the initial construction period. Based on discussions with TVA, it was concluded that no future geotechnical/foundation work is planned during the current construction phase.

b. Observations and Findings

No findings of significance were identified. The construction specifications and work procedures addressed by this IP were previously inspected under Unit 1 inspection activities. No additional inspections were required for this IP.

c. Conclusions

IP 45051 is considered closed; however, if future work activities arise that are outside of IMC 2517, Watts Bar Unit 2 Construction Inspection Program, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

**OA.1.14 (Closed) Geotechnical/Foundation Activities Work Observation (IP 45053)**

a. Inspection Scope

The purpose of this IP was to determine whether work and inspection performance relative to geotechnical/foundation activities were accomplished in accordance with specifications and procedures.

The results from the Unit 2 reconstitution effort concluded that no additional inspections were required for this IP, as documented in IIR 05000391/2009602. Also, the structures covered by this IP are common and the Unit 1 reconstitution effort documented in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix E, "Geotechnical/Foundation Activities," confirmed adequate reviews were completed.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Requirements of the IP were met and no additional inspections were required. IP 45053 is considered closed; however, if future work activities arise that are outside of IMC

2517, Watts Bar Unit 2 Construction Inspection Program, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

#### **OA.1.15 (Closed) Geotechnical/Foundation Activities Record Review (IP 45055)**

##### a. Inspection Scope

The purpose of this IP was to review documentation of geotechnical/foundation activities described in IP 45053 as well as additional activities such as corrective action documents, training, and audits.

Historical NRC inspection reports associated with this IP were reviewed as part of the Unit 2 reconstitution efforts. The inspectors concluded that no additional inspections were required for this IP, as documented in IIR 0500391/2009602. The structures covered by this IP are common between Unit 1 and 2. Unit 1 reconstitution effort documented in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix E, "Geotechnical/Foundation Activities," confirmed adequate inspections were completed.

##### b. Observations and Findings

No findings of significance were identified. Requirements of the IP were met. No additional inspections were required for this IP.

##### c. Conclusions

IP 45055 is considered closed; however, if future work activities arise that are outside of IMC 2517, Watts Bar Unit 2 Construction Inspection Program, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

#### **OA.1.16 (Closed) SSER 22 Appendix HH: Open Item 18**

##### a. Inspection Scope

The inspectors reviewed Open Item 24 in SSER 18, Appendix HH for WBN Unit 2 which is identified as follows:

*Based on the extensive layup period of equipment within WBN Unit 2, the NRC staff must review, prior to fuel load, the assumptions used by TVA to re-establish a baseline for the qualified life of equipment*

The inspectors selected a sample of the applicant's aging calculations for EQ components to verify that the effects of environmental conditions during the layup period were adequately addressed. The inspectors selected the sample to include the majority of EQ components that had been subject to the layup period. Specifically, the inspectors reviewed:

- WBNEQ-CABL-064, Material Aging Calculation for Okonite Cables
- WBNEQ-MOT-001, EQ Calculation for Westinghouse Motors
- WBNEQ-JBOX-001 EQ Binder Tab B, GE Terminal Blocks

- GE Memorandum Dated February 24, 1978 Re: Qualification of EB Terminal Board
- EDQ00299920110003, Material Aging Calculation to Assess the Impact of the Layup Period on the Unit 2 EQ Cable Qualified

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the applicant utilized the Arrhenius equation, a commonly used formula for the temperature dependence of the reaction rate constant, to determine the effect of the layup period on EQ-qualified life of components and that the thermal values were based on historical plant data and the applicant's heat transfer calculations. The inspectors noted that the effects of radiation and pressure were appropriately not addressed in the aging calculation because the selected EQ components were not exposed to these conditions during the extensive layup period.

c. Conclusions

The inspectors determined that the applicant's EQ calculations evaluated the environmental impact of the extensive layup period on EQ components. The inspectors concluded that the applicant's assumptions for re-establishing a baseline for the qualified life of EQ components were consistently applied and adequate. Therefore, the inspection efforts associated with SSER22 Appendix HH Open Item 18 are complete and closed.

**OA.1.17 (Closed) SSER 22 Appendix HH: Open Item 19**

a. Inspection Scope

The inspectors reviewed Open Item 19 in SSER 22, Appendix HH for WBN Unit 2 which is identified as follows:

*The NRC staff should complete its review of TVA's EQ program procedures for WBN Unit 2 prior to fuel load.*

The inspectors reviewed a sample of the applicant's EQ program procedures to verify that they adequately addressed the regulatory criteria and guidance identified in 10 CFR 50.49, NUREG-0588, Rev. 1, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," and Regulatory Guide 1.89, "Qualification of Class 1E Equipment for Nuclear Power Plants. Specifically the inspectors reviewed the following procedures:

- SS-E18.10.01, Environmental Qualification Requirements for Safety Related Electrical Equipment
- SS-E18.10.02, Environmental Qualification Requirements for Safety-Related Electrical Cable
- WB-DC-40-42, Environmental Design
- WB-DC-40-54, Environmental Qualification to 10CFR50.49

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the WBN Unit 2 EQ procedures adequately addressed the criteria and guidance specified in 10 CFR 50.49, NUREG-0588, and Regulatory Guide 1.89. Therefore, the inspection efforts associated with SSER22 Appendix HH Open Item 19 are complete and closed.

**OA.1.18 (Closed) Construction Deficiency Report (CDR) 391/81-26 and 391/81-66:  
Reinspection, Reevaluation & Revision of Pipe Whip and Jet Impingement  
Protective Devices (PDs) (IP 35007)**

a. Inspection Scope

Background: In 1981, the applicant reported to the NRC, in accordance with 10 CFR 50.55(e), deficiencies associated with the documentation, fabrication, and installation of all pipe whip and jet impingement PDs.

The PDs provide protection, as required, to safety systems and components, from the effects of postulated high energy pipe breaks. The nonconformance reports (NCRs) described deficiencies associated with documentation of welding, fit-up, bolting, and PD locations.

Inspection Activities: To address these deficiencies, the applicant reinspected and evaluated all PDs. Weld repairs were made, as required, and all welds were documented. The location was established and the configuration and clearances were verified for all PDs. Anchor bolts were inspected, tested, and documented. A log of all design changes was generated and maintained. Inspection Report 50-390/83-27 and 50-391/83-19 documented the NRC acceptance of the corrective actions, for Unit 1, associated with these NCRs.

The inspectors observed walk-downs of seven randomly selected Unit 2 PDs. The PDs were associated with four different systems at three different locations. The inspectors observed numerous measurements at each PD against the design drawings. All attributes associated with welds, fit-up, bolting, and PD locations were found to be within design tolerances.

The inspectors reviewed the applicant's Unit 2 closure package form NGDC PP-19-2 with tracking document PER 172651. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The documents reviewed and PDs inspected for CDR 391/81-26 and 391/81-66 met the requirements of 10 CFR 50, Appendix B. This item is closed.

## **V. MANAGEMENT MEETINGS**

### **X.1 Exit Meeting Summary**

On June 6, 2011, the resident inspectors presented the inspection results to Mr. David Stinson and other members of his staff. Although some proprietary information may have been reviewed during the inspection, no proprietary information was included in this inspection report.

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Applicant personnel**

D. Stinson, Site Vice President, TVA, Unit 2  
R. Smith, Engineering Manager, Bechtel  
B. Briody, Maintenance and Modifications Manager, TVA, Unit 2  
R. Kuhn, Quality Assurance Manager, Bechtel  
R. Baron, Nuclear Assurance Project Manager, TVA, Unit 2  
T. Raley, Instrumentation & Controls Manager, Bechtel  
M. Pitre, Lead Field Welding Engineer, Bechtel Construction  
G. Newell, TVA Film Examiner  
S. Melton, Pipefitter Supervisor, Bechtel Construction  
R. Cox, Boilermaker Supervisor, Bechtel Construction  
G. Scott, TVA Licensing  
C. Stephenson, TVA Licensing  
B. Perkins, Lead Engineer, Bechtel  
G. Jones, Watts Bar EQ Program Owner  
B. Dean, Watts Bar EQ Program Owner  
R. Hill, Field Welding Engineer, Bechtel  
V. Krishnan, Senior Engineer, Bechtel  
A. Nikaeen, Senior Engineer, Bechtel  
R. Gonzalez, Junior Engineer, Bechtel  
T. Metzler, Licensing, TVA, Unit 2

### **INSPECTION PROCEDURES USED**

IP 35007 Quality Assurance Program Implementation During Construction  
IP 36100 Inspection of 10 CFR Parts 21 and 50.55(e) Programs for Reporting Defects and Noncompliance  
IP 37002 Construction Refurbishment Process – Watts Bar Unit 2  
IP 45051 Geotechnical/Foundation Activities Procedures Review  
IP 45053 Geotechnical/Foundation Activities Work Observation  
IP 45055 Geotechnical/Foundation Activities Record Review  
IP 46071 Concrete Expansion Anchors  
IP 49063 Safety-Related Piping - Work Observation  
IP 49065 Safety-Related Piping - Records Review  
IP 50073 Mechanical Components – Work Observation  
IP 50090 Pipe Support and Restrain Systems  
IP 51063 Electric Cable – Work Observation  
IP 53053 Containment Penetrations (Mechanical) Work Observation  
IP 55050 Nuclear Welding General Inspection Procedure  
IP 55093 Reactor Vessels Internals (Welding) Observation of Welding and Associated Activities  
IP 57070 Nondestructive Examination Procedure Magnetic Particle Testing Examination Procedure Review/Work Observation/Record Review  
IP 92717 IE Bulletins for Information and IE Information Notice Followup

TI 2512/023 Inspection of Watts Bar Nuclear Plant Hanger Update Corrective Action Program Plan  
 TI 2512/026 Inspection of Watts Bar Nuclear Plant Instrument Lines Corrective Action Program Plan  
 TI 2512/036 Inspection of Watts Bar Nuclear Plant Environmental Qualification Special Program

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

#### Opened

05000391/2011604-01	NCV	Failure to Correct a Nonconformance (Section C.1.7)
05000391/2011604-02	NCV	Failure to Maintain Adequate Design Specifications (Sections OA.1.6)

#### Discussed

2512/026	TI	Instrument Sensing Line CAP (Section OA.1.1)
2512/036	TI	Environmental Qualification Special Program (Section OA.1.2)
Open Item 20	SSER-22 (App. HH)	Resolve Whether or Not Routine Maintenance Activities Should Result in Increasing the EQ of the 6.9kV Motors to Category I Status in Accordance with 10CFR50.49 (Section OA.1.3)
Open Item 23	SSER-22 (App. HH)	Resolve Whether or Not TVA's Reasoning for Not Upgrading the MSIV Solenoid Valves to Category I is a Sound Reason to the Contrary, as Specified in 10CFR50.49 (Section OA.1.4)
Open Item 24	SSER-22 (App. HH)	The NRC Staff Requires Supporting Documentation from TVA to Justify its Establishment of a Mild Environment Threshold for Total Integrated Dose of Less Than $1 \times 10^3$ Rads for Electric Components such as Semiconductors or Electric Components Containing Organic Metal (Section OA.1.5)
89-02	BL	Stress Corrosion Cracking of High Hardness Type 410 Stainless Steel Internal Preloaded Bolting in Anchor Darling Model S350W Swing Check Valves or Valves of Similar Design (Section OA.1.6)

Closed

80-18	BL	Maintenance of Adequate Minimum Flow Thru Centrifugal Charging Pumps (CCPs) Following Secondary Side High Energy Line Rupture (Section OA.1.6)
80-20	BL	Failure of Westinghouse Type W-2 Spring Return to Normal Control Switches (Section OA.1.7)
93-04	GL	Rod Control System Failure and Withdrawal of Rod Control Cluster Assemblies (Section OA.1.8)
36100	IP	Inspection of 10CFR Part 21 and 50.55(e) Programs for Reporting Defects and Noncompliance (Section OA.1.9)
II.F.1.2.d	TMI Action	Verify Installation of Containment Pressure Monitors (Section OA.1.10)
II.F.1.2.f	TMI Action	Verify Installation of Containment Hydrogen Accident Monitoring Equipment (Section OA.1.11)
45051	IP	Geotechnical/Foundation Activities Procedure Review (Section OA.1.12)
45053	IP	Geotechnical/Foundation Activities Work Observation (OA.1.13)
45055	IP	Geotechnical/Foundation Activities Record Review (Section OA.1.14)
Open Item 18	SSER-22 (App. HH)	Verify Method for Addressing Effects of Environmental Conditions on Equipment During the Layup Period (Section OA.1.15)
Open Item 19	SSER-22 (App. HH)	Verify Unit 2 EQ Program (Section OA.1.16)
391/81-26 and 391/81-66	CDR	Reinspection, Reevaluation, and Revision of Pipe Whip and Jet Impingement Protective Devices (Section OA.1.18)

## LIST OF DOCUMENTS REVIEWED

### II. MANAGEMENT OVERSIGHT AND CONTROLS

#### C.1.1 Magnetic Particle Examination of Safety-Related Welds

##### Procedure

25402-000-4MP-T040-S0124, Bechtel Nondestructive Examination Standard Magnetic Particle Examination MT-ASME, Rev. 5, 11/24/2009

##### MT Examination Reports

MT-171, Weld No. 2-001A-D009-02, 04/06/2011

MT-184, Weld No. 2-001A-D003-04, 05/04/2011

#### C.1.2 Coatings for Pipe Support and Restraint System

##### Specification

G-55, Technical and Programmatic Requirements for Protective Coating Program for TVA Nuclear Plants, Rev. 18, 10/08/2010

##### Procedure

Modification/Addition Instruction (MAI)-5.3, Protective Coatings, Rev. 17, 12-17-2010

##### Work Order

08-953828-000, Generic Work Order for Application of Safety Related Paint/Coatings, 08/12/2008

#### C.1.4 Safety-Related Piping - Work Observation

##### Miscellaneous

WO 11182521, CCM EDCR 53590 Scope 2 Sys 072 070 WBN-2-PIP-072-B

DRA 53590-133

DRA 53590-134

DRA 53590-135

47W437-2, Mechanical Containment Spray System Piping, Rev. L

FSK-M-2995, Resolution of BIT 1438

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

##### Miscellaneous

WO 08-953901-006, CCM ASME III – EDCR 53121 Sys 062 Replace Missing Valves Upstream of RCP 4 Seal Water Injection

DRA 53121-002

DRA 53121-132  
DRA 53121-135

### **C.1.6 Electrical Cable – Work Observation**

WO 111171707, CCE DCN 54912 Stage 1 Rev 1 Sys 062 063 070 WBN-1-MTR-062-0108-A

### **C.1.7 Pipe Support and Restraint Systems**

#### Procedures

Bechtel Procedure 25402-000-GPP-0000-N3503, "Piping Installation," Rev. 3  
TVA WDP-PD-2, "Walkdown Procedure for Piping and Pipe Supports," Rev. 9  
TVA Procedure MAI-5.1B "Wedge Bolt (WB) Anchor Installation," Revision (Rev.) 19

#### Walkdown Package (WP)

WBN2-PD-067-1925-00  
WBN2-PD-067-1925-00  
WBN2-PD-062-1873-05  
WBN2-PD-074-1598-20  
WBN2-PD-070-1917-55  
WBN2-PD-003-1833-01

#### Unit 2 Specifications

General Engineering Specification G-43, "Installation, Modification, and Maintenance of Pipe Supports and Pipe Rupture Mitigative Devices," Rev. 13  
General Engineering Specification G-32, "Bolt Anchors Set in Hardened Concrete," Rev. 23

#### Work Order Package (WO)

WO 111073907  
WO 110724208  
WO 111180422  
WO 111149348

### **C.1.8 Containment Penetrations (Mechanical) - Work Observation**

#### Miscellaneous

WO 110739617  
Field Welding Checklists (WR-5) for Penetrations X-20A & X-20B  
Drawing WM-M-1584, X-20A Weld Map, Rev.0  
Drawing WM-M-1585, X-20B Weld Map, Rev.0  
NDE Request (WR-10) for Penetration X-20A  
Welder Performance Qualification Test Record (WR-1)  
Material Withdrawal Request, MWR -13961  
Material Traceability and Transfer Record, Penetration X-20B

### **C.1.9 Nuclear Welding General Inspection Procedure**

#### Miscellaneous

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants  
 The Watts Bar Unit 2 piping code of record (American Society of Mechanical Engineers [ASME] Boiler and Pressure Vessel Code, 1971 Edition with addenda through Summer 1973, Section III, Division 1, Rules for Construction of Nuclear Facility Components).  
 Bechtel's Special Processes Manual (SPM) which includes program documents for general welding standards, control of welding procedures, weld filler metal, weld documentation, welder qualifications, and nondestructive examination (NDE) procedures.  
 WO# 111181128, Field Welding Checklist (Form WR-5) for new weld nos. 2-063A-D124-23 C0R0 and 2-063A-D124-26 C0R0 (with Supplements)  
 25402-000-4MP-T040-S0036, Bechtel Welding Standard, Documentation of Welds (WD-1), Revision 6  
 25402-000-4MP-T040-S0013, Bechtel General Welding Standard, GWS-1, Revision 2  
 Welding Procedure Specification (WPS) P8-T-Ag, Rev. 0  
 Welder Performance Qualification Test Records (WR-1) for P69, and P106  
 Laboratory Testing Inc. CMTR for Taylor Forge Stainless 8" dia. LR Elbow with Heat Code MVUN-1  
 Energy & Process Corporation CMTR for Ta Chen International Inc. 8" dia. stainless pipe with Heat Code 37744  
 Weld Filler Metal lot/heat numbers: B200, B202, and B204

#### Drawings

Bechtel Weld Map Drawing No. FSK-M-3009, Rev. 3

### **C.1.10 Reactor Vessels Internals (Welding) Observation of Welding and Associated Activities**

#### Miscellaneous

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants  
 The Watts Bar Unit 2 code of record (American National Standards Institute [ANSI] B31.1, Power Piping Code, 1973 Edition with addenda through Summer 1973).  
 Bechtel's Special Processes Manual (SPM), Rev. 2 which includes program documents for general welding standards, control of welding procedures, weld filler metal, weld documentation, welder qualifications, and nondestructive examination (NDE) procedures.  
 25402-000-4MP-T040-S0036, Bechtel Welding Standard, Documentation of Welds (WD-1), Revision 6  
 25402-000-4MP-T040-S0013, Bechtel General Welding Standard, GWS-1, Revision 2  
 Welding Procedure Specification (WPS) P8-T-Ag, Rev. 0  
 Welder Performance Qualification Test Records (WR-1) for B18, and B25  
 WO# 110716964, Field Welding Checklist (Form WR-5C) for FW-No. 1 through 48 (with Supplements)  
 Arcos Industries, LLC CMTR shipped to the Weldstar Company for 1/16" diameter ER316/316L solid bare rod with Lot/Heat No. AT8700/735354  
 Weld Filler Metal lot/heat numbers: B200, B202

25402-000-4MP-T040-S0130, VT – ANSI B31.1 1973, Bechtel Nondestructive Examination Standard, Visual Examination, Revision 4

### Drawings

Bechtel Weld Map Drawing No. WM-M-007, Rev. 0  
Bechtel Drawing Revision Authorization (DRA) No. 54835-003, Rev. 0

### **C.1.11 Nuclear Welding General Inspection Procedure**

#### Miscellaneous

WEC Drawing No. 1546E86, Revision Date September 15, 1986

## **IV. OTHER ACTIVITIES**

### **OA.1.1 Instrument Sensing Line CAP (TI 2512/026, IPs 49063 and 49065)**

#### Procedures

TI-276, Temporary Equipment Control, Rev. 6  
MAI-4.4A, Instrument Line Installation, Rev. 14  
MAI-4.4B, Instrument and Instrument Panel Installation, Rev. 6  
MAI-4.5, Pipe and Tube Bending, Rev. 5  
25402-000-GPP-0000-N3503, Piping Installation, Rev. 4  
25402-000-GPP-0000-N3401, Instrument and Instrument Line Installation, Rev. 6

#### Specifications

N3E-934, Instrument and Instrument Line Installation and Inspection, Rev. 8

#### Design Control Documents

EDCR 52446, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 52447, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 52668, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 52684, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53007, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53089, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53092, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53232, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53317, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53389, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53390, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53391, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53419, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53580, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53606, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53607, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53614, Inspect/Replace/Install Instrument Sensing Lines  
EDCR 53615, Inspect/Replace/Install Instrument Sensing Lines

EDCR 53616, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53617, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53618, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53620, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53621, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53629, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53630, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53638, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53642, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53644, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 53809, Inspect/Replace/Install Instrument Sensing Lines  
 EDCR 55172, Inspect/Replace/Install Instrument Sensing Lines

### Drawings

47W600-0-7, Electrical Instruments & Controls, Unit 1, Rev. 4  
 47W600-0-8, Electrical Instruments & Controls, Unit 1, Rev. 3  
 2-47W600-0-7, Electrical Instruments & Controls, Unit 2, Rev. 1  
 2-47W600-0-8, Electrical Instruments & Controls, Unit 2, Rev. 1

### Work Orders

WO 110692086, Inspect/Replace/Install Instrument Sensing Lines per EDCR 53630

### PERs and SRs

SR 354670, Inadequately Secured Compressed Gas Cylinders  
 SR 353888, Specification N3E-934 and Drawings 47W600-0-7 and 47W600-0-8 not Updated

### Audits

25402-SA-ENG-10-004, Instrument Lines CAP Self-Assessment, 5/20/10  
 25402-WBN-SR-10-1279, Work Order Closure Review & Slope Verification of Work, 10/14/10  
 25402-WBN-SR-11-1489, Panel 2-L-351B Sense Line Supports, 1/15/11  
 25402-WBN-SR-10-1169, Actions to Address Inadequate Instrument Line Slope, 8/23/10  
 25402-WBN-SR-10-1315, Instrument Tube Bending and Installation, 10/29/10  
 25402-WBN-SR-10-1281, Walkdown Package Validation, 9/27/10  
 25402-WBN-SR-11-1488, Sense Line Support Configuration, 1/15/11  
 25402-WBN-SR-10-0876, I&C Walkdown Package Validation, 3/5/10  
 25402-WBN-SR-10-1442, Sense Line Support Work Order Implementation, 12/11/10  
 25402-WBN-SR-10-1436, Instrument Tubing Sense Line Inspection, 12/08/10  
 25402-WBN-SR-10-1351, Instrumentation Tubing Installation and Inspection, 10/27/10  
 25402-WBN-SR-10-1426, Instrument Sense Line Slope Installation & Inspection, 12/8/10  
 25402-WBN-SR-10-1091, Installed Instrument Transmitters, 6/19/10

### Miscellaneous

Implementation Plan for the Instrument Lines Corrective Action Program

**OA.1.2 EQ Special Program and SSER 22 Appendix HH Open Items 18, 19, 20, 23 and 24.**Procedures/Programs

SS-E18.10.01, "Environmental Qualification Requirements for Safety Related Electrical Equipment" Dated February 15, 2005  
 SS-E18.10.02, "Environmental Qualification Requirements for Safety-Related Electrical Cable" Dated October 18, 2001  
 WB-DC-40-42, "Environmental Design" Dated July 9, 2008  
 WB-DC-40-54, "Environmental Qualification to 10CFR50.49" Dated August 12, 2008  
 25402-3DP-GEE-00001 Rev 000, "Equipment Environmental Qualification Program"

Environmental Qualification Documents/Calculations

WBNEQ-CABL-064, "Material Aging Calculation for Okonite Cables"  
 WBNEQ-MOT-001, "EQ Calculation for Westinghouse Motors"  
 WBNEQ-JBOX-001 Binder Pages B9, 13 and B14 for GE Terminal Blocks  
 GE Memorandum Dated February 24, 1978 Re: Qualification of EB Terminal Board, Pages E-84 thru 89  
 EDQ00299920110003, Material Aging Calculation to Assess the Impact of the Layup Period on the Unit 2 EQ Cable Qualified Life Dated April 19, 2011  
 EDQ00299920090011, Revision 1, "WBN Unit 2 – List of 10 CFR 50.49 Components and Cables" Dated January 21, 2011  
 RDM 72186, A Review of Electronic Components in a Radiation Environment of  $\geq 5 \times 10^4$  rads, revision 0

Purchase Orders/Procurement Packages

Purchase Order Cables, 103131-MRA-EWG2-00002, EWE2-00034, WB2-09-0230  
 Purchase Order 26088, Limit Switches,  
 Purchase Requisition 2502-011-SRA-NEE0-00002, Revision 0

**OA.1.7 NRC BL 89-02: Stress Corrosion Cracking of High-Hardness Type 410 Stainless Steel Internal Preloaded Bolting in Anchor Darling Model S350W Swing Check Valves or Valves of Similar Design**Design Control Documents

EDCR 53817, Wrap-Up EDCR for System 067, 1/13/10

Specifications

WBNP-DS-501433-0904, Rev. 15, ASME Boiler and Pressure Vessel Code Section III Motor Operated Valves – All Sizes and Manual Valves – NPS 2-1/2 inch and Larger (Class 2 and 3 Valves Only), 4/8/11

Drawings

CC05269, Rev. B, Swing Check Valve Assembly for 2-CKV-070-676A/B, 4/5/11  
 09-56866-02, Rev. A, Swing Check Valve Assembly for 2-CKV-003-0873, 12/16/10  
 455KAB1-001, Rev. A, Swing Check Valve Assembly for 2-CKV-003-0656, 7/26/77

SA-20971-1C, Rev. A, Swing Check Valve Assembly for 2-CKV-003-0874-S, 9/27/77

Corrective Action Documents

PER 143976, 3/8 inch bolts in check valve flappers found corroded and broken, 5/3/2008  
 PER 356559, IEB 89-02, SR Swing Check, 410 Stainless Recurrence Controls, 4/14/11

Miscellaneous

Open Items / Commitment Completion Form, Tracking No. NCO880118006, 4/12/11  
 Open Items / Commitment Completion Form, Tracking No. NCO880118002, 2/17/11  
 Open Items / Commitment Completion Form, Tracking No. PER143976, 2/7/11

**OA.1.7 BL 80-18: Maintenance of Adequate Minimum Flow thru CCPs Following Secondary Side High Energy Line Rupture.**

Miscellaneous

TVA BL 80-18 Commitment Closure Package  
 NRC IIR 50-390/82-41, dated January 12, 1982  
 NRC IIR 50-390/85-60, dated December 6, 1985  
 Regulatory Framework Letter from TVA to NRC dated January 21, 2011  
 EDCR 52328, Rev. A  
 Field Change Notice WBTM-10626, dated February 14, 1983

**OA.1.8 NRC BL 80-20: Failure of Westinghouse Type W-2 Spring Return to Normal Control Switches.**

Miscellaneous

TVA BL 80-20 Commitment Closure Package  
 NRC IIR 50-390,391/94-35, dated June, 1994  
 EDCR 52361, Rev. A  
 DWG 2-47W605-53, Electrical layout of Control Board Panel 2-M-4, Rev. 0  
 Calculation E27885081201, Rev.7  
 DCN P-01109, Rev. A  
 DRA 2-45B640-120, Switch Contact Development, Rev. 0  
 DRA 2-45B-640-27, Switch Contact Development, Rev. 0  
 DRA 2-45B640-22, Switch Contact Development, Rev. 0  
 DRA 2-45B640-220, Switch Contact Development, Rev.0  
 DRA 2-45B640-79, Switch Contact Development, Rev. 0  
 DWG 45N600-1-3, Wiring Diagrams Main Steam System, Rev. 7  
 DWG 2-45W760-68-1, Wiring Diagram 6900V Reactor Coolant Pump BDS, Rev. 0  
 DWG 2-45W760-63-1, Wiring Diagram Safety Injection System, Rev. 1  
 DWG 2-45W760-68-3, Wiring Diagram Reactor Coolant System, Rev. 2  
 DWG 2-45W600-99-1, Wiring Diagram Reactor Protection System, Rev. 0  
 Field Change Notice WBTM-10626, dated February 14, 1983

**OA.1.9 NRC GL 93-04: Rod Control System Failure and Withdrawal of Rod Control Cluster Assemblies.**

Miscellaneous

TVA GL 93-04 Commitment Closure Package  
 DCN W-34191 Rev.A  
 EDCR 52324, Rev. A  
 TVA contract 65717, Westinghouse shop order 340  
 Letter from Westinghouse to TVA, WBT-D-0807, dated July 2, 2009  
 Letter from Westinghouse to TVA, WBT-D-0972, dated August 28, 2009

**OA.1.10 Inspection of 10CFR Part 21 and 10CFR50.55(e) Programs for reporting defects and noncompliance**

Procedures

NGDC PP-13, NRC Reporting Requirements, Rev. 2  
 NGDC PP-3, Corrective Action Program, Rev. 7  
 NPG-SPP-03.1.4, Corrective Action Program Screening and Oversight, Rev. 0002  
 NPG-SPP-03.5, Regulatory Reporting Requirements, Rev. 0002  
 NPG-SPP-03.1, Corrective Action Program, Rev.0001

Audits

25402-WBN-SR-10-1300, Welding CAP Implementation Plan  
 25402-WBN-SR-10-1306, WBN Unit 2 Compliance to NRC 10CFR Part 21.6  
 25402-WBN-AR-09-0004, Procurement, Supplier Quality, and Subcontractors  
 25402-WBN-SR-10-0977, Posting of 10CFR Part 21 Reporting Requirements in Knoxville Office  
 25402-WBN-SR-10-1195, ASME Related Purchase Order Development

Reportability Screening PERs

PER 202125, Part 21 Report – Failure of Spare Limitorque Actuator Motor  
 PER 168920, Potentially incorrect starter installed  
 PER 239995, Failure of DCN PMTI  
 PER 230149, Operating requirement 14.8.1.c  
 PER 211458, DCN 54347

**OA.1.11 TMI Action Item II.F.1.2.d, Verify Installation of Containment Pressure Monitors**

Miscellaneous

TVA TMI Action Item II.F.1.2.d Commitment Closure Package  
 NUREG-0847, SER 5 dated November 1990  
 NRC IIR 50-390/84-59, dated November 7, 1984  
 Regulatory Framework Letter from TVA to NRC dated October 28, 2010  
 EDCR 55172, Rev. A  
 EDCR 52366, Rev. A  
 Material Requisition 25402-011-MRA-JP02-00004, Rev.001  
 Purchase Memorandum 25402-011-PMA-JP02-00011

### **OA.1.12 TMI Action Item II.F.1.2.f, Verify Installation of Containment Hydrogen Accident Monitoring Equipment**

#### Miscellaneous

TVA TMI Action Item II.F.1.2.f Commitment Closure Package  
 NUREG-0847, SER 5 dated November 1990  
 NRC IIR 50-390/84-85 and 50-391/84-57 dated January 09, 1985  
 NRC IIR 50-390/95-74 and 50-391/95-74 dated December 01, 1995  
 Regulatory Framework Letter from TVA to NRC dated October 28, 2010  
 EDCR 52346, Rev. A  
 EDCR 52694, Rev. A  
 Material Requisition 25402-011-MRA-JA29-00002, Rev.003  
 WBN2 H2 Analyzer Replacement Procurement Specification, Rev. 0003

### **OA.1.18 (Closed) CDR 391/81-26 and 391/81-66: Reinspection, Reevaluation & Revision of Pipe Whip and Jet Impingement PDs**

#### Problem Evaluation Reports

CDRs Closure Package: Form NGDC PP-19-2 with Tracking Number: PER 172651

#### Drawings

48W1701-01, Structural Steel Protective Devices Inside Containment, Rev. 5  
 48W1701-08, Structural Steel Protective Devices Inside Containment, Rev. 15  
 48W1701-07, Structural Steel Protective Devices Inside Containment, Rev. 4  
 48W1700-02, Structural Steel Protective Devices Inside Containment, Rev. 6  
 48W1700-14, Structural Steel Sections & Details Inside Containment, Rev. 6  
 48W1700-06, Structural Steel Sections & Details Inside Containment, Rev. 6  
 48W1700-04, Structural Steel Plan Elev. 743'-3" Inside Containment, Rev. 7  
 48W1708-01, Structural Steel Protective Devices North Main Steam Valve Rooms, Rev. 5  
 48W1708-10, Structural Steel Sections & Details North Main Steam Valve Rooms, Rev. 12  
 48W1708-09, Structural Steel Sections & Details North Main Steam Valve Rooms, Rev. 9

#### Specifications

N3C-884, Construction Specification for Fabrication and Installation of Pipe rupture Mitigative Devices and Associated Support Structures, Rev. 0, Dated 2/28/78  
 3.C.5.4, Process Specification for Final Visual Weld Examination of Structural Welds, rev 2, Dated 1/28/85  
 G-32, General Engineering Specification for Bolt Anchors in Hardened Concrete, Rev, 23

#### Miscellaneous

47BM470-6, Bill of Material for Miscellaneous Systems (Impingement Sleeves), Rev 0, Dated 12/27/77  
 WB-DC-40-31.53, Design Criteria Document for Pipe Whip Restraints, Jet Deflectors and Sleeves, Rev. 8

## LIST OF ACRONYMS

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
BL	Bulletin
CAP	Corrective Action Program
CCP	centrifugal charging pump
CDR	Construction Deficiency Report
CFR	<i>Code of Federal Regulations</i>
CMTR	Certified Material Test Report
CSL	coating service level
C0R0	Cut-out # 0 and Repair # 0
DCN	Design Change Notice
DRA	design revision authorization
ECP	Employee Concerns Program
EDCR	Engineering Document Construction Release
EQ	Environmental Qualification
ERCW	Essential Raw Cooling Water
FW-No.	field weld number
GL	Generic Letter
IMC	Inspection Manual Chapter (NRC)
IP	Inspection Procedure (NRC)
IR	Inspection Report (NRC)
kV	kilovolt
MAI	Modification Addition Instruction
MCR	main control room
MOV	motor operated valve
MT	magnetic particle testing
NCR	nonconformance report
NCV	non-cited violation
NDE	nondestructive examination
NRC	Nuclear Regulatory Commission
PD	protective device
PER	Problem Evaluation Report
PO	Purchase Order
PORV	power operated relief valve
QA	quality assurance
QC	quality control
RCS	reactor coolant system
Rev.	revision
RPV	Reactor Pressure Vessel
SAR	safety analysis report
SCWE	Safety Conscious Work Environment
SER	safety evaluation report
SI	Safety Injection
SL	severity level
SP	Special Program
SR	service request
SSER	Supplement to Safety Evaluation Report
SSD/SDI	expansion shell anchors

TI	Temporary Instruction (NRC)
TVA	Tennessee Valley Authority
TMI	Three Mile Island
VT	visual testing/examination
WBN	WBN Nuclear Plant
WEC	Westinghouse Electric Corporation
WO	work order
WOG	Westinghouse owners group