



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

February 9, 2011

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6A Lookout Place  
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Chattanooga, TN 37402-2801

**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2010605**

Dear Mr. Bhatnagar:

On December 31, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on January 12, 2010, with Mr. Masoud Bajestani 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. This inspection determined that adequate corrective actions were taken to resolve the issues associated with Replacement Items CAP and an Electrical Cable CAP sub-issue, Cable Jamming. Based on the results of this inspection, these items are closed for Unit 2; however, future inspections may be conducted for new related activities.

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 05000391/2010605 w/attachment

cc w/encl: (See next page)

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Letter to Ashok S. Bhatnagar from Robert C. Haag dated February 9, 2011

SUBJECT: WBN NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2010605

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2010605

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: 1260 Nuclear Plant Rd  
Spring City TN 37381

Dates: October 1 – December 31, 2010

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Approved by:

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

## 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 three-month period of inspections in the areas of quality assurance (QA); 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 (IMC) 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>.

The inspection identified two NRC-identified Severity Level (SL) IV non-cited violations (NCVs).

### **Inspection Results**

- The inspectors identified an Unresolved Item (URI) related to the inadequate end clearance for a clamp holding instrument tubing to a Unistrut support for instrumentation associated with the discharge pressure from the Unit 2A Safety Injection system (SIS) pump. The inspectors concluded that in order to properly evaluate the applicant's disposition of this issue, additional inspection would be required. (Section C.1.3)
- The inspectors identified an URI related to the implementation of the refurbishment program and the inspection of material condition inside safety-related piping. The inspectors concluded that in order to properly evaluate whether the applicant performed pipe internal surface inspections in accordance with applicable instructions and whether the refurbishment program, specifically Attachment A of Procedure 25402-3DP-G04G-00090, "Engineering Evaluation of for Commodity Refurbishment," Rev. 003 was properly implemented, additional inspection would be required. (Section C.1.9)
- A SL IV, NCV of 10 *Code of Federal Regulations* (CFR) Part 50, Appendix B, Criterion X, "Inspection," was identified by the inspectors when the applicant failed to adequately perform a pre-assembly hold point visual inspection of a pump impeller for a safety-related component. (Section C.1.11)
- A SL IV, NCV of 10 CFR Part 50, Appendix B, Criterion XV, "Nonconforming Materials, Parts or Components," was identified by the inspectors for the failure to adequately document and disposition physical damage to an ASME III pressure retaining part following disassembly of a safety-related component. (Section C.1.11)
- The inspectors identified an URI related to the verification and acceptance of an incomplete installation of electrical conductors that appeared to have QC final acceptance. The inspectors concluded that in order to properly evaluate and disposition this issue, additional inspection would be required to determine the extent of condition for similar problems with quality control inspections. (Section C.1.15)

- The inspectors concluded that concerns pertaining to the Corrective Action Program (CAP) on Replacement Items, and the CAP Sub-Issue on cable jamming have been appropriately addressed for Watts Bar Unit 2 and these items are closed. (Sections OA.1.28 and OA.1.39)
- The inspectors concluded that concerns pertaining to several TMI Action Items, NCVs, URIs, CDRs, and IFIs have been appropriately addressed for Watts Bar Unit 2 and these items are closed.
- Other areas inspected were adequate with no findings of significance identified. These areas included: various Unit 2 CAPs; electrical systems and components; mechanical systems and components; nuclear welding; structural concrete and welding; nondestructive examination and in-service inspection activities; TMI Action Items; refurbishment; and fire protection.

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## REPORT DETAILS

### Summary of Plant Status

During the current inspection period, Tennessee Valley Authority (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 NRC non-cited violation (NCV) 05000391/2010602-01 (PERs 217958 and 218287), on cable damage, and NCV 05000391/2008010-01 (PER 158979), related to a failure to document insufficient divisional separation between electrical circuits, as discussed in Section C.1.13 of this report. Additionally, the inspectors reviewed 13 recent Bechtel QA surveillance reports regarding in-process quality control (QC) inspections and ongoing construction work activities. Documents reviewed are listed in the attachment.

###### b. Observations and Findings

No findings of significance were identified.

###### c. Conclusions

The PERs reviewed were properly identified, addressed, and resolved. Specific PERs reviewed dealt with the NCV closeout inspection.

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

###### a. Inspection Scope

The inspectors continued routine meetings with the Unit 2 Employee Concerns Program (ECP) representative to evaluate the effectiveness of the applicant's program for resolving employee concerns. The inspectors reviewed existing program requirements and recent safety-related concerns identified by the applicant's and contractor's ECP programs. The inspectors also verified that significant problems were documented under the corrective action program and were being properly identified, addressed, and resolved by TVA. This included a review of anonymous PERs and trending for the months of October and November.

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 safety-conscience work environment.

**Q.1.3 In-depth QA Inspection of Performance (IP 35061)**

a. Inspection Scope

The purpose of this IP is to verify that site work is being performed in accordance with NRC requirements, safety analysis report (SAR) commitments, and implementing procedures; the QA/QC program is functioning in a manner to ensure that requirements and commitments are being met; and that prompt and effective action is taken to achieve permanent corrective action on significant discrepancies. The method for verifying these objectives have been met was primarily accomplished through in-office review, routine inspector evaluations, and focused team inspection efforts. Each applicable section of the IP was reviewed over the course of the 2010 assessment period. Specifically:

Section 02.01.a, "Field Drawings and Work Procedures" primarily verifies that specific activities, utilizing the most recent revisions of field drawings, construction specifications, and work procedures, are in agreement with the technical requirements. IP requirements for this section were routinely satisfied during the 2010 assessment period through implementation of numerous work observations, completed work, and record review inspections utilized during the implementation of various other IPs.

Section 02.01.b, "Field Inspection" inspection scope is focused around in-process installation of field equipment and qualification of those performing the work. IP requirements for this section were routinely satisfied during the 2010 assessment period through implementation of numerous work observations, completed work, and record review inspections utilized during the implementation of various other IPs.

Section 02.01.c, "Field Engineer/Engineering Reports" inspection scope directs inspection effort to verify that adequate supervision is occurring on field work and that any identified discrepancies are properly documented. IP requirements for this section were routinely satisfied during the 2010 assessment period through implementation of numerous work observations, completed work, and record review inspections utilized during the implementation of various other IPs.

Section 02.01.d, "Quality Control" inspection scope focuses on verifying that adequate QC efforts are being implemented by reviewing that QC procedures, documentation, and qualification of QC inspectors are properly maintained. IP requirements for this section were routinely satisfied during the 2010 assessment period through implementation of numerous work observations, completed work, and record review inspections utilized during the implementation of various other IPs.

Section 02.01.e, "Nonconforming Items Reports (NCRs)" inspection scope focuses on verifying that construction discrepancies are properly identified and resolved, including trending of similar issues. IP requirements for this section were routinely satisfied during the 2010 assessment period. Additionally, IP requirements were satisfied during the inspection that was documented in NRC Problem Identification and Resolution Inspection Report 05000391/2010607.

Section 02.01.f, “Materials and Equipment” inspection scope focused on verifying that materials used in construction were properly received, stored, and handled during in-process installation. IP requirements for this section were routinely satisfied during the 2010 assessment period. Specifically, inspection efforts during the inspection that was documented in NRC 05000391/2010603, Procurement, Receiving, and Storage inspection effort focused on validating the adequacy of this section’s objectives.

Section 02.01.g, “Audits” inspection scope focuses on verifying that audits, performed by the applicant, are meaningful, effective, and reflect quality performance by the QA/QC organization. IP requirements were satisfied during the inspection that was documented in NRC Problem Identification and Resolution Inspection Report 05000391/2010607.

Section 02.02, “Part 21 Requirements” inspection scope primarily verifies adequate title 10 *Code of Federal Regulations* (CFR) Part 21 posting and procedures exist. The inspectors reviewed the procedure for reporting defects and non-compliances, NGDC-13, “Watts Bar Nuclear Plant Unit 2 – NRC Reporting Requirements,” Rev. 2, and held discussions with licensing personnel about records monitoring and posting and reporting requirements for 10CFR21 to verify that the program meets the requirements of 10CFR21. The inspectors walked down two locations in the plant where 10CFR21 requirements were posted to verify that all required information was present.

The following sample was inspected:

- IP 35061 Section 02.02 – one sample

b. Observations and Findings

No findings of significance were identified. A majority of the items have been previously inspected under various Unit 2 inspection activities during the 2010 assessment period. Below is a summary of each section of IP 35061:

Section 02.01.a, “Field Drawings and Work Procedures” requirements were routinely satisfied during the 2010 assessment period

Section 02.01.b, “Field Inspection” requirements were routinely satisfied during the 2010 assessment period

Section 02.01.c, “Field Engineer/Engineering Reports” requirements were routinely satisfied during the 2010 assessment period

Section 02.01.d, “Quality Control” requirements were routinely satisfied during the 2010 assessment period

Section 02.01.e, “Nonconforming Items Reports (NCRs)” requirements of issue identification, resolution, and trending were routinely satisfied during the 2010 assessment period and during the Problem Identification and Resolution Inspection Report 005000391/2010607.

Section 02.01.f, “Materials and Equipment” requirements of material and equipment receipt, storage, and handling were specifically satisfied during the 05000391/2010603 integrated inspection report (IIR) assessment period

Section 02.01.g, “Audits” requirements of audit scope, frequency, and findings resolution were satisfied during the Problem Identification and Resolution Inspection Report 05000391/2010607.

Section 02.02, "Part 21 Requirements" regarding procedures, implementation, and postings were satisfied during the 05000391/2010603 IIR assessment and during this inspection period.

c. Conclusions

The inspectors determined that the documents and items reviewed in the 2010 assessment period supported that the QA/QC program is functioning in a manner to ensure that requirements are met and that corrective actions are properly identified and resolved.

## II. Management Oversight and Controls

### C.1 Construction Activities

#### C.1.1 Unit 1 and Unit 2 Construction Activity Interface Controls (IP 50073)

a. Inspection Scope

During the inspection period, the inspectors independently assessed applicant controls, associated with Unit 2 construction work activities, to prevent adverse impact on Unit 1 operational safety. The inspectors attended routine Unit 1/Unit 2 interface meetings to assess the exchange and sharing of information between the two site organizations. Periodic construction and planning meetings were observed to assess the adequacy of the applicant's efforts to identify those construction activities that could potentially impact the operating unit. 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 walk-downs of selected construction work locations to verify controls, designed to protect the operating unit, provided an adequate level of protection and had been properly implemented.

Specific work activities observed included:

- Transfer activities associated with movement of shipping container containing the rotating assembly for reactor coolant pump (RCP) 1 into Unit 2 containment through the airlock
- Transfer activities associated with movement of construction scrap material out of the Unit 2 containment through the airlock
- Unit 2 fuel transfer tube repair per design change notice (DCN) 52660 Stage 2 (work order (WO) 111033394 Mechanical)
- Review of work controls for removal of Valve 2-FCV-070-0143-A (Auxiliary Building Secondary Containment Enclosure (ABSCE) Boundary) for refurbishment per WO 08-953311-000
- Signal Tracing through the control building (discussed in additional detail in Section C.1.16)

The inspectors also reviewed and inspected selected work activities which the applicant had screened as not affecting Unit 1 to verify the adequacy of that screening effort. These included, but were not limited to, the following:

- Valve refurbishment activities
- Concrete repair activities in the Unit 2 reactor building

- Ongoing construction activities in the cable spreading room and auxiliary building
- Installation of conduits and associated supports in the auxiliary building under WO 11065714 and associated engineering document construction release (EDCR) 55233-2

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 properly implemented.

**C.1.2 Mechanical Components – Work Observation and Construction Refurbishment Process (IPs 50073 and 37002)**

a. Inspection Scope

The inspectors observed work activities associated with the construction inspection and refurbishment of safety-related mechanical components to ensure that these components will be in compliance with the original licensing and design basis, and meet or exceed vendor specifications and the original criteria specified in procurement documentation. The inspectors observed the work instructions to verify that the procedures identified requirements and provisions for ensuring that the material condition of safety-related mechanical components was evaluated and documented prior to final assembly of associated components (such as valves) in accordance with applicant procedure 25402-000-GPP-0000-N1302, "Watts Bar Unit 2 Completion Project Component Refurbishment Evaluation," Revision (Rev.) 0003. The inspectors observed activities to verify that these instructions were being followed during system restoration and that appropriate QC hold points were identified for in-process independent inspection of component assembly.

The inspectors observed a sample of existing safety-related valves being reassembled (after asbestos abatement) with new gaskets in accordance with the original manufacturer's instructions. The inspectors observed installation activities which included verification that tolerances/clearances were met; appropriate drawings and work procedures were available; and hold points were observed. The inspectors also observed work activities to verify that any failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances in safety or quality-related structures, systems, and components (SSCs), were promptly identified in accordance with 10CFR50, Appendix B, Criterion XVI. The inspectors interviewed two personnel and verified their ability to perform their assigned duties, QA/QC independence, and adequate management support for QA/QC functions.

The following areas were inspected:

- Disassembly, refurbishment and visual inspection of emergency raw cooling water (ERCW) air-operated valve (AOV) 2-FCV-067-0188-A per WO 08-953760-000
- Disassembly, refurbishment and visual inspection of ERCW AOV 2-FCV-067-0186 per WO 08-953757-000

- Disassembly, refurbishment and visual inspection of ERCW AOV 2-TCV-067-0129 per WO 08-953778-000
- Disassembly, refurbishment and visual inspection of ERCW AOV 2-FCV-067-0190 per WO 08-953761-000
- Blue check and visual inspection of reactor coolant (RC) motor-operated valve (MOV) 2-FCV-068-0332-B per WO 08-953300-000
- Blue check and visual inspection of RC MOV 2-FCV-068-0333-A per WO 08-953301-000
- Disassembly and visual inspection of RC MOV 2-FCV-068-0303 per WO 08-953783-000

The following samples were inspected:

- IP 50073 Section 02.03 - two samples
- IP 37002 Section 02.02.a.1 - seven samples

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.1.3 Instrumentation Installation Activities – Work Observation (IP 52053 and Technical Instruction (TI) 2512/026)**

a. Inspection Scope

The inspectors interviewed responsible personnel, reviewed documentation, and evaluated Unit 2 instrument installation activities. The inspectors interviewed responsible construction personnel to determine the status of installation activities being performed at Unit 2. The inspectors reviewed installation Modification Addition Instruction (MAI) 4.2A, "Piping/Tubing Supports" and MAI-4.4A, "Instrument Line Installation" to determine the verification, testing and documentation requirements for instrument, instrument line, and support installation. The inspectors performed walk-downs to evaluate the installation activities in the 2A & 2B Safety Injection system (SIS) pump rooms to determine the progress and quality of installation activities.

The following item was inspected:

- 2-ISLS-998-3257 – 2A SIS Pump Discharge Instrument Sensing Line Support (ISLS)

b. Observations and Findings

The inspectors identified the following unresolved item (URI):

Introduction: The inspectors identified a URI related to inadequate end clearance for a clamp holding instrument tubing to a Unistrut support for instrumentation associated with the discharge pressure from the Unit 2A SIS pump.

Description: On December 14, 2010, the inspectors observed that a tubing clamp associated with the ISL for the 'process line' piping portion of the 2A SIS pump discharge pressure instrumentation was attached to Support no. 2-ISLS-998-3257.

The inspectors noted that the clamp did not exhibit the proper end clearance as prescribed by applicant procedures. The inspectors had previously inspected this ISL in August and October 2010 but the field walk-down and inspection (which would include field work to properly assemble the clamp, if not already installed) of this section of the ISL had not been completed at that time. The inspectors noted that the instrument clamp had been adjusted and was now connected to its associated support, 2-ISLS-998-3257. The inspectors inquired about this condition with the construction staff and were told the field walk-down and inspection of that portion of the ISL had been completed under WO 10-951003-003.

After review of WO 10-951003-003 this issue was brought to the attention of TVA's staff. Subsequently, TVA management told the inspectors that the field walk-down and inspection of the 'process line' portion of the ISL had not yet been completed. In addition, TVA staff told the inspectors that WO 10-951003-003 did not correctly identify the actual field walk-down and inspection work that was performed under that WO. On December 16, 2010 TVA initiated a new WO (111749016) to perform a walk-down and inspection of the 'process line' portion of this ISL and support in question.

The applicant initiated PER 299588 to address the issues identified by the NRC inspectors related to inadequate end clearance associated with the tubing clamp attached to support 2-ISLS-998-3257.

The inspectors concluded that in order to properly evaluate the applicant's disposition of this issue, additional inspection would be required to determine (1) whether work on this portion of the instrument sensing line had actually been completed per an approved WO; and/or (2) was work performed on this ISL without an approved WO. This issue was identified as URI 05000391/2010605-01, "Insufficient End Clearance of a Two Piece Clamp."

c. Conclusions

The inspectors concluded that additional inspection would be required to resolve questions associated with the work performed to anchor this instrument tubing to the support.

**C.1.4 Safety Related Components – Records Review (IP 50075)**

a. Inspection Scope

The inspectors reviewed records of the two most recent QA audits associated with MOV actuators to determine whether requirements had been met. The requirements include that the audit reports clearly define the scope of the audits and the results, frequency of the audits were met, and appropriate follow-up actions to resolve identified deficiencies or weakness were implemented. The inspectors reviewed the audited organization's response to the audit findings.

The inspectors reviewed the following audit reports:

- TVA Nuclear, Nuclear Assurance, Vendor Audit and Services, Audit Report 2008V-20
- Exelon/NUPIC, Joint Audit Report Number: 19584

The inspectors reviewed quality-related receipt inspection and material certification records associated with Butterfly Valves to determine whether these records conform to

established procedures and whether they reflect work accomplished consistent with requirements. The requirements include material characteristics, performance tests, nondestructive tests, and other specifications. The inspectors reviewed receipt inspection and storage records to determine if they indicated, where appropriate, defective or incorrect components; and that defective or incorrect components were controlled and prevented from installation and possible use.

The inspectors reviewed the following purchase order (PO) records associated with Butterfly Valves:

- PO 44823, 2 line items
- PO 44913, 1 line item

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspection results are too limited to support a conclusion at this time.

**C.1.5 Structural Concrete – Work Observation (IP 46053)**

a. Inspection Scope

The inspectors observed concrete placement, reviewed pre-placement and mixing activities to confirm that the concrete production, concrete placement, and installation of components were performed as specified for the following WOs:

- WO 09-953531-019, Installation of conduit sleeves per EDCR 53554-2
- WO 09-954408-001, Concrete repair for Support No. 47A45-25-138
- WO 110934063, Concrete repair for Support No. Watts Bar (WBN)-STRU-667-5001

The inspectors also reviewed activities associated with MAI-5.4, “Concrete Repair, Grouting, and Dry Packing,” as well as interviewed personnel involved with these activities. This was done to assess the following conditions prior to and during the placement process:

- The pre-placement inspection performed by QC was completed before any concrete was placed.
- The placement area was cleaned and joint preparation was as specified in the construction specification.
- Records were produced, reviewed, and indicated the proper mix, location, time placed, water additions, and temperature of the concrete mix and ambient conditions.
- Concrete temperature, slump, air content, and unit weight were determined at the proper location and frequency.
- Sampling and testing techniques conformed to the procedures specified in the applicable American Society for Testing and Materials (ASTM) standards.
- Test specimens, for concrete strength determination, were sampled at the required location and frequency and were molded and cured in accordance with specified requirements.

The following samples were inspected:

- IP 46053 Section 02.03.e – three samples
- IP 46053 Section 02.03.f – three sample
- IP 46053 Section 02.03.h – six samples

Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Structural concrete activities observed were completed in accordance with applicable drawings, procedures, and specifications.

**C.1.6 Structural Steel and Supports – Work Observation (IPs 48053 and 55100)**

a. Inspection Scope

The inspectors observed structural steel welding performed by the applicant. Observed activities were compared to the requirements of applicant procedures “GWS-Structural,” Rev.3, Welding Procedure Specification “P1-A-Lh (Structural),” Rev. 1, and the American Welding Society (AWS) D1.1 “Structural Welding Code,” 2002 and 1973 editions.

The inspectors observed the following four welds during production:

- WM-C-044-FW-3, Rev. 0, Work Order 08-954513-0
- WM-C-044-FW-20, Rev. 0, Work Order 08-954513-0
- WM-C-044-FW-21, Rev. 0, Work Order 08-954513-0
- FSK-C-367-FW-6, Rev. 1, Work Order 09-954482-001

These observations were conducted to verify that the following attributes, for shielded metal arc welding, were followed:

- Welding procedures, drawings, instructions, and data sheets were at the work station or readily available.
- Welding was performed in accordance with welding procedure requirements.
- Low Hydrogen electrodes were of the specified classification and properly controlled.
- Preheat and interpass temperatures were controlled and measured in accordance with the procedure.
- Surrounding plant equipment was protected from weld spatter, arc strikes, and work activities.
- Proper cleaning and fit-up were achieved, QC inspections and hold points were followed.
- Weld joint geometry was as specified and that surfaces to be welded were prepared, cleaned, and inspected in accordance with applicable procedures or instructions.

The inspectors also reviewed QC procedures to verify adequate implementation by QC personnel. The inspectors interviewed QC inspection personnel performing structural steel receipt inspections to verify knowledge of the work activity requirements and procedures and to identify any adverse trend. A receipt inspection of structural steel for P.O. No. 160694, item No. 6, was observed to confirm that the QC inspector verified the acceptability of inspectable requirements in accordance with applicant procedure 25402-000-GPP-0000-N6104, "Materials Receiving," Rev. 5. The inspectors reviewed Consolidated Power Supply Certification of Conformance and Steel Dynamics material test and inspection report for P.O. 160694 to independently verify material conformance to ASTM A-36 and quality assurance requirements. The "X" laydown storage yard was inspected to verify stored structural steel material was controlled, marked, protected and segregated in accordance with Bechtel procedure 25402-000-GPP-0000-N6204, "Field Material Control and Traceability," Rev. 10.

The inspectors reviewed the Material Traceability and Transfer Record for WOs 08-954513-011 and 09-954482-001. On a sampling basis, the inspectors reviewed the structural steel material used in the field to verify that it was the correct type and grade and that the material was traceable to the Material Traceability and Transfer Record. Additional documents reviewed are included in the attachment.

The inspectors performed the following samples:

- IP 55100 Section 02.04 – four samples
- IP 48053 Section 02.03.a – one sample
- IP 48053 Section 02.03.b – one sample
- IP 48053 Section 02.04 – one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The observed welds conformed to the applicable requirements of the AWS code and applicant procedure requirements. The inspection of receipt, storage, and control of materials was in accordance with applicable project procedures and QA requirements.

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

a. Inspection Scope

The inspectors reviewed a sample of design documents and interviewed personnel associated with the design of pipes and pipe supports. Specifications, drawings, calculations, implementing procedures, and design inputs were among the documents reviewed. TVA Design Criteria Documents WB-DC-40-31.9, "Criteria for Design of Piping Supports and Supplemental Steel in Category I Structures," Rev. 21, and WB-DC-40-31.7, "Analysis of Category I and I(L) Piping Systems," Rev. 23, were reviewed by the inspectors to determine whether the design and design change process was adequately performed and controlled. The inspectors reviewed design activities to verify that any significant design and field changes from approved drawings were adequately controlled and processed commensurate with the original design. Additional documents reviewed are included in the attachment.

The inspectors observed ongoing pipe support installation activities and interviewed personnel engaged in the installation of supports to verify the following:

- The latest issue (revision) of applicable drawings and procedures were available to the installers.
- Significant modifications to supports were approved by appropriate personnel before implementation.
- Clearances between the pipe and restraints were as specified.
- Weld joint geometry was as specified and surfaces, to be welded, were prepared, cleaned, and inspected in accordance with applicable procedures.
- Pre-installation checks on type supports were performed for obvious damage, rust, or other conditions that might interfere with their proper operation.
- Pre-installation checks were made to ensure any field repairs or adjustments to the units were performed in accordance with the manufacturers' instructions and specifications.
- Personnel engaged in the installation of safety-related pipe supports received adequate training to perform special processes.

Support installation activities of the following WOs were observed:

- WO 110884643, Modify System 070 (Component Cooling Water), Pipe Supports 2-70-321 in Accordance with Drawing Revision Authorizations (DRAs) 52529-013 and 52529-14
- WO 08-957282-002, Modification of Unit 2 ERCW (System 067) Pipe Supports to Remove Deleted and add New Pipe Supports
- WO 110948061, System 74 residual heat removal (RHR) Heat Exchanger 2-A pipe support # 74-2RHRV121-1
- WO 09-953716-008, System 62 Chemical and Volume Control System (CVCS) support # 2-62-A586-1

The following samples were inspected:

- IP 50090 Section 02.01 - one sample
- IP 50090 Section 02.03.a – three samples
- IP 50090 Section 02.03.b – four samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The activities observed related to pipe supports were adequate and completed in accordance with applicable drawings and specifications.

**C.1.8 Reactor Coolant Pressure Boundary Piping - Work Observation (IPs 49053, 49055, 37002 and 55050)**

a. Inspection Scope

The inspectors observed work activities associated with the reactor coolant system (RCS) piping including RCS loops 1 through 4 hot and cold legs, engineering

evaluations, visual inspections, chemical swipes, and nondestructive examination (NDE) performed per the following WOs:

- Loop 1           WO 111040754
- Loop 2           WO 111041081
- Loop 3           WO 111041196
- Loop 4           WO 111041360

The inspectors entered and visually examined the piping to verify the internal material condition was restored to design requirements and equipment vendor specifications. NDE activities are documented separately in Section C.1.18.

The inspectors also inspected the following:

- Inspection (QC) and/or work performance verification, including specified frequency of inspections
- Utilization of qualified inspection personnel
- Control of nonconforming items
- Handling, protection, cleaning, and quality-related inspections

The following samples were inspected:

- IP 49053 Section 02.01- four samples
- IP 49053 Section 02.02 - four samples
- IP 49053 Section 02.03 - four samples
- IP 37002 Section 02.02.d - eight samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Activities associated with the RCS piping were performed in accordance with applicable procedures, specifications, and drawings.

**C.1.9 Safety-Related Piping - Work Observation (IPs 49063 and 37002)**

a. Inspection Scope

The inspectors observed work activities associated with the construction inspection and refurbishment of safety-related piping systems and passive components including engineering evaluations, visual inspections, chemical swipes, and NDE, when applicable. The inspectors reviewed the work instructions to verify that the procedures identified requirements and provisions for ensuring that the material condition of accessible portions of piping systems was evaluated and documented prior to final assembly of associated components (such as valves and pumps) in accordance with CCPP 25402-000-GPP-0000-N1302, "Watts Bar Unit 2 Completion Project Component Refurbishment Evaluation," Rev. 0003. The inspectors also observed work activities to verify that any failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances in safety or quality-related and SSCs, were promptly identified in accordance with applicable procedures and 10CFR50, Appendix B Criterion XVI.

The inspectors also evaluated the following:

- Conformance with construction/installation specifications
- Conformance with inspection (QC) and work performance procedures
- Handling; protection; cleaning; and quality-related inspections
- Control of non-conforming items

The following areas were inspected:

- CVCS MOV gate valve (2-FCV-062-061B) piping upstream/downstream [disassembled per WO 08-953156-000]
- Main steam (MS) MOV gate valve (2-FCV-1-16-A) piping upstream/downstream [disassembled per WO 09-952883-000]

The following samples were inspected:

- IP 49063 Section 02.02 - two samples
- IP 37002 Section 02.02.d - two samples

b. Observations and Findings

The inspectors identified the following URI:

Introduction: The inspectors identified a URI related to the implementation of the refurbishment program and the inspection of material condition inside safety-related piping.

Description: On November 20, 2010, after disassembly of the of MS MOV gate valve 2-FCV-1-16-A , the refurbishment group was notified about the opportunity to perform an internal inspection of the piping system in accordance with applicant procedure SPP-9.7, "Corrosion Control Program," prior to any cleaning or maintenance activities and document any findings (Step 4.8 of WO 09-952883-000). The refurbishment group waived this step and did not visually inspect the piping; however, upon further inspection, NRC inspectors noted some significant rusting and debris on the inner diameter of the pipe internal surface both upstream and downstream of 2-FCV-1-16-A. The applicant initiated PER 296296 to document the condition of the piping. The inspectors concluded that in order to properly evaluate whether the applicant performed pipe internal surface inspections, in accordance with applicable instructions, and whether the refurbishment program, specifically Attachment A of Procedure 25402-3DP-G04G-00090, "Engineering Evaluation for Commodity Refurbishment," Rev. 003, was properly implemented, additional inspection would be required. Additionally, the inspectors will need to review 1) the applicant's refurbishment program implementing procedures and 2) corrective actions associated with PER 296296. This issue was identified as URI 05000391/2010605-02, "Implementation of the Piping Refurbishment Program."

c. Conclusions

The inspectors concluded that additional inspection would be required to resolve questions associated with implementation of the piping refurbishment program.

### C.1.10 Reactor Vessel and Internals – Work Observation (IP 50053)

#### a. Inspection Scope

The inspectors conducted inspections of the reactor pressure vessel (RPV) and upper internals storage, preservation, housekeeping, and protection activities to determine whether requirements, work procedures, and QC inspection procedures were being met. These activities are controlled by applicant procedure 25402-000-GPP-0000-N2102, "Housekeeping," Rev. 8. The inspectors entered the RPV to observe the condition of the RPV and to ensure that housekeeping measures were in place. The inspectors ensured that the core barrel and lower internals were in their storage locations in the refueling cavity and were protected with a temporary protective waterproof material. The following samples were inspected:

- IP 50053 Section 02.01.c - one sample
- IP 50053 Section 02.02.a - one sample
- IP 50053 Section 02.03.b - one sample
- IP 50053 Section 02.03.c - one sample

#### b. Observations and Findings

No findings of significance were identified.

#### c. Conclusions

Adequate controls were in place to protect the RPV, core barrel, and lower internals.

### C.1.11 Mechanical Components – Work Observation and Construction Refurbishment Process (IPs 50073 and 37002)

#### a. Inspection Scope

The inspectors observed work activities associated with the construction inspection and refurbishment of safety-related mechanical components to evaluate if:

- Correct shelf life limited parts/materials were replaced (e.g. lubricants, gaskets, packing, elastomers)
- Appropriate inspections were conducted with clear acceptance criteria
- Associated corrective actions were performed
- Testing was performed or included in an established test program

The refurbishment process ensures that components will be in compliance with the original licensing and design basis and will meet, or exceed, vendor specifications and the original criteria specified in procurement documentation. The inspectors reviewed the work instructions and procedures to verify that they identified requirements and provisions for ensuring that the material condition of safety-related piping system active components was evaluated and documented prior to final assembly of associated components (such as valves and pumps) in accordance with 25402-000-GPP-0000-N1302, "Watts Bar Unit 2 Completion Project Component Refurbishment Evaluation," Rev. 0003. The inspectors observed activities to verify that these instructions were being followed during system restoration and that appropriate QC hold points were identified for in-process independent inspection of component assembly.

The inspectors observed safety-related valves being reassembled (after asbestos abatement) with new gaskets in accordance with the original manufacturer's instructions. Existing pumps were observed being reassembled following cleaning and inspection in accordance with the original manufacturer's instructions. The inspectors also reviewed activities to verify prompt identification of any failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances in safety or quality-related SSCs, in accordance with applicable procedures and 10CFR50, Appendix B, Criterion XVI.

The inspectors interviewed four personnel to verify their ability to perform their assigned duties, that QA/QC independence was maintained, and adequate management support for QA/QC functions existed.

The inspectors also observed the following activities:

- Receipt inspection and segregation of nonconforming items
- Storage, handling and protection
- Installation; which included verification that tolerances/clearances were met, appropriate drawings and work procedures were available, and hold points were observed

The following areas were inspected:

- Observed RHR MOV gate valve (2-FCV-74-9-B) seat lapping, modification per generic letter (GL) 95-07 and partial re-assembly per WO 08-953120-006
- Observed RHR MOV gate valve (2-FCV-74-1-A) modification per GL 95-07 and partial re-assembly per WO 08-953120-000
- Observed SIS MOV gate valve (2-FCV-063-0040-B) partial reassembly per WO 08-953172-000
- Observed MS MOV gate valve (2-FCV-1-16-A) disassembly and modification per GL 95-07 per WO 09-952883-000
- Observed the installation of WBN-2-PMP-068-0031( Reactor Coolant Pump #2) #1 seal housing per EDCR 53056 and WO 09-953325-000

The following samples were inspected:

- IP 50073 Section 02.02.a - five samples
- IP 50073 Section 02.02.b - five samples
- IP 50073 Section 02.02.c - four samples
- IP 50073 Section 02.03 - four samples
- IP 37002 Section 02.02.b - five samples

#### b. Observations and Findings

The inspectors identified the following two Severity Level (SL)-IV NCVs:

##### Violation 1:

Introduction: A SL IV NCV of 10CFR50, Appendix B, Criterion X, "Inspection," was identified for the failure to adequately perform a pre-assembly hold point visual inspection of a pump impeller for a safety-related component. Specifically, the field engineer and QC inspector did not visually inspect all surfaces of the impeller for pitting, scoring, and cracks, prior to signing off the completion of this hold point activity in the associated work order.

Description: The inspectors conducted an inspection of the partial re-assembly of the Train-A RHR pump to observe compliance with component assembly instructions contained in WO 08-953078-000. The work was performed on September 1, 2010, as part of refurbishment activities in accordance with procedure, 25402-000-GPP-0000-TI216, "Watts Bar Unit 2 Completion Project Refurbishment Program," Rev. 0005. The inspectors observed the performance of Step 6.2.1 (QC Hold Point) in WO 08-953078-000, "Inspection of Impeller," prior to the installation of the impeller in the RHR pump assembly. Step 6.2.1 specified to visually inspect the impeller for pitting, scoring, and cracks. This step also specified the following acceptance criteria, "No axial scoring at clearance area. No excessive pitting. No visible cracks." The inspectors observed the field engineer and the QC Inspector visually inspect the readily accessible surfaces of the impeller; however, no attempt was made at the time by either the field engineer or the QC inspector to inspect between the impeller shrouds and between the impeller vanes. The inspectors also noted that no supplemental lights or inspection mirrors were used for the visual inspection. The inspectors then observed both individuals sign the completion of the QC Hold Point Step 6.2.1.

After completion of this step, while the impeller was still accessible for observation, the inspectors examined the impeller and observed a layer of corrosion (rust) on the inside surfaces of the impeller shrouds and on both sides of the impeller vanes. This corrosion layer was sufficient to visually obscure possible surface cracks in the corrosion resistant steel casting. The inspectors brought this observation to the attention of the applicant and the pump assembly process was suspended before the impeller was installed in the pump. PER 255663 was initiated to document the issue and later the corrosion layer was mechanically removed from the impeller and the surfaces previously obscured by the corrosion layer were inspected by a metallurgist. Subsequently, the applicant took action to provide additional training of site QC personnel to emphasize expectations for hold points as documented in PER 255663

The inspectors determined that this issue was more than minor in accordance with Inspection Manual Chapter (IMC) 2517, because it represented an inadequate quality oversight function that, if left uncorrected, could adversely affect the ability to identify possible defects in a safety-related component. The finding was of very low safety significance because no adverse material defects were identified after removing the layer of corrosion from the impeller. This finding was related to the Work Practices component of the Human Performance cross-cutting area (H.4(b)) because the applicant failed to effectively communicate expectations regarding procedural compliance and that personnel follow procedures.

Enforcement: 10CFR50, Appendix B, Criterion X, "Inspections," requires, in part, that a program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity. Examinations, measurements, or tests of material or products processed shall be performed for each work operation where necessary to assure quality.

Contrary to the above, the QC inspection of the Train A RHR pump impeller was not performed in an adequate manner in accordance with the instructions in step 6.2.1 of WO 08-953078-000. Specifically, when this inspection was conducted on September 1, 2010, rust on surfaces of the impeller prevented the identification of pitting or cracks; however, the QC inspector completed the signoff indicating that the impeller had no excessive pitting or visible cracks. Because this was a SL IV violation and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy, 05000391/2010605-03, "Failure to perform adequate QC inspection."

Violation 2:

Introduction: A SL IV NCV of 10CFR50, Appendix B, Criterion XV, "Nonconforming Materials, Parts or Components," was identified for failure to properly resolve physical damage to a pressure retaining part following disassembly of an ASME III safety-related component. The applicant also failed to document subsequent unauthorized repair of the damaged pressure retaining part prior to valve reassembly.

Description: The inspectors conducted an inspection of the partial disassembly and match marking of the bonnet and disk of a safety related 4" pressure seal gate valve (2-FCV-1-16-A) on the main steam system per WO 09-952883-000. The work was performed as part of refurbishment activities in accordance with applicant procedure, 25402-000-GPP-0000-TI216, "Watts Bar Unit 2 Completion Project Refurbishment Program," Rev. 0005. On, November 17, 2010, after the valve bonnet was removed from the valve body the inspectors observed that it was accidentally dropped, impacting some piping and structural steel before coming to rest on metal scaffolding approximately 11 feet below. Initial observation after recovery of the part showed damage to the acme threads on the top half of the bonnet and also damage to the bonnet in the vicinity of the pressure sealing surface. Procedure 25402-000-GPP-0000-TI216 specifies that mechanical /civil components that are comprised of metal components are subject to loss of material, cracking, change in material properties (e.g., reduction of fracture toughness, distortion), fouling and physical damage (arc strikes, gouges, etc.). Also, this procedure states that results of the inspections/test will be evaluated to determine if the applicable expected pre-service degradation mechanism has impacted the associated equipment/component to verify the equipment will be capable of meeting its specified life. Section 6.2.4 requires that if an unexpected degradation mechanism is identified, a PER shall be initiated. If unacceptable degradation has occurred, the equipment will be refurbished or replaced to ensure it will be capable of meeting its design criteria. Additionally, applicant procedure, 25402-MGT-0003, "Corrective Action program," Rev. 9, Section 6.1.1 (a.) requires that personnel shall promptly document problems including adverse conditions and Section 6.4.6 (i) requires that if the hardware disposition is repair or accept-as-is, Engineering must review or perform the evaluation and document or reference the technical justification. Also required is that, repair and accept-as-is dispositions require approval, prior to their implementation, by the Bechtel Project Engineering Manager (PEM) and TVA. A service request (SR) was initiated on November 18, 2010, to document the incident as an industrial safety issue also known as a Near Miss – Dropped Item and SR stated, "the valve bonnet is currently being evaluated for damage, but no immediate damage is apparent." The SR did not identify the damage as a nonconforming condition requiring engineering evaluation. The SR was later reviewed by the prescreening committee (PSC) and assigned PER number 287616. The inspectors were later notified that the valve had been re-assembled and valve packing had been installed per the WO.

The inspectors determined that this issue was more than minor in accordance with IMC 2517, because it represented a failure to document a nonconforming condition in accordance with approved procedures. Lack of identification of the valve part damage as a non-conforming condition circumvented the approved process of entering the non-conforming condition into the corrective action program, formally evaluating the damage, determining an acceptable disposition, and obtaining Engineering and Authorized Nuclear Inspector (ANI) concurrence of the corrective action plan. Re-use of a damaged pressure retaining part that does not conform to requirements without proper evaluation and repair/replacement in accordance with approved procedures would not only affect ASME III code compliance, but could also adversely affect the ability of a safety-related component to perform its safety function. The finding was of very low safety significance

because this condition was identified by the inspectors before the valve had been placed in service. This finding was related to the Work Practices component of the Human Performance cross-cutting area (H.4(b)) because the applicant failed to effectively communicate expectations regarding procedural compliance and that personnel follow procedures.

Enforcement: 10CFR50, Appendix B, Criterion XV, "Nonconforming Materials, Parts or Components," requires, in part, that nonconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures.

Contrary to the above, on November 18, 2010, the applicant failed to adequately document physical damage to a pressure retaining part following disassembly of an ASME III safety-related component (2-FCV-1-16-A)) as a nonconforming condition in accordance with applicant procedures. Neither the associated WO 09-952883-000 nor the corrective action program reflected that component damage occurred and was repaired, in accordance with procedures 25402-MGT-0003 and 25402-000-GPP-0000-TI216. Subsequently, the applicant took action to revise the PER, document the damage in the WO, and notify the ANI as documented in PER 287616. Because this was a SL IV violation and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy, 05000391/2010605-04, "Failure to identify a nonconformance."

c. Conclusions

The inspectors identified two violations associated with inspections of safety-related components and the identification, documentation, disposition, and notification of non-conforming parts

**C.1.12 Electrical Components and Systems – Procedure Review (IP 51051) and Instrument Components and Systems – Procedure Review (IP 52051)**

a. Inspection Scope

The inspectors assessed whether the adequacy of the applicant's procedures had been maintained in an acceptable manner. Specifically, the inspectors evaluated recent changes to procedures related to electrical construction to determine if the procedures continued to be appropriate for the activity, were technically adequate, and properly maintained NRC requirements and SAR commitments. Procedures for receipt of materials, storage of materials, work control, materials handling, inspection, construction testing, and change control were reviewed. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The changes to procedures governing conduct of electrical and instrument systems construction were sufficiently controlled to maintain the quality and technical adequacy of the procedures.

### C.1.13 Electrical Components and Systems - Work Observation (IP 51053)

#### Electrical Components

##### a. Inspection Scope

The inspectors interviewed responsible field engineers and conducted direct observations of installed configurations and work activities to assess the adequacy of TVA and Bechtel controls for the installation and maintenance of safety related electrical items.

The inspectors reviewed inspection and repair procedures for Containment Electrical Penetration Assembly WBN-2-PENT-293-0049-G covered within WO 11169473 and EDCR 55006. The inspectors interviewed field engineers responsible for these inspections. The inspectors reviewed the inspection records regarding penetration 49 - inboard. Penetration wiring and individual port integrity were examined using close up photographs for penetrations 7 – outboard, 19 – inboard, 38 - outboard, and 39 - outboard.

Additionally, the inspectors selected a sample of ten work order packages and conducted direct observations of in-process work, direct reviews of completed installations, and verifications of as-built conformance to requirements. The associated safety related items included three electrical containment penetrations, three flow control valves, a protective relay, two SIS control switches, a reactor trip breaker, a reactor trip bypass breaker, and a Control Room isolation system control switch. The observations included completed installations of environmentally qualified electrical splices at Penetration 52- Inboard.

The inspectors also reviewed the as-built installation of hand-switches installed in Panel 2-L-11A for Systems 3 (Auxiliary Feedwater) and 30 (Auxiliary Building Ventilation) in accordance with specifications and instructions in completed WO 09-954-102-004 and EDCR 52356. Placement of tags and location of switches were verified. Additional documents reviewed are included in the attachment.

The observations of in-process and completed work were performed to determine whether work packages contained up to date instructions and specifications, and whether the full scope of work specified by the work orders was completed and properly documented. The inspectors determined whether components were installed and protected as specified by engineering and that necessary divisional separation was established. The inspectors examined electrical connections to confirm they were secure and protected in properly installed conduit and protective enclosures. The inspectors determined whether components were securely mounted and supported and examined identification tags/labels to verify information was correct and was placed on durable and properly secured holders. Placement of ground conductors was examined to verify proper installation.

Verifications of as-built installations were performed to determine whether the associated components were of the type specified on drawings and instructions, and whether they were installed, located, oriented, supported, protected, etc., in accordance with the drawings and instructions.

The following samples were inspected:

- IP 51053 Section 02.02.d – five samples
- IP 51053 Section 02.02.e – one sample

b. Observation and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined the applicant's inspections, work activities, and completed work performed on electrical penetrations and other safety-related electrical components met applicable requirements.

a. Inspection Scope

The inspectors observed in-process safety-related conduit installations covered under WO 09-954179-020. The conduit installations inspected were 2VC6065B (System 063 – Safety Injection), 2VC6066B and 2VC6067B (System 068 – Reactor Coolant), and 2VC6075A (System 1 – Main Steam). The inspection was conducted inside the auxiliary building at elevation 772' column lines A12 to A11.

In addition, the inspectors observed in-process safety-related conduit installations covered under WO 09-953531-010. The conduits inspected under this work order were

2VC6005A, 2VC6006A, 2VC5194A, 2VC5195A, & 2VC5002 for system 067 (Essential Raw Cooling Water).

The inspectors directly inspected the details of the conduit installations including total bend radius per run, pull fittings, conduit supports, identification tags, division markings, conduit routing, and cleanliness of work. The inspectors determined whether the work had proper QC signoffs and if the documentation was in accordance with the work plan.

The inspectors reviewed documentation, including the Material Pick Lists, work descriptions, Material Traceability and Transfer Records, Actual Work Performed sheets, drawings, Field Change Requests, DRAs, Integrated Cable and Raceway Design System (ICRDS) Raceway Reports, and work instructions. The inspectors analyzed the routing shown in the documentation to verify consistency with the information indicated in the QA reports.

The following samples were inspected:

- IP 51053 Section 02.02.c – nine samples

b. Observation and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined the observed conduit installations were adequately performed in compliance with required procedures.

### **C.1.14 Electrical Components and Systems – Record Review (IP 51055)**

#### a. Inspection Scope

The inspectors assessed the adequacy of work documentation developed by the applicant that was associated with the construction of safety-related electrical items.

The inspectors reviewed a sample of records created for eight work orders (specified in Section C.1.13). The review was performed to determine whether the information in the records was consistent with the work performed, based upon direct inspections of the configurations established in the plant. In addition, the inspectors determined whether the records were complete, record content met procedure requirements, records were accessible, legible, and had been verified to be complete and correct by an appropriate authority. Additional documents reviewed are included in the attachment.

The following samples were inspected:

- IP 51055 Section 02.02.c – eight samples

#### b. Observations and Findings

No findings of significance were identified.

#### c. Conclusions

The sample of electrical construction records met applicable requirements.

### **C.1.15 Electrical Cable - Work Observation (IP 51063)**

#### a. Inspection Scope

The inspectors observed in-process safety-related cable pulls covered under WO 110914496 (cables 2V1870A and 2PL3051A) and WO 111038142 (cable 2V1920A). The inspectors reviewed the ICRDS QA report for each of the cables pulled. The inspectors analyzed the routing shown in the documentation to verify consistency with the information indicated in the QA reports. The inspectors reviewed the work order details compared to the associated actual cable markings. The inspectors inspected the cable pull set-up and worker positioning to address installation requirements. The work was performed in the Auxiliary Building at elevation 713' in the area of the Boric Acid Tank column line A12.

The inspectors conducted inspections of in-process work orders for cable installations in the Control Building for system 067 (Essential Raw Cooling Water). Activities associated with two work orders were inspected: WO 09-953531-014, which implemented EDCR/DCN 53554A to install and terminate cables 2V704A, 2V706A, 2V712A and 2V714A; and WO 09-953531-016, which implemented EDCR/DCN 53554A to install and terminate cables 2V710A, 2V711A, 2V718A and 2V719A.

The inspectors checked the in-process activities for proper revision control of construction documents, proper content of work packages, adequate completion of prerequisite actions, adequate protection for cables, accurate identification of cabling and components, correct installation of cabling and components, performance of required quality inspections, proper documentation of any non-conformances, and proper documentation of completed construction activities.

The inspectors observed cable trays to verify the trays were properly dressed with Herculite to protect the cables during lay down operations. The inspectors observed the cable staged in the floor below to verify cables were protected against physical damage and the configurations maintained proper bending radii. The installation involved pushing the cable through a conduit and lay down in cable trays. The cables inspected in this pull were 2V1870A (3/c #10 – WFC-52 type – Contract 8267/5063); 2PL3051A (3/c #8 – PXMJ-WFA-64 Contract 5063); and 2V1920A (3/c #2 – PXMJ-WFA-67 Contract 5063).

The documents reviewed by the inspectors were evaluated to determine whether NRC requirements, work procedures, and quality control inspection procedures were being met. Documentation reviewed by the inspectors included Cable Installation/Pullback Data Sheets, Material Pick Lists, Material Withdrawal Requests, Drawing Revision Authorizations, routing drawings, EDCR work scope statements, Field Change Requests, WO – work descriptions, General Work Instructions, ICRDS cable standard report sheets, and other documents contained in the work order packages. In addition, the inspectors reviewed the Nuclear Power Group (NPG) Inspection and Examination Procedure No. IEP-206, “TVA–Model Inspection Plan (MIP)-Cable Installation Inspection-E01,” Rev. 0003.

The following samples were inspected:

- IP 51063 Section 02.02.c – 11 samples

b. Observations and Findings

The inspectors identified the following URI:

Introduction: The inspectors identified a URI related to the verification and acceptance of an incomplete installation of electrical conductors that appeared to have QC final acceptance.

Description: The installation of electrical conductors used a temporary cable support (i.e. mare’s tail) instead of the required permanent Kellums Grip support. The use of Kellums Grip supports was specified in MAI-3.2, “Cable Pulling for Insulated Cables Rated Up to 15,000 Volts,” Rev. 0021. The inspectors identified that the Cable Installation/Pullback Data Sheet for cable no. 2V704A was signed as verified and accepted by QC while the temporary cable supports were installed. The QC inspectors signed acceptance of the work record without additional measures to ensure that the incomplete configuration it would be corrected prior to construction completion.

The applicant documented this condition in PER 296266. The inspectors concluded that in order to properly evaluate and disposition this issue, additional inspection would be required to determine the extent of condition for similar problems with quality control inspections. This is URI 05000391/605-05, “Evaluation of Quality Control Acceptance of Incomplete Cable Support Installation.”

c. Conclusions

With the exception of the instance identified in the URI, the inspectors determined the observed installation activities were adequately performed in compliance with associated procedures. The work documentation was appropriate and the staff was able to properly track the two work orders involved with this work.

### C.1.16 Electrical Cable – Electrical Cable Signal Tracing (IP 51063 and TI 2512/016)

#### a. Inspection Scope

The inspectors observed ongoing signal tracing activities to verify cable routing for various safety-related cables. This effort was being conducted to support limited scope walk-down (LSWD) package 1288, which required identification and documentation of the routed cables as designed. The inspectors reviewed the LSWD package and WO 111044164. The inspectors also compared the test device wiring connections with drawings 45N2681-3, "Wiring Diagram NSSF Aux Relay Panel 2-R-55 Connection Diagrams, Sh-3," Rev. 11, and 1-45B2768-5C, "Wiring Diagram 480 Reac MOV Bd 2B1-B Connection Diagram – Compt 5C," Rev. 0. The inspectors also interviewed personnel performing the signal tracing to verify their knowledge of the activities and reviewed calibration dates for the Rycom utility locator used to verify the cable routing.

Specifically the inspectors reviewed cable tracing activities for cable:

- 2V2155B, routed from 2-MCC-213-B1/5C-B to 2-PNL-99-R55-B

The following sample was inspected:

- IP 51063 Section 02.02.e - one sample

#### b. Observations and Findings

No findings of significance were identified.

#### c. Conclusions

The scope of the inspection was too narrow to establish any conclusions at this time.

### C.1.17 Concrete Expansion Anchors (IP 46071, 50090, and 51053)

#### a. Inspection Scope

The inspectors observed anchor bolt removal, hole drilling, and anchor bolt installation for pipe hanger supports 63-2SIS-R063, 74-2RHRV121-1, and 74-2RHR-R63 associated with WO 111099202, WO 110948061 and WO 110948049, respectively. The inspectors also reviewed applicable WOs, associated drawings, and procedures. The inspectors discussed with the field personnel the scope of work and procedure implementation. The inspectors observed ongoing anchor installation activities to verify the following:

- Anchor bolt hole drilling including depth, perpendicularity to concrete surface, hole size, and rebar damage prevention
- Embedded depth of anchor bolt
- Thread engagement of nut and projected length of bolt above the concrete surface met the acceptance criteria
- Proper consideration of oversized holes in base plates
- Minimum edge distance from concrete and steel lined openings
- Minimum spacing between bolts
- Minimum distance from embedded steel

- Bolt marking/stamp and diameter
- Number of washers used on a bolt

The inspectors also observed torquing activities of conduit support anchor bolts to verify they were in accordance with MAI 5.1B, "Wedge Bolt (WB) Anchor Installation," Rev. 19. The latest approved revision of this MAI was available and used by the installers and the QC hold point for torquing was observed by a qualified QC inspector. Proper calibration of the torque wrench used for the torquing activities was reviewed to ensure proper tension was developed on the anchor bolt. The inspectors verified that proper torque values were used, and that the projected length of the bolt above the concrete surface measured by the QC inspector met the acceptance criteria, in accordance with MAI 5.1B. The inspectors also observed QC inspection activities such as the location of supports, verification of bolt type and grade, verification of bolt size, identification, thread engagement, and proper documentation of inspection activities. The identified deviations were properly handled and documented by the QC inspector. Additional documents reviewed are included in the attachment. The anchor bolt torquing of the following conduit supports were observed:

- 111567926-323
- 110879601-529-F56277A
- 111567926-388
- 110879601-518-F56277A
- 110879601-100
- 110879601-101
- 110879601-98

The following samples were inspected:

- IP 46071 Section 02.02 – 10 samples
- IP 51053 Section 02.02d – seven samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The activities observed related to concrete anchor installation were adequate and completed in accordance with applicable procedures and specifications.

**C.1.18 Liquid Penetrant Examination of Safety-Related Welds (IP 57060)**

a. Inspection Scope

The inspectors observed liquid penetrant (PT) examination activities associated with ongoing pipe welding of the CVCS and SIS. These examinations were performed using procedure 25402-000-4MP-T040-S0125, "Bechtel Nondestructive Examination (NDE) Standard, Liquid Penetrant Examination, PT (SR) – ASME," Rev. 6. Specific weld PT activities observed included:

<u>Report</u>	<u>Weld Number</u>	<u>Component</u>
PT-190	2-063A-T007-01C1R0	ASME Section III Class 2, 2 inch SS
PT-199	2-062B-T284-43	ASME Section III Class 1, 3 inch SS

PT-237	2-062B-D139-8C	ASME Section III Class 1, 3 inch SS
PT-237	2-062B-D139-08 8C1R0	ASME Section III Class 1, 3 inch SS
PT-239	2-062B-D139-8B	ASME Section III Class 1, 3 inch SS

The inspectors also reviewed the completed PT examination reports which documented the above NDE activities and verified the following:

- Applicable drawings, instructions, or travelers clearly specified the test procedure to be used and a copy of that procedure was available in the areas in which the work was being performed.
- Sequencing and timing of the examination relative to other operations such as grinding, welding, or heat treating were specified.
- Personnel qualification records were up to date.
- Required equipment and materials were at the work station.
- Specific areas, locations, and extent of examination were clearly defined.
- Examined surfaces were cleaned at the conclusion of the examination.

The inspectors also observed ongoing PT examination of ASME Class II piping weld 2-063B-D197-14, associated with WO 1181128 and PER 225309. This base material repair weld was to correct an errant attempt to excavate nearby weld 2-063B-D197-011 C0R2.

The inspectors reviewed the travelers associated with the work, observed work site conditions, and witnessed procedural performance of the associated PT examinations. The inspectors compared the technician's interpretation of indications against procedural requirements, questioned the technicians on the requirements, and reviewed the associated report of results. Inspectors observed the technician's cleanup following the weld examinations. Additional documents reviewed are included in the attachment.

The inspectors performed the following samples:

- IP 57060 Section 02.02 - six samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

PT examination activities and NDE personnel qualification records reviewed by the inspectors met the requirements of the ASME Section III code of record.

### **C.1.19 Radiographic Examination (RT) Record Review (IP 57090)**

a. Inspection Scope

The inspectors reviewed radiographs and other film records associated with recently completed weld repairs of the RCS Loop 4 Hot Leg Nozzle Weld and verified that quality was in accordance with the applicable procedures and Code requirements. Records reviewed included film for recently completed weld repairs (before and after) and one historical film record from original construction. Qualification records of RT personnel for applicable records have been reviewed in previous Inspection Reports (e.g. IIR 05000391/2009602). RT film and examination reports were reviewed to determine whether they were prepared, evaluated, and maintained in accordance with applicable

commitments and/or requirements. The records were compared to the applicable code (ASME Boiler and Pressure Vessel Code, Section III, 1971 Edition with Addenda through Summer 1973) to verify compliance. Additional documents reviewed are included in the attachment. Specific radiographs reviewed included the following:

<u>RT Report</u>	<u>Component</u>
RT-1401	Weld 2-068E-W004, original construction (January 8, 1978)
RT-19	Weld 2-068E-W004, performed as corrective action associated with PER 17933 (December 22, 2009)
RT-91	Weld 2-068E-W004, following recent weld repairs (October 5, 2010)

The following sample was inspected:

- IP 57090 Section 02.03 - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the reviewed radiographs met applicable ASME Code requirements and other regulatory requirements.

### **C.1.20 Structural Welding General (IP 55100)**

a. Inspection Scope

The inspectors performed inspections of applicant structural steel welding by observing in process welding. Additional documents reviewed are included in the attachment. Observed activities were compared to the following requirements:

- Bechtel Procedure GWS-Structural, Rev. 3
- American Welding Society [AWS] D1.1, Structural Welding Code, 2002 edition
- AWS D1.1, Structural Welding Code, 1973 edition
- Bechtel WPS (Welding Procedure Specification) P1-A-Lh (Structural) Rev. 1
- Bechtel WPS P8,P1-T-Ag, Rev. 1

The inspectors observed four welds during production to ensure the following inspection procedure attributes were met:

- Welding procedures, drawings, instructions, and data sheets were at the work station or readily available.
- Welding was performed in accordance with WPS requirements.
- Low Hydrogen electrodes were of the specified classification and properly controlled.
- Preheat and interpass temperatures were controlled and measured in accordance with the procedure.
- Surrounding plant equipment was protected from weld spatter, arc strikes, and work activities.
- Proper cleaning and fit-up were achieved, QC inspections and hold points were followed.

- Back-gouging was performed according to procedure requirements.
- Weld joint geometry was as specified and surfaces to be welded were prepared, cleaned, and inspected in accordance with applicable procedures or instructions.
- Shielding gas and environmental conditions were controlled as required.

The following welds were inspected during production:

Weld No.	Drawing No.	Work order No.	Component
FW-2	WM-M-1285 Rev. 0	111088755	(67) ERCW Pipe Support #47A450-26-25
FW-3	FSK-M-610 Rev. 1	09-951298-001	HEPA-filter support 2030-DW915-21-8
FW-14	WM-C-055 Rev. 0	09-954482-002	Sys. (43/62) 745" el Platform @ AZ 180°
FW-16	WM-C-055 Rev. 0	09-954482-002	Sys. (43/62) 745" el Platform @ AZ 180°

The following samples were inspected:

- IP 55100 Section 02.04 – 4 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed welds were found to conform to the applicable requirements of the AWS code and the applicant's procedural requirements.

### III. Operational Readiness Activities

#### F.1 Fire Protection (IP 64051)

a. Inspection Scope

The inspectors reviewed procedures for the control of transient combustibles, ignition sources, and impairments and also held discussions with fire operations personnel about controls to verify that the program was being implemented in accordance with applicable procedures. The inspectors walked down three samples of hot work being performed for construction activities to verify hot work was being performed per program requirements. During the walk-downs, the inspectors reviewed ten fire extinguishers to verify appropriate testing had been completed and that no evidence of deterioration was present. Also, the inspectors interviewed fire watch personnel regarding their duties and responsibilities in case of a fire at the work site. Additional documents reviewed are included in the attachment.

The following samples were inspected:

- IP 64051 Section 02.01 - one sample
- IP 64051 Section 02.07 - 10 samples
- IP 64051 Section 02.08 - three samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

TVA implemented adequate fire protection measures for the current level of construction activities being performed.

**IV. Other Activities**

**OA.1.1 (Discussed) Reactor Coolant System Dissimilar Metal Butt Welds (TI 2515/172, Rev. 1)**

a. Inspection Scope

The inspectors conducted interviews, reviewed documentation, and observed field activities associated with the Mechanical Stress Improvement Process (MSIP) for three reactor pressure vessel nozzle dissimilar metal (DM) butt welds (2-N-12-SE, loop 1 cold leg; 2-N-16-SE, loop 1 hot leg; and 2-N-11-SE, loop 2 cold leg) to determine whether activities were conducted in accordance with the guidance in ERPI MRP-139, "Primary System Piping Butt Weld Inspection and Evaluation Guideline," Rev 1. The review included associated stress analysis reports; personnel qualifications; procedures; performance and verification records. See the attachment for additional documents reviewed and specific responses to the reporting requirements for TI-2515/172.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on observed activities, the licensee's program will ensure the intended safety objective of ensuring the integrity of Alloy 600 reactor coolant system butt welds scoped into MRP-139.

**OA.1.2 (Discussed) Construction Deficiency Report (CDR) 391/85-38: Containment Spray System Pipe Supports (IP 50090, IP 35007 and TI 2512/023)**

a. Inspection Scope

In January 1980, TVA notified the NRC of a potential 50.55(e) item concerning defective pipe supports. These deficiencies were originally identified in historical NCR WBN CEB 2019. Based on a previous review of completed inspections of the modified supports the NRC had determined that CDR 390/80-06-01 had been adequately resolved for Unit 1; however, because of these problems and NRC Bulletin 79-14, all hangers were to be re-inspected, as documented in Inspection Reports 05000390/82-21 and 05000391/82-17. In October 1985, TVA notified the NRC that the containment spray system pipe supports for WBN Unit 2 Steel Containment Vessel Dome had several deficiencies which included incorrect plate sizes, bolt holes, and welds. These deficiencies were originally identified in historical NCR WBN CEB 6260 and NCR WBN CEB 6804 as part of the re-inspection program. Additional documents reviewed are included in the attachment.

The inspectors performed the following:

- Reviewed the applicant's open item closure report including any actions associated with PER 172699 which was issued to track required Unit 2 actions for historical NCR WBN CEB 6804.
- Reviewed the applicable piping system valve walk-down packages and drawings
- Reviewed the applicable procedures and verified recurrence control measures had been incorporated.
- Reviewed the containment spray piping stress analysis.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspection results are too limited to support a conclusion at this time. The inspectors determined that further inspection will be required to verify resolution of the original construction deficiency for Unit 2.

**OA.1.3 (Discussed) Control Room Design Review (CRDR) Special Program (SP) (TI 2512/035)**

a. Inspection Scope

Background: This program was implemented in response to the NRC requirements established following the Three Mile Island (TMI) Station accident that licensees and applicants conduct a CRDR to identify and correct Human Engineering Discrepancies (HED) in their Control Rooms. TVA responded to this request by creating a review program plan that incorporated accepted Human Factor principles, gathered and reviewed required plant design information, surveyed the Control Room, identified and assessed HEDs, determined design improvements required, and verified that the design improvements would address deficiencies while not creating new HEDs.

The inspectors reviewed the applicant's CRDR implementation plan, which outlined the methodology planned to resolve the 222 identified HEDs. These were the same HEDs identified and resolved during the Unit 1 SP resolution. The inspectors reviewed select EDCRs and daughter WOs created to resolve the issue highlighted in the individual HED. Most of the EDCRs were divided into individual main control room (MCR) panels that encompassed a number of overlapping HEDs. Of the EDCRs selected for review, each was inspected to verify that: the scope of the EDCR encompassed the associated HEDs, other work instructions referenced (EDCRs, WOs, etc.) were appropriately included, affected components were appropriately identified, upgrades and modifications were identified, and unit differences were captured and evaluated through Human Factors Evaluations (HFE). Additional documents reviewed are included in the attachment.

Specific inspection activities included:

- A review of five CRDR HEDs (23, 57, 73, 88, and 163) to verify that identical actions were planned on Unit 2 as were implemented on Unit 1
- 15 field observations of MCR components on panel 2-M-4 to verify that the components satisfied panel design output - spatial arrangement, scale, mimic bus arrangement, component identification, and alarm window arrangement

- 15 field observations of MCR components on panel 2-M-5 to verify that the components satisfied panel design output - spatial arrangement, scale, mimic bus arrangement, component identification, and alarm window arrangement
- 15 field observations of MCR components on panel 2-M-6 to verify that the components satisfied panel design output - spatial arrangement, scale, mimic bus arrangement, component identification, and alarm window arrangement
- A review of applicant CRDR Midpoint Self-Assessment (25402-SA-ENG-10003)

b. Observations and Findings

No findings of significance were identified

c. Conclusions

The inspectors determined that applicant efforts are still in process and will require further inspection to verify acceptable completion

**OA.1.4 (Discussed) Applicant Actions on TMI Action Items and NRC Bulletin (BL) 80-20 (IP 92717)**

a. Inspection Scope

The inspectors reviewed Unit 2 design activities associated with TMI Action Items and NRC BL 80-20, Westinghouse Type W-2 Spring Return to Normal Control Switches. The inspectors verified that TMI and BL resolution plans were properly controlled and translated into drawings, design change packages, procedures, and other design documentation.

Specifically, the inspectors reviewed design drawings and documents and interviewed responsible design personnel related to this inspection scope. The design information was reviewed to ensure compliance with NUREG 0737, "Clarification of TMI Action Plan Requirements" and TVA's response to BL 80-20. The Unit 2 planned or in-process activities were also compared to actions taken on Unit 1 to determine whether the Unit 2 actions were technically valid and were implemented in accordance with NRC and applicant requirements.

Additionally, the inspectors reviewed field work as referenced in the CRDR SP (Section OA.1.3). This effort ensured that the instrumentation was installed in the proper location, was of the correct range, was protected from further construction activities, and was similar to that used in resolution of Unit 1 issues.

Specifically, the inspectors evaluated actions planned or in-process for BL 80-20 and the following TMI Action Items: Control Room Design Reviews (TMI I.D.1), Plant Safety Parameter Display Console (TMI I.D.2), Containment Pressure Monitor (TMI II.F.1.2.D), Containment Water Level Monitor (TMI II.F.1.2.E), and Containment Hydrogen Monitor (TMI II.F.1.2.F).

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that TVA's committed actions for these TMI actions and BL 80-20 are still in process or not available for review, and will require further inspection to verify acceptable completion.

**OA.1.5(Discussed) TMI Action Item II.D.3: Valve Position Indication of Acoustic Monitoring on Pressurizer (PZR) Power Operated Relief Valves (PORVs) (IP 52055)**

a. Inspection Scope

The inspectors reviewed the adequacy of the applicant's actions to implement TMI Action Item II.D.3, which called for providing a reliable capability to verify the position of PZR PORVs under accident conditions. Specifically, the inspectors interviewed responsible engineers, and examined an EDCR and a procurement control package to verify critical design requirements were correctly translated into drawings and specifications. In addition, the inspectors conducted direct observations of acoustic monitoring system items maintained in stores to verify the items had been adequately receipt inspected, stored, and controlled. Additional documents reviewed are included in the attachment.

c. Observations and Findings

No findings of significance were identified. The inspector's review of EDCR 53760, "Acoustic Position Monitoring for RCS PORVs," determined that the specified features of the Acoustic Monitors were sufficient to address the concerns of Action Item II.D.3; however, the inspectors determined that physical installation of the Acoustic Monitoring System had not yet been accomplished on Unit 2. Further inspection would be required. The inspectors determined that procurement and storage control documents for the Acoustic Monitors properly incorporated manufacturer's specifications for protection and maintenance of the items. Based upon direct observations of stored components, the inspectors confirmed that instrument and electrical components were stored in the proper storage level designation and were properly identified by the correct labels, part numbers, and serial numbers on the receipt inspection label. Storage conditions and requirements were controlled and monitored as specified by the applicable specification and manufacturer.

c. Conclusions

The inspectors determined the design control documents, procurement control documents, and stored items reviewed in this inspection met applicable requirements.

**OA.1.6 (Discussed) TMI Action Item II.E.3.1: Emergency Power for PZR Heaters (IP 51055)**

a. Inspection Scope

The inspectors reviewed the adequacy of the applicant's actions to implement TMI Action Item II.E.3.1, which called for providing a reliable source of emergency power to PZR Heaters. Specifically, the inspectors interviewed responsible engineers and examined three design control packages (EDCRs) and three procurement control packages to determine whether critical design requirements had been correctly translated into drawings, specifications, and procedures. The design information was also reviewed to confirm that actions required in NUREG 0737, "Clarification of TMI Action Plan Requirements," were specified for Unit 2. The inspector verified that documents accurately identified the purchased items and whether required vendor documents were received.

In addition, the inspectors conducted direct observations of two panels and a current transformer in storage to verify stored items were adequately controlled and protected

against loss or degradation. Records for receipt and acceptance of the selected items were reviewed to confirm the applicant properly verified the correctness and quality of items received. Additional documents reviewed are included in the attachment.

The following samples were inspected:

- IP 51055 Section 02.02.a – three samples
- IP 51055 Section 02.02.b – three samples

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the applicable TMI design requirements had been correctly translated into design control documents reviewed for this inspection.

Procurement and storage control documents were found to implement manufacturer's storage specifications and licensee procedural requirements. The electrical components were stored in the proper storage level designation and were properly identified by the correct labels, part numbers, and serial numbers on the receipt inspection label. Storage conditions and requirements were controlled and monitored as specified by the applicable specification and manufacturer, and in-place storage requirements were satisfied.

c. Conclusions

The inspectors determined that the documents and items reviewed in this inspection met applicable requirements. Further inspection would be required to adequately verify proper installation of the emergency power supply capability.

**OA.1.7 (Discussed) TMI Action Item II.G.1: Emergency Power Supplies for PZR PORVs, PZR PORV Block Valves, and PZR Level Indicators (IP 51055)**

a. Inspection Scope

The inspectors reviewed Unit 2 construction design activities for the overall compliance and progress of TMI action II.G.1, Emergency Power for PZR PORVs, PZR PORV Block Valves, and PZR Level Indicators. The inspectors evaluated whether TMI actions including NRC requirements and SAR commitments were properly translated into design drawings, design change packages, procedures, and other design documentation of instrument and electrical components. These reviews were performed to assure that designs were adequately controlled.

Specifically, the inspectors reviewed the following EDCRs related to the design of the PZR PORVs and PZR PORV block Valves on Unit 2:

- EDCR-2 53756
- EDCR-2 53287
- EDCR-2 53292

b. Observations and Findings

No findings of significance were identified. The inspectors review verified that the design packages and drawings identified that the power to the PORV and the PORV block valves would be supplied from different emergency power sources (i.e. both power sources emanating from the same division but different emergency buses).

The inspectors determined that procurement documentation for electrical components related to the PORVs and block valves on Unit 2 (Material Requisition #: 25402-011-MRA-EY00-00009) adhered to manufacturer's storage specifications and licensee procedural requirements.

Development of the design for the PZR PORVs and PZR PORV block valves on Unit 2 was complete; however, the design configurations had not yet been installed or as-built.

c. Conclusions

Design packages and/or drawings were verified for TMI Action Item II.G.1, for adherence to SAR commitments and applicable requirements. The inspectors determined that the committed activities for this TMI action were still in process, and will require further inspection to verify acceptable completion.

**OA.1.8(Discussed) Back-up Power Supply for Hydrogen Igniters (TI 2515/174)**

a. Inspection Scope

The inspectors reviewed Unit 2 construction design activities for overall compliance and progress of Generic Safety Issue (GSI-189) for a Hydrogen Igniter Back-up Power Supply. The review was conducted to determine whether committed actions, including NRC requirements and SAR commitments, were properly translated into design drawings, design change packages, procedures, and other design documents for instrument and electrical components and associated items for Unit 2 to assure that designs were adequately controlled.

b. Observations and Findings

No findings of significance were identified. The inspectors' review of in-process design documents determined that TVA was developing a design for an emergency power supply for operation of Unit 2 post-accident Hydrogen igniters. The review found that the design and specified actions for Unit 2 as currently planned would address the requirements of the Generic Safety Issue in a similar manner as done for Unit 1.

c. Conclusions

The Unit 2 design to address the GSI-189 commitment was still in process and had not been issued. The inspectors will require additional inspection of design and procurement activities to adequately verify the disposition of the commitments.

**OA.1.9(Discussed) Welding Corrective Action Program (CAP) Sub-Issue: Radiographs for ASME Piping Welds (TI 2512/032 and IP 57090)**

a. Inspection Scope

The inspectors observed radiography performed on repairs to weld number 2-068E-W004-01, Loop 4 Hot Leg to RPV Nozzle, to verify compliance with the applicable procedure (RT-ASME/ANSI Piping Rev. 3), and 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, Appendix IX, Nondestructive Examination Methods.

Additional documents reviewed are included in the attachment. The inspectors observed the following attributes:

- Adequate procedures, work packages, and drawings were available to the technicians
- The repair locations and boundaries were adequately identified
- Proper IQI (Image Quality Indicator) size, type, and placement
- Proper film type and placement

The inspectors performed the following sample:

- IP 57090 Section 02.02 – one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed activities for this Welding CAP sub-issue met the requirements of 10 CFR Part 50, Appendix B; Bechtel's Quality Assurance and Special Processes Manuals; TVA's Quality Assurance Program; and the code of record.

**OA.1.10 (Discussed) Design Baseline Verification CAP (TI 2512/019)**

a. Inspection Scope

The inspectors observed the applicant perform an Independent Design Review (IDR) on Watts Bar Unit 2. The purpose of this effort was to support the closure of the Design Basis Verification CAP. The IDR was an eight person effort lasting 3 weeks. The inspectors reviewed the resumes of the team members to confirm they did not have extensive prior involvement in the engineering design of the Watts Bar plant.

The IDR focused on the Unit 2 RHR and the unit shared component cooling system (CCS). The purpose was to confirm that regulatory requirements were correctly implemented into engineering design specifications, calculations, drawings, and procedures. The methodology was to review the design documentation for the two selected systems, and their support systems, to ensure that the (SAR) design bases were maintained through construction implementation documentation.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the participants performing the IDR had extensive prior industry experience in various engineering disciplines. The inspectors were made aware of a number of self-identified problems resulting from the independent review. Specifically, the findings from the IDR were as follows:

- Regarding calculations, unverified assumptions were not being tracked in a consistent way to ensure future closure
- Self Assessment reports were not being issued within the prescribed timeframe
- Industry operating experience was not being consistently referred to the Unit 2 organization by the Unit 1 Corrective Action Review Board.

The IDR also produced several observations and recommendations. The IDR overall conclusion was that the design process for Watts Bar 2 effectively implements design requirements and NRC regulations. Numerous PERs were initiated to place the IDR results in the corrective action program.

c. Conclusions

The inspectors concluded that the IDR was a competent and substantial engineering review activity with appropriate results.

**OA.1.11 (Discussed) PZR Penetration Nozzles and Steam Space Piping Connections in Pressurized Water Reactors and BL 2004-01 (TI-2515/160 and IPs 92717, 57080, 73053)**

a. Inspection Scope

The inspectors conducted interviews, reviewed documentation, and observed field activities associated with the ultrasonic examination (UT) of two pressurizer nozzle dissimilar metal welds (2-SE-12 and 2-SE-13, pressurizer safety and relief nozzle welds). This was performed to determine whether activities were conducted in accordance with the licensee's response to NRC Bulletin 2004-01, Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors, and the requirements of the ASME Boiler and Pressure Vessel Code of Record for preservice inspection activities (2001 Edition through the 2003 Addenda).

The inspectors reviewed the licensee's response to BL 2004-01, and the associated Safety Evaluation Report (ML100950044) to determine the licensee's commitments in response to the bulletin. The inspectors verified the observed and reviewed licensee activities met the commitments. See the attachment for specific responses to the reporting requirements for TI-2515/160.

The inspectors reviewed the UT procedure, N-UT-82, "Generic Procedure for the Ultrasonic Examination of Dissimilar Pipe Welds," Rev. 003. Essential variables and parameters were specified and verified to be within the limits allowed by demonstration as required by 10CFR50.55a, and ASME Section XI. The procedure was verified to contain information regarding the type of instrument to be used, appropriate extent of coverage, calibration, frequencies and types of search units, scanning and reference levels were identified; and requirements for identification, recording, and acceptance of indications were identified.

The inspectors observed the performance of UT on two dissimilar metal welds, 2-SE-12 and 2-SE-13. The inspectors verified the applicable procedures and drawings were available and used, identified and reviewed personnel qualification records for the UT examiner, observed portions of the calibration, verified indications detected were evaluated in accordance with procedure N-UT-82, evaluated calculations performed in support of transducer selection, and verified the nozzle designs adequately matched those previously demonstrated.

The inspectors reviewed records associated with the UT of 2-SE-12 and 2-SE-13 including personnel qualification to verify certification to perform the examinations in accordance with 10CFR50.55a and ASME Section XI. The inspectors also verified certifications for materials used during the inspection including transducers and calibration blocks.

The inspectors performed the following samples:

- IP 57080 Section 02.01 – one sample
- IP 57080 Section 02.02 – two samples
- IP 57080 Section 02.03 – two samples
- IP 73053 Section 02.03.A – two samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspection results are too limited to support a conclusion at this time.

**OA.1.12 (Discussed) Electrical Cable Issue CAP - Sub-Issue: Cable Supports in Vertical Conduit (IP 51065 and TI 2512/016)**

a. Inspection Scope

Background: NRC issued a Technical Evaluation Report (TER) for WBN on January 30, 1987. The TER identified a concern that cables in long vertical conduits were inadequately supported and that, "... random failures due to cutting of the insulation and conductor creep may occur during normal service conditions, especially silicone rubber insulated cables." In its Cable Issues CAP, numerous sub-issues were identified by TVA. In its CAP plan, TVA stated that cables in long vertical conduits and cable trays may be inadequately supported, which could potentially cause unacceptable cable insulation degradation. TVA stated that the root cause of the problem was a failure to include industry standard support requirements in design and installation documents.

As discussed in Section 3.2.1 of NUREG-1232, Volume 4, TVA issued Revision 1 to its CAP plan for cable issues at WBN Unit 1 by letter dated June 27, 1989. This CAP plan was based on the resolution of similar issues at the Sequoyah (SQN) and Browns Ferry (BFN) facilities. The staff reviewed the cable issues CAP plan and found it unacceptable for WBN Unit 1. TVA submitted a revised program by letters dated December 20, 1989, and June 15, July 31, October 11, and November 5, 1990 (ADAMS Nos. ML073541157, ML073541204, ML073541237, ML073550196, and ML082380711). The revised CAP was reviewed and approved by NRC, as documented in Section 1.13.1 of, and Appendix P to Supplement 7 of NUREG-0847, "Safety Evaluation Report [SER] Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2" (ADAMS No. ML082420254). In Appendix P to Supplement 7 of the SER (SSER 7), the NRC staff found the CAP plan for the cable issues acceptable. The staff would perform inspections to assure adequate implementation of the program and would further supplement its safety evaluation when the inspections were completed and all the open items resolved.

In its letter dated October 11, 1990, TVA agreed not to take credit for frictional resistance of horizontal runs and to provide additional restraints upstream of the first access point for conduits that exceed the National Electric Code Article 300-19 (1987), "Supporting Conductors and Vertical Raceways." In its letter of September 26, 2008, TVA stated that the WBN critical cases had been compared with those already tested at SQN. If SQN conduit configuration enveloped WBN, no cable testing by WBN was performed. If SQN conduits did not envelope WBN, the cable was replaced or in situ cable testing was performed; any cable found unacceptable was replaced. TVA also evaluated Class 1E conduits containing cables of all insulation types and added cable supports when acceptance criteria were not satisfied. In addition, cable installation specification and site

procedures were revised to incorporate appropriate cable support requirements for cable installed in vertical conduits, and thereby prevent recurrence. Conduits that exceeded the support requirements of General Construction Specification G-38 were analyzed, and conduit support points with bearing pressure greater than allowable were inspected and supports added as required. In its letter dated April 6, 2009, TVA responded to questions regarding the characterization of "rework" of conduits. TVA stated that "rework" meant that the installation will be modified such that it meets the requirements of TVA specifications. Section 8.7.1, "Cables Routed in Vertical Conduits-Support Intervals," of Specification G-38 provides the spacing requirements for vertical conduit supports. Cable supports will be added to Class 1E conduits according to the methods described in Section 8.7.2 of G-38, which includes selection of support type and installation practices.

TVA was also asked to provide a justification for determining that "creep" did not occur in the vertical conduits. TVA stated that the "looseness" of the cable will be assessed to demonstrate that the cable was subjected to minimal pressure. TVA calculation assessed the impact of the sidewall bearing pressure (SWBP) on the cable at the transition due to the weight of the cable vertical drop. This was done based on the cable being at rated temperature. Because the WBN Unit 2 specific cables have been deenergized and have been at a much lower temperature than rated. This lower temperature, in conjunction with the verification that the cable is "loose," provides assurance that insulation creep has not occurred.

On the basis that TVA will implement the plan for the sub-issue using the same approach as used at WBN Unit 1 and using the requirements in General Construction Specification G-38, which meets current standards, the NRC staff finds that the plan for resolution is acceptable. TVA commitments in this regard (NCO 850440002, 10180967) are to: 1) identify and evaluate all previously installed vertical conduit runs (exposed and embedded) containing Class 1E designated cables, in accordance with established criteria and complete any rework necessary prior to initial fuel loading of the unit; and 2) perform visual inspection of the support of vertical conduits that do not meet the G-38 vertical support requirements and, if cables are found to be under tension, replace the portion under tension.

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's Cable Support in Vertical Conduit and Tray sub-issue within the Electrical Cable Issues CAP has been adequately developed. This was done to ensure that the Unit 1 historical problems were being prevented and resolved for Unit 2. This inspection focused on a review of the adverse conditions involving vertical support of cables within safety related conduit.

The inspectors reviewed General Engineering Specification G-38, section 8.7 to verify that direction and acceptance criteria for the installation of cable supports for cables in long vertical runs had been appropriately incorporated. Additionally, the inspectors reviewed Design Criteria WB-DC-30-22, section 5.2 to verify that provisions had been made for installation of cable supports in long vertical runs. The design criteria referenced a design guide for specific details on support location and application.

Calculation EDQ00299920090003, Rev. 000, was reviewed to ensure that methodology employed in Unit 1's reconciliation had been applied to the remaining Unit 2 cables and that no cables had been inadvertently excluded from consideration. The inspectors reviewed licensee QA assessments and audits of engineering activities associated with

the cable issues CAP and followed up on findings/recommendations. Additional documents reviewed are included in the attachment.

The following sample was inspected:

- IP 51065 Section 02.07.b - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors were unable to observe sufficient completed work to evaluate the adequacy of field implementation; however, based on the above review, the inspectors concluded that the programmatic aspects of TVA's implementation plan for this CAP were adequate. Additional inspections will be required to evaluate the adequacy of the field implementation.

**OA.1.13 (Discussed) Electrical Cable Issue CAP - Sub-Issue: Cable Supports in Vertical Trays (IP 51065 and TI 2512/016)**

a. Inspection Scope

Background: NRC issued a TER for WBN on January 30, 1987. The licensee developed its Cable Issues CAP. Within the cable issues, numerous sub-issues were identified by TVA. In its CAP plan, TVA stated that cables in long vertical conduits and cable trays may be inadequately supported, which could potentially cause unacceptable cable insulation degradation. Random failures due to cutting of the insulation and conductor creep may occur during normal service conditions, especially for silicone rubber insulated cables. TVA stated that the root cause of the problem was a failure to include industry standard support requirements in design and installation documents.

As discussed in Section 3.2.1 of NUREG-1232, Volume 4, TVA issued Revision 1 to its CAP plan for cable issues at WBN Unit 1 by letter dated June 27, 1989. This CAP plan was based on the resolution of similar issues at the SQN and BFN facilities. The staff reviewed the cable issues CAP plan and found it unacceptable for WBN Unit 1. TVA submitted a revised program by letters dated December 20, 1989, and June 15, July 31, October 11, and November 5, 1990 (ADAMS Nos. ML073541157, ML073541204, ML073541237, ML073550196, and ML082380711). The revised CAP was reviewed and approved by NRC, as documented in Section 1.13.1 of, and Appendix P to Supplement 7 of NUREG-0847, "Safety Evaluation Report [SER] Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2" (ADAMS No. ML082420254). In Appendix P to Supplement 7 of the SER (SSER 7), the NRC staff found the CAP plan for the cable issues acceptable. The staff would perform inspections to assure adequate implementation of the program and would further supplement its safety evaluation when the inspections were completed and all the open items resolved.

Specifically in regard to cable support in vertical tray, vertical cables tend to creep downward, pulling on the upper horizontal section, causing high stresses at 90° bends which cuts off the insulation. Additionally, the agency was concerned that no credit was taken for non-qualified tie wraps in the support of vertical cables. In its letter of April 6, 2009 (ADAMS No. ML091120183), TVA stated that General Construction Specification G-38, Section 8.6.3.2, allows the use of cable tie wraps for the following applications: (a)

where required to maintain a neat orderly arrangement of cables, cable ties shall be installed at intervals not exceeding 10 feet, and (b) to maintain required nominal spacing between medium-voltage circuits. The NRC staff also verified that TVA's calculation took no credit for full support from tie wraps due to lack of EQ of the wraps. TVA stated that this calculation also evaluates the effect of the horizontal section above a vertical tray section. It states that the presence of the cable ties, Vimasco, and fire stops in a horizontal section is considered in establishing a coefficient of friction. However, credit cannot be taken for cable ties in a horizontal section to provide support to a vertical tray section since they are not qualified. The restraint provided by the horizontal section is based on the coefficient of friction between cable jacket and the bottom of the tray in the horizontal section.

On the basis that TVA will implement the plan for the sub-issue using the same approach as used at WBN Unit 1 and using the requirements in General Construction Specification G-38, which meets current standards, the NRC staff found that TVA's plans for resolution acceptable. TVA commitments in this regard (NCO 890140002, 890140007) are to: 1) report on support of Class 1E cables installed in long vertical cable tray runs in Unit 2 before Unit 2 fuel loading; and 2) complete calculations, walk-downs, evaluations, and rework for Unit 2, as required to address this issue, before Unit 2 fuel loading.

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's Cable Support in Vertical Tray sub-issue within the Electrical Cable Issues CAP has been adequately developed. This was done to ensure that the Unit 1 historical problems were being prevented and resolved for Unit 2. This inspection focused on a review of the adverse conditions involving vertical support of safety related cables within long vertical tray.

The inspectors reviewed General Engineering Specification G-38, section 8.7 to verify that direction and acceptance criteria for the installation of cable supports for cables in long vertical runs had been appropriately incorporated. Additionally, the inspectors reviewed Design Criteria WB-DC-30-22, section 5.2 to verify that provisions had been made for installation of cable supports in long vertical runs. The design criteria referenced a design guide for specific details on support location and application. Calculation EDQ00299920090003, Rev. 000, was reviewed to ensure that methodology employed in Unit 1's reconciliation had been applied to the remaining Unit 2 cables and that no cables had been inadvertently excluded from consideration. The inspectors reviewed licensee QA assessments and audits of engineering activities associated with the cable issues CAP and followed up on findings/recommendations. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions associated with the Electrical Cable Issues CAP sub-issue of conductor support in vertical tray to verify the adequacy of the program. The inspectors concluded that the programmatic aspects of TVA's implementation plan were adequate. Additional inspections will be required to evaluate the adequacy of the field implementation of supports and cable replacements associated with the corrective action.

**OA.1.14 (Discussed) Electrical Cable Issue CAP - Sub-issue: Cable Splices (TI 2512/016 and IP 51063)****a. Inspection Scope**

The inspectors reviewed the applicant's current actions to resolve the Electrical CAP Sub-Issue, Cable Splices. The review was conducted to confirm that the applicant's program complied with all applicant commitments and NRC requirements.

The inspectors' reviews included the applicant's procedures for cable installation and splicing (MAI-3.2, MAI-3.3), and an engineering tabulation and analysis of the splices installed in Unit 2 (EDQ00299920090007). The inspectors conducted direct observations of installed splices and reviewed associated documentation for splices in cable 2V6396B at penetration 2-PENT-293-0052B / Splice 2-SPL-2V6396-1 port numbers EBH13-10-16, EBH14-10-17, and EBH15-10-18 for 3/C size #16 AWG (WO 110958372). In addition, the inspectors reviewed TVA Nuclear Power Group Design Criteria Document (WB-DC-30-5) and TVA General Engineering Specifications (G-38, G-40, DS-E13.6.2) to evaluate the established criteria and guidance for installations of electrical components, including cables, conduits, and penetrations.

The inspectors compared the applicant's procedures to the National Electrical Manufacturer's Association (NEMA) FB-1-2007 standard Section 2.3.3, "Conduit Bodies Used as Boxes." The inspectors examined Kapton type cable in penetration components to assess insulation characteristics for this type of cable and type of splicing material and tools used, and finished product conditions.

The inspections of completed work included verifications of correct splicing materials, accurate cable identification, proper control of bending radius, proper divisional separation, adequate protection of installed and in-process work, protection against foreign material intrusion, and proper documentation of work, inspection, and test activities. Additional documents reviewed are included in the attachment.

The following samples were inspected:

- IP 51063 Section 2.02.d – three samples

**b. Observations and Findings**

No findings of significance were identified. The inspectors noted that the calculations contained a number of walk-down data sheets that identified numerous historical non-conformances on cables in locations where splices were installed inside conduit raceway fittings. These cables were properly identified as "failed" due to improper cable bend radius imposed on the individual conductors connected to the splices. All aspects of the splices reviewed were appropriately documented.

**c. Conclusions**

The inspectors determined that the splices were applied according to the construction implementation instructions and that all Class 1E splices not already accepted as part of the Unit 1 installation are scheduled to be replaced and the issues regarding cable bend radius have been incorporated into the corrective action plan for Unit 2.

**OA.1.15 (Discussed) Electric Cable – Work Observation: Resolution to URI-391/87-19-06  
“Non-Safety Related Cables in Close Proximity to Safety-Related Cables”  
(IP 51063)**

a. Inspection Scope

Background: The issue associated with this URI dealt with having Class 1E wiring within an enclosure in physical contact with non-Class 1E wiring. When the URI was written, the non-Class 1E wiring was not classified as an “associated circuit.” At that time there were no restrictions or guidance for identifying non-Class 1E circuits in the same enclosure with Class 1E cables as “associated circuits”. Since that time, the applicant has modified their design criteria (WB-DC-30-4) to include definitions for identifying non-safety related cables in close proximity to safety related cables as “associated circuits” in raceway, open air, and in enclosures. Drawing 1-45W3000-1 also detailed separation criteria. Associated circuits were subject to a level of protection comparable to those used for Class 1E circuits.

The inspectors interviewed responsible engineering staff to determine the status of work associated with the resolution to URI 391/87-19-06. To confirm applicable requirements were defined in design criteria, the inspectors reviewed WB-DC-30-4 “Separation / Isolation,” Rev. 22. The inspectors evaluated whether the design criteria were implemented by reviewing the following calculations developed to support breaker testing procedures:

- WBNEEBMSTI070005, “125 VDC Protection and Coordination Calculation,” Rev.56
- WBN-EEB-MS-TI07-0018, “120VAC Protection, Coordination, and Short Circuit Study,” Rev. 78
- WBN-EEB-MS-TI15-0011, “480V Non-Class 1E Power Cable Associated Circuits,” Rev. 93

In addition, the inspectors reviewed drawing 1-45W3000-1, “Cable/Wiring Separation Requirements Notes,” Rev. 2, along with some selected DRAs and related printouts from the ICRDS. The review was conducted to verify that proper separation was specified for Panel 2-JB-1973.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that for Panel 2-JB-1973, which was identified in the URI, DRAs 53217-235 and 54144-193 to drawing 45N2630-63 removed one cable and associated the remaining cables with train B. These changes were reflected in the ICRDS printouts for cables 2SG477B, 2SG478B, and 2SR755.

One of the methods for protecting associated circuits as described in SAR chapter 8.3 was to conduct periodic testing of circuits with single circuit breakers. Consistent with the SAR, the inspectors observed that the testing of breakers was properly addressed in the calculations and the design criteria. In addition, the inspectors verified that the methods described in the calculations and the design criteria were in accordance with guidance contained in Regulatory Guide 1.75 and IEEE Std. 384-1992 related to periodic testing of circuit breakers.

c. Conclusions

The inspectors determined that TVA had adequate criteria for determining associated circuits. The field work associated with this issue had not progressed sufficiently to allow an inspection of work activities.

**OA.1.16 (Discussed) Master Fuse List (MFL) SP (TI 2512/037)**

a. Inspection Scope

The inspectors assessed the adequacy of the applicant's actions to implement the SP for correcting deficiencies with the control of safety-related fuses and interrupting devices (i.e. Master Fuse List). Specifically, the inspectors interviewed responsible engineers, reviewed procedures for fuse installation and control, and examined three non-safety related examples of completed work control packages that were implemented to install and field-verify fuses. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified. The inspectors determined the temporary fuse tabulations were still being migrated to the permanent Maximo information system. Also, a controlled process for initial installation and verification of fuses was being implemented; however, no safety-related fuses had yet been installed or field-verified. Further inspection will be required to verify the full migration of the fuse tabulations into Maximo, and to verify adequate implementation of the process for installing and verifying safety-related fuses.

c. Conclusions

The inspectors determined that the actions committed for control of safety-related fuses were properly defined, but were not yet implemented sufficiently to verify adequate completion.

**OA.1.17 (Discussed) Radiation Monitoring System (RMS) SP (TI 2512/041)**

a. Inspection Scope

The inspectors assessed the adequacy of the applicant's actions to implement the SP for correcting deficiencies with the RMS.

The inspectors interviewed responsible engineers and reviewed EDCRs 2-52340 and 2-52341. The review was performed to verify that the EDCRs had correctly translated design requirements for the RMS sample lines into installations in the Unit 2 Containment, Auxiliary Building, and Turbine Building. The review also was performed to verify the design properly addressed the system deficiencies identified in the SP. A sample of associated electrical I&C calculations were reviewed to determine if they had been appropriately performed, revised, or for the case of open items, adequately tracked.

The inspectors also reviewed Self-Assessment 25402-SA-ENG-10-014. The self-assessment was performed to verify incorporation of the design requirements into associated documents. The inspectors reviewed the self-assessment to determine that all PERs and Conditions Adverse to Quality (CAQs) from the Unit 1 RMS SP Closure Report were reviewed for applicability to Watts Bar Unit 2.

The inspectors also examined selected purchase orders for U2 RMS sample line components, reviewed receipt inspection records, and conducted direct observations of selected items maintained in storage pending future installation. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified. The inspectors noted that EDCRs 2-52340 and 2-52341 identified several differences between Unit 1 and Unit 2 involving operations, equipment, and design, and determined that the differences were appropriately justified, reviewed, and approved by a designated authority.

Actions to correct deficiencies with documenting primary calibrations of radiation monitor were still in process, and no samples were yet available for NRC inspection. Also, further inspection will be required to evaluate correct installation of design features.

c. Conclusions

The inspectors determined the RMS sample line design documents and equipment items reviewed in this inspection met applicable requirements.

**OA.1.18 (Discussed) CDR 391/86-11: Thermal Expansion of Liquid Sample Piping**

a. Inspection Scope

CDR 391/86-11 was created to address deficiencies in design provisions to accommodate thermal expansion in liquid sample piping in System 43 (Water Quality Sampling) and System 90 (Radiation Sampling). The inspection scope was to confirm that the required modification was implemented.

The inspectors determined that the following four EDCRs had been issued to install liquid sample piping:

- 52341, "Replacement of Radiation Monitoring System Loops," Rev. A
- 53917, "Modify, Inspect, and/or Install Water Quality and Sampling System Sample Lines," Rev. A
- 53919, "Modify, Inspect, and/or Install Sample Lines," Rev. A
- 53927, "Modify, Inspect, and/or Install Water Quality and Sampling System Sinks," Rev. A

b. Observations and Findings

No findings of significance were identified. The inspectors determined that each EDCR called for installers to field route tubing and use pre-existing supports as possible. The EDCRs specified that the detailed designs, including thermal expansion analyses, was not to be accomplished until after being field-routed and installed using skill of the craft. The as-installed configurations would then be sketched in detail and submitted to design engineering for stress analysis. After completing the analyses and accomplishing any resulting rework, engineering was to incorporate the sketches into as-built isometric drawings. The inspectors observed that WOs had been prepared, but no physical installations had yet been initiated.

c. Conclusions

The detailed designs for the liquid sample lines were not complete and had not been analyzed to demonstrate the configurations would adequately accommodate thermal expansion. Further inspections will be required to adequately verify completion of this commitment.

**OA.1.19 (Discussed) NRC BL 78-04: Environmental Qualification (EQ) of Certain Stem Mounted Limit Switches inside Reactor Containment (IP 52055)**

a. Inspection Scope

Background: BL 78-04 was issued due to a review by Westinghouse of the seismic and environmental qualifications of the electrical circuitry used for valve operation of certain stem mounted limit switches (SMLS) associated with various safety related valves. The SMLS were found not to be environmentally qualified for loss of coolant accident (LOCA) conditions. The SMLS in question was identified as NAMCO Model D2400X or EA-170-302 SNAP LOCK. All NAMCO SNAP LOCK type switches had been seismically qualified by tests, and only environmental qualification was a concern for this issue.

The inspectors reviewed documentation related to BL 78-04. Specifically, the inspectors reviewed a list of environmentally qualified components contained in EDQ00299920090011, "Appendix A - WBN Unit 2, List of 10CFR50.49 Components by System," Rev. 2. The list was created from the Category and Operating Time Calculations. While this list was still being updated to match POs and EDCRs to specific components, the components listed were considered complete for the current design. The inspectors selected a sample of limit switches (switches WBN-2-ZS-68-0307B-A and WBN-2-ZS-63-0072A-A) and reviewed the associated PO 26088, Material Receiving Instruction 25402-011-MRI-JZ02-0003, Rev.0, and Qualification Test Report (QTR) 155, Rev 2, for those switches to verify that EQ requirements had been properly transferred into purchase orders and receipt inspection. The inspectors compared a list of EQ limit switches to the switches identified by Westinghouse in a letter to TVA dated March 15, 1978 and tracked in NCR 1666R, Rev 1.

The inspection included determinations whether received components were properly identified, met applicable engineering specifications, and satisfied critical characteristics for environmental qualification.

The following samples were inspected:

- IP 52055 Section 2.02.a – two samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the switches were identified to be properly EQ qualified, and that EQ requirements were properly translated from the EQ Binder to purchase and receipt for the sample reviewed. Switch replacement activities require continued inspections.

**OA.1.20 (Discussed) RPV Head and Vessel Head Penetration (VHP) Nozzles (TI 2515/150, Rev. 3)****a. Inspection Scope**

During the inspection period, the inspectors reviewed the implementation of the licensee's baseline/Pre-service Inspection (PSI) activities for monitoring degradation of the VHPs. The inspectors conducted an on-site review the RPV head and VHP nozzle inspection activities in accordance with the requirements of Order EA-03-009, issued on February 20, 2004. Although the Order has been rescinded and replaced by ASME Code Case N-729-1, Watts Bar 2 is committed to performing a baseline inspection prior to fuel load in accordance with paragraph IV.C(5)(b) of the Order. Completion of the applicable portions of this TI will close out NRC's actions in (BL 01-01, 02-01 and 02-02) consistent with the staff SER dated June 30, 2010.

In addition to TI 2515/150, the inspections were conducted in accordance with the guidance of IP 55080 (Ultrasonic Testing Examination) and 55060 (Liquid Penetrant Examination).

The inspectors observed and/or reviewed portions of the NDE activities listed below. The review included NDE procedures, NDE reports, equipment and personnel qualification records, and calibration reports (as applicable). Additional documents reviewed are included in the attachment.

- The inspectors observed UT examinations and reviewed documentation of VHP Nos. 55, 51, 31, and 15.
- The inspectors reviewed documentation for UT examinations of VHP Nos. 1, 10, 74 and AHA 1.
- The inspectors reviewed documentation for PT examinations of Auxiliary Head Adaptors (AHAs) Nos. 1 – 4 and Vent-1.

Order EA-03-009 requires that the volumetric examinations performed by the applicant cover 2 inches above and below the extent of the welds. If this cannot be achieved, the applicant is required to perform calculations to reduce the coverage area from 2 inches below the weld to the point where the nozzle is subject to less than 20,000 psi tensile stress under operating conditions. The applicant has several nozzles which meet the requirements of this condition. Because the calculations had not been performed at the time of the inspection they could not be reviewed, and therefore this TI and BLs 01-01, 02-01 and 02-02 cannot be closed.

**b. Observations and Findings**

No findings of significance were identified. The applicant and their contractor, Areva, were found to be performing the examinations with knowledgeable personnel. All procedures and personnel were found to be qualified and demonstrated to the capability, identify, disposition, and resolve deficiencies, such as primary water stress cracking corrosion (PWSCC) and RPV Head corrosion, in accordance with EPRI Performance Demonstration Initiative (PDI).

Many of the nozzles inspected contained thermal sleeves and centering rings, however they did not inhibit complete examination of the specified area by use of a blade probe. Otherwise, the vessel head was free of debris, insulation, physical configurations or layouts that might inhibit examination.

The applicant did not identify any indications within the volume of the nozzles or surface exams during the observed and reviewed examinations. Additionally no evidence of PWSCC, corrosion, leak paths, or boric acid was identified.

c. Conclusions

Within the observed activities, procedures, and records, the applicant was found to be adequately meeting the requirements of order EA-03-009.

**OA.1.21 (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 92717)**

a. Inspection Scope

The inspectors conducted interviews, observed maintenance, and reviewed documents related to the applicant's implementation of BL 89-02 at Watts Bar Unit 2. The inspectors reviewed the implementation plan and schedule for Unit 2 to determine if appropriate corrective actions were taken or planned. The inspectors observed work on one check valve to determine if:

- The work instructions were appropriate to the circumstances;
- Appropriate replacement parts were specified;
- The applicant properly pre-planned the work; and,
- The applicant performed the work in accordance with the work instructions.

The inspectors also reviewed completed work packages on 12 additional check valves to determine if the corrective actions were appropriately implemented. Additionally, the inspectors reviewed the applicant's plans to determine if all susceptible check valves were included in the applicant's scope of work to address this BL. Lastly, the inspectors reviewed the scope of work for each valve to determine if the applicant was using the same approach as was used for Unit 1. Additional documents reviewed are included in the attachment.

b. Observations and Findings

For the sample of valves selected, the scope of work for Unit 2 was consistent with the approach used for Unit 1 in that the applicant was replacing the flapper assembly hold down bolts with a material that was better suited for the intended application. The design change documentation was not available for review by the inspectors prior to the close of this inspection period

c. Conclusions

This item remains open pending review of the applicant's design change documents controlling the scope of work related to NRC BL 89-02.

**OA.1.22 (Closed) Structural Steel and Supports – Procedures Review (IP 48051)**

a. Inspection Scope

The purpose of this IP was to determine if the Watts Bar Unit 2 structural steel and support requirements in the SAR were adequately addressed in the construction specifications and work procedures. 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 G, "Structural Steel and Supports," confirmed adequate reviews were completed. However, a sample of new procedures in the area of structural steel and supports covered by this IP was inspected and the results are documented in this report.

Section 02.01 of this IP requires the completion of IP 35100, which was completed and documented in IIR 05000391/2009602, Attachment 3. Sections 02.02 and 02.03 of this procedure require a determination on whether an audit program was established to address the safety-related work and control functions in the area of structural steel and supports, including welding and training for examination, inspection and craft personnel. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3 as well.

Section 02.04 requires a determination and coordination of the interfaces and boundaries of the civil-structural and mechanical engineering disciplines within this IP. Some of the interrelated areas are addressed in other NRC IPs such as Pipe Support and Restraint Systems (IP 50090), Concrete Expansion Anchors (IP 46071), Nuclear Welding General (IP 55050) and the Structural Welding General (IP 55100). In addition, some of the TVA's CAPs are interrelated with this IP in the area of structural steel and supports, such as the Hanger and Analysis Update Program (HAAUP) CAP, Cable Tray and Supports CAP, Conduit and Supports CAP, and Heating Ventilation and Air Conditioning (HVAC) and Supports CAP. Instructions and procedures for structural steel and supports reviewed using the IPs and CAPs described above may be related to this IP. The NRC Region II's inspection efforts associated with structural steel and supports were coordinated between the civil, mechanical, and welding disciplines.

Section 2.05 requires the review of construction specifications related to structural steel and supports activities to verify conformance with applicable technical requirements. As stated in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix G, "Structural Steel and Supports," the majority of the TVA construction specifications associated with structural steel were previously inspected by NRC as they also applied for Unit 1 and no major changes have been identified. Therefore, this section is considered complete as documented in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix G, "Structural Steel and Supports."

Section 02.06 of this procedure requires a review of the QC procedures including handling and storage of materials. Inspection required by Section 2.06 were completed and documented in IIR 05000391/2009602, Attachment 3. This section also requires the review of the construction procedures associated with structural steel and supports generated from the specifications to determine adequacy. New procedures in the area of structural steel covered by this IP were inspected during this inspection period as documented below.

During this inspection period the inspection scope included the review of construction specifications related to the installation of structural steel to determine whether the specified technical requirements conform to the commitments contained in the FSAR. Inspection activities also included the review of the construction procedures generated from the specifications in order to determine their adequacy with respect to prescribing adequate methods for achieving the construction specification requirements.

The inspectors reviewed construction installation procedures, MAIs, and general engineering specifications related to the erection of structural steel and supports to verify compliance with the requirements of the AISC Manual of Steel Construction, Eighth Edition and the AISC Specification for Design, Erection and Fabrication of Structural Steel for Buildings, November 1, 1978.

The following instructions and procedures associated with structural steel erection and installations were reviewed:

- 25402-000-GPP-0000-N3221, Structural Steel Erection, Rev. 3
- MAI 5-9, Fabrication and Installation of Structural and Miscellaneous Steel, Rev. 8
- MAI 5-9, Fabrication and Installation of Structural and Miscellaneous Steel, Rev. 8
- MAI 5-2, Bolting for Structural Connections, Rev. 7
- PS 4.M.4.4, G-29B-S01: ASME Section III and Non-ASME Section III (Including AISC, ANSI B31.1, and B31.5) Bolting Material, Rev. 5

The inspectors also reviewed construction procedures to determine their adequacy with respect to their methods for achieving the construction specification requirements applicable to structural steel welding. Bechtel procedures were compared to the requirements of American Welding Society [AWS] D1.1, Structural Welding Code, 2002 and 1973 editions, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding [SMAW] AWS A5.1, 2001 Edition, 2003 Addenda, TVA Controlling Welding, Brazing, and Soldering Processes, MMDP-10, Rev.0009, and TVA General Engineering Specification, G29B-S02-SSE-TOC, Materials and procurement Section 2 - Standard Material Specification Subsection E – Metallic Welding/Brazing Materials Rev 2-24-2006. The following procedures associated with structural steel welding were reviewed:

- Welding Procedure Specification P1-A-Lh, Rev. 1 (Structural-Plug/Slot)
- Technical Specification for Welding Filler Metal WM-E9018-B3 (CVN), Rev. 1
- Technical Specification for Welding Filler Metal WM-E8018-B2 (CVN), Rev. 0
- Technical Specification for Welding Filler Metal WM-E7018 (CVN), Rev. 1
- Welder Performance Qualification Specification WQ-2, Rev. 1
- Welding Standard Documentation of Welds WD-1, Rev. 6
- Welding Procedure Qualification Records: 1109, 1110, 1111, 1112
- Construction Completion Project Procedure, Rev. 3
- Nondestructive Examination Standard VT-AWS D1.1, Rev. 2
- UT-AWS D1.1, Rev 1

The following samples were inspected during this inspection period:

- IP 48051 Section 02.06 – five samples

b. Observations and Findings

No findings of significance were identified. A majority of the items have been previously inspected under Unit 1 inspection activities or during recent Unit 2 construction inspections.

Below is a summary of each section of IP 48051:

- Section 02.01 – Closed. See IIR 05000391/2009602, Attachment 3
- Section 02.02 – Closed. See IIR 05000391/2009602, Attachment 3
- IP 448051 Section 02.03 – Closed. See IIR 05000391/2009602, Attachment 3
- Section 02.04 – Closed. NRC inspection efforts were coordinated with related civil, mechanical and welding disciplines.
- Section 02.05 – Closed. See NUREG-1528, Appendix G
- Section 02.06 – Closed. Five samples of new project procedures inspected and documented in this inspection report
- Section 02.07 – Not applicable because the SALP program is no longer in use.

c. Conclusions

The procedures and records reviewed during this inspection period, associated with structural steel and supports 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 associated with structural steel, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

**OA.1.23 (Closed) Containment Penetrations (Mechanical) – Procedures Review (IP 53051)**

a. Inspection Scope

The purpose of this IP was to determine if the Watts Bar Unit 2 containment penetrations requirements in the SAR were adequately addressed in the construction specifications and work procedures. 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 M, "Containment Penetrations," confirmed adequate reviews were completed. However, a sample of new procedures in the area of containment penetrations covered by this IP was inspected and the results are documented in this report. A majority of the containment penetrations were completed during initial construction efforts

Section 02.01 of this IP requires the completion of NRC IP 35100, which was completed and documented in IIR 05000391/2009602, Attachment 3.

Sections 02.02.a and 02.02.d of this IP require a determination on whether adequate procedural guidance on shipping, receipt inspection, and establishment of an audit program, exists in the area of containment penetrations. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.

Sections 02.02.b and 02.02.c of this IP require a determination on whether adequate procedural guidance exists regarding installation and testing methodology. The inspectors reviewed EDCR 52492 and WO 110739617 associated with work on Unit 2 containment penetration X-20B. These documents utilize guidance provided in other disciplines, inspectable under different inspection programs such as Nuclear Welding General Inspection Procedure (IP 55050) and the NDE Inspection Procedure (IP 57050). TVA's guidance on these activities has been previously reviewed by NRC Region II's inspection efforts and found to have adequate guidance associated with welding and NDE activities.

Section 2.03 requires the review of construction specifications related to containment penetrations to verify conformance with applicable technical requirements. As stated in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix M, "Containment Penetrations," the majority of the TVA construction specifications associated with containment penetrations were previously inspected by the NRC as they also applied for Unit 1 and no major changes have been identified. Therefore, this section is considered complete as documented in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix M, "Containment Penetrations."

Section 2.04 requires a review of construction specifications related to containment penetrations to verify the manufacturer's recommendations relative to the handling, care, installation, or testing are considered in applicable work procedures. Available drawings and work procedures were reviewed. Additional discussions were held with the responsible engineer regarding this IP guidance and proposed testing.

Section 02.05 of this procedure requires a determination of whether the licensee has an established program for ensuring that all craft, examination, and inspection personnel associated with implementing work procedures for containment penetrations are trained and qualified to the appropriate requirements. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.

New procedures in the area of containment penetrations covered by this IP were inspected during this inspection period as documented in the attachment to this report.

The following samples were inspected during this inspection period:

- IP 53051 Section 02.02.b – two samples
- IP 53051 Section 02.02.c – two samples
- IP 53051 Section 02.04 – two samples

b. Observations and Findings

No findings of significance were identified. A majority of the items in this IP have been previously inspected under Unit 1 inspection activities or during recent Unit 2 construction inspections. Below is a summary of each section of IP 53051:

- Section 02.01 – Closed. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.
- Sections 02.02.a and 02.02.d – Closed. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.
- Sections 02.02.b and 02.02.c – Closed. TVA's guidance on these activities has been previously reviewed by NRC Region II's inspection efforts and found to have adequate guidance associated with welding and NDE activities.
- Section 02.03 – Closed. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.
- Section 02.04 – Closed. NRC inspection efforts found adequate guidance available for the current status of incomplete containment penetrations.
- Section 02.05 – Closed. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.

c. Conclusions

The procedures and records reviewed during this inspection period, associated with containment penetrations 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 associated with containment penetrations, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

**OA.1.24 (Closed) CDR 391/82-01: NCO850364001 – Excessive Movement of Containment Penetration Bellows (IP 35007)**

a. Inspection Scope

In December 1981, the applicant notified the NRC that analysis problems N3-63-7A and N3-74-1A utilized incorrect maximum operating temperatures for safety related pipe stress analyses. This deficiency was originally identified in historical NCR WBN CEB 8119. A similar deficiency was identified for Unit 1 and was documented in CDR 390/82-01. Based on a previous review of completed engineering change notice (ECN) 3645 and verification of modified analyses the inspectors had determined that CDR 05000390/82-01 had been adequately resolved for Unit 1 as documented in Inspection Report, 05000390/84-30 and 391/84-25.

To address Unit 2, the inspectors performed the following:

- Reviewed the applicant's open item closure report including any actions associated with PER 172647 which was issued to track required Unit 2 actions for historical NCR WBN CEB 8119.
- Reviewed the applicable piping system calculations.
- Reviewed the updated pipe stress analysis and verified that updated temperatures were included in the calculations.
- Verified that pending corrective actions were captured in controlled programs to accomplish this work.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on these actions the inspectors determined that the applicant had resolved the original construction deficiency for Unit 2. This item is closed for Unit 2.

**OA.1.25 (Closed) CDR 391/82-11: NCO850368001 – Design of HVAC Penetrations in Containment (IP 35007)**

a. Inspection Scope

In December 1981 the applicant notified the NRC that the containment vessel contractor designed the HVAC penetrations in a non-conservative manner. This deficiency was originally identified in historical NCR WBN CEB 8120. A similar deficiency was identified for Unit 1 and was documented in CDR 390/82-11.

Based on a previous review of completed ECN 2689 and verification of modified analyses the inspectors had determined that CDR 390/82-11 had been adequately resolved for Unit 1 as documented in Inspection Report, 05000390/83-42 and 05000391/83-31.

To address Unit 2, the inspectors performed the following:

- Reviewed the applicant's open item closure report including any actions associated with PER 172650 which was issued to track required Unit 2 actions for historical NCR WBN CEB 8120.
- Reviewed the applicable steel containment vessel penetration calculations.
- Reviewed the updated penetration drawings and performed field walk-downs to verify adequate and accurate placement.
- Verified that pending corrective actions were captured in controlled programs to accomplish this work.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on these actions the inspectors determined that the applicant had resolved the original construction deficiency for Unit 2. This item is closed for Unit 2.

**OA.1.26 (Closed) CDR 391/80-21-06: Incorrect Valve Weights in Auxiliary Feedwater (AFW) Piping (IP 50090, IP 35007 and TI 2512/023)**

a. Inspection Scope

In August 1980, the applicant notified the NRC that level control valve (LCV) weights used for the seismic analysis of the AFW piping were incorrect. This deficiency was originally identified in historical NCR WBN CEB 8006 and was documented in CDR 390/80-27-06. Based on a previous review of completed ECN 2620 and field verification of modified supports, the inspectors determined that CDR 390/80-27-06 had been adequately resolved for Unit 1 as documented in Inspection Reports 05000390/84-13 and 05000391/84-11. Additional documents reviewed are included in the attachment.

To address Unit 2, the inspectors performed the following:

- Reviewed the applicant's open item closure report including any actions associated with PER 172658 which was issued to track required Unit 2 actions for historical NCR WBN CEB 8006.
- Reviewed the applicable piping system walk-down packages and drawings.
- Reviewed the applicable procedures and verified recurrence control measures had been incorporated.
- Inspected several of the AFW system valves and verified that the walk-down packages and valve drawings (which included valve weights) were consistent with the information obtained in the field.
- Reviewed the AFW pipe stress analysis and verified that updated valve weights or unverified assumptions, as applicable, were included in the calculations.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on these actions the inspectors determined that the applicant had resolved the original construction deficiency for Unit 2. This item is closed for Unit 2.

**OA.1.27 (Closed) CDR 391/85-07: Incorrect Relief Valve Thrust Loads in the Safety Injection System Piping (IP 50090, IP 35007 and TI 2512/023)**

a. Inspection Scope

In February 1985, the applicant notified the NRC that safety injection pipe supports were inadequate due to the inaccurate assumptions associated with the use of relief valve thrust loads in the seismic analysis. The subject deficiency was identified by the licensee during performance of the Unit 2 analysis of the pipes which connect the relief valves to each accumulator tank in the safety injection system. This deficiency was originally identified in historical NCR WBN CEB 8420 (NCR 8420). A similar deficiency had been identified for Unit 1 and was documented in CDR 390/84-50. Based on a previous review of completed ECN 5246 and field verification of modified supports, the inspectors determined that CDR 390/84-50 had been adequately resolved for Unit 1 as documented in Inspection Reports 05000390/85-33 and 05000391/85-28. Since the work for Unit 1 work for NCR 8420 was completed prior to the initiation of the Unit 1 HAAUP CAP, this issue was not considered as part of the Unit 1 HAAUP CAP.

For Unit 2, ECN 5405 was completed and closed on June 2, 1986. All construction work specified by ECN 5405 to resolve the Unit 2 portion of CEB 8420 was completed and documented in a work completion memorandum dated June 1, 1987. In addition, for the current implementation of the Unit 2 HAAUP CAP, the applicant walked down and reanalyzed Unit 2 piping systems and pipe supports. Updated relief valve thrust loads were considered as part of the analysis check list included in WBN-RAH-510 of the WBN Rigorous Analysis Handbook and a reanalysis was performed utilizing the applicable design criteria contained in WB-DC-40-31.7, "Analysis of Category I and I(L) Piping Systems," Rev. 23. Additional documents reviewed are included in the attachment.

To address Unit 2, the inspectors performed the following:

- Reviewed the applicant's open item closure report including any actions associated with PER 172605 and PER 172606 which were issued to track required Unit 2 actions for historical NCR WBN CEB 8420 and ECN 5405. This included the applicable piping analysis and necessary pipe support modifications.
- Reviewed the work completion memorandum dated June 1, 1987 addressing the Unit 2 portion of the work.
- Reviewed a sample of piping system valve walk-down packages and drawings.
- Reviewed applicable portions of procedures and verified recurrence control measures had been incorporated.
- Reviewed a sample of safety injection system pipe stress analysis calculations (N363A29R, Rev. 3 and N363A30R, Rev. 4) and verified that updated thrust loads were included.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on these actions the inspectors determined that the applicant had resolved the original construction deficiency for Unit 2. This item is closed for Unit 2.

**OA.1.28 (Closed) CDR 391/82-55: Concrete Anchorage Free Edge Violation (IP 50090, IP 46071 and TI 2512/023)**

a. Inspection Scope

In June 1982, the applicant notified the NRC that in some instances, expansion bolt anchors for supports of various systems had been installed too close to concrete free edges and did not meet the specifications in G-32. This deficiency was originally identified in historical NCR 4068R. A similar deficiency had been identified for Unit 1 and was documented in CDR 390/82-58. Based on a review of the final construction deficiency report (ML082381234) dated September 15, 1983, inspector discussions with licensee representatives, and review of supporting documentation, the inspectors determined that CDR 390/82-58 had been adequately resolved for Unit 1 as documented in Inspection Reports 05000390/84-34 and 05000391/84-29. Additional documents reviewed are included in the attachment.

In addition, to address Unit 2, the inspectors performed the following:

- Reviewed the applicant's open item closure report, including any actions associated with PER 172664 which was issued to track required Unit 2 actions for historical NCR 4068R.
- Reviewed the applicable procedures and verified recurrence control measures had been incorporated.
- Reviewed piping system walk-down packages and associated engineering calculations. Similar concrete free edge distances not meeting the specifications in G-32 were identified during the walkdowns.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on these actions the inspectors determined that the applicant had resolved the original construction deficiency for Unit 2. This item is closed for Unit 2.

**OA.1.29 (Closed) Electrical Cable Issue CAP - Sub-issue: Cable Jamming (TI 2512/016 and IP 51063)**

a. Inspection Scope

Background: Cable Jamming is most likely to occur when three single conductor cables of the same diameter are being pulled into a conduit with a jam ratio of between 2.8 and 3.1. Under this circumstance, the cables are most vulnerable to alignment in a flat configuration. The jam ratio is defined as the ratio of the conduit inner diameter to the

cable outer diameter. A failure of cable installation specifications and procedures to require checks for potential cable jamming prior to cable pulling and use of inappropriate jam ratios could contribute to jamming.

As part of the resolution of this CAP sub-issue prior to Unit 1 startup in 1996, Class 1E conduit segments were evaluated to identify those segments most likely to have experienced jamming during installation. This included both Unit 1 and 2 cables in conduits. These segments were ranked according to their calculated percent allowable sidewall bearing pressure. Selected cables were removed and inspected, and no evidence of cable damage due to jamming was identified.

In addition, the resolution provided changes to cable installation specifications and revisions to site procedures to ensure that the jam ratio for Class 1E cable is not between 2.8 and 3.1 prior to pulling in conduits and duct banks. According to the procedures, if the jam ratio was within the critical range, then the cables would not be pulled without prior engineering approval. The inspectors reviewed the safety evaluation issued by the NRC staff (ADAMS ML 092151155) which documented their acceptance of TVA's approach to resolve the cable jamming sub-issue for Unit 2.

In this inspection, the inspectors reviewed the applicant's actions to resolve the Electrical CAP Sub-Issue, Cable Jamming. The review was conducted to confirm that the applicant's program implemented all associated commitments for Unit 2 and complied with NRC requirements. The inspection included reviews of cable and conduit installation specifications G-38 and G-40, and cable pull procedures in MAI-3.2 "Cable Pulling for Insulated Cables Rated up to 15,000 Volts," Rev. 21. The inspectors also reviewed Cable Jamming Closure Report Rev. 000, in part, to assess the results of integrity testing performed to evaluate the cables previously replaced as part of the disposition to this CAP sub-issue.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that procedures established for the installation of all types of cables properly address jamming. The changes in the procedures and the staff awareness of this issue provide adequate assurance the cables will not be subject to damage due to jamming.

c. Conclusions

The inspectors concluded that concerns pertaining to the Electrical Cable Issue CAP sub-issue on cable jamming were appropriately addressed for Watts Bar Unit 2.

**OA.1.30 (Closed) NRC BL 74-15: Misapplication of Cutler-Hammer (Eaton) 3-position Maintained Switch Model 10250T (IP51065)**

a. Inspection Scope

Background: The original issue with the use of the Cutler-Hammer (Eaton) 3-position maintained switch model 10250T involved an anomaly with EQ testing conducted in May 1987. The total integrated dose level to which the test specimens were exposed at the test facility was only  $9.11 \times 10^5$  RADs; whereas, the required dose level was  $1.0 \times 10^6$  RADs. Subsequently, another test facility successfully subjected the contact blocks in the Cutler-Hammer 10250T1 to additional radiation and upgraded its qualification to  $1.5 \times 10^8$  RADs.

In this inspection, the inspectors interviewed responsible engineering staff to determine the plant-specific operational requirements for the assemblies provided to Unit 2, and to obtain their perspective of the application of qualification test results. The inspectors reviewed the equipment qualification binder associated with the Cutler-Hammer (Eaton) 3-position maintained switch model 10250T WBNEQ-HS-002, Rev 12, to evaluate the completeness and adequacy of documentation. Documents reviewed included Wyle Test Report No. 48792-02, dated October 7, 1987 and Report 30007-99, dated December 30, 1988. In addition, the inspectors reviewed correspondence between TVA and Wyle Laboratories contained in document 25402-011-G26-GAKS-05334-001, dated October 20, 2010, which provided clarification regarding which test results to reference for Watts Bar. The inspector's evaluation of the applicant's disposition of this issue included reviews of the Certificate of Conformance from Wyle Laboratories for Wyle Code Numbers for Cutler Hammer P/N 10250T3053 - FUH-025 & FUH-026, and 4322210250T3053SSW015, for contact block P/N 10250T1 – 390031250T1CB413~418, dated August 12, 2010.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the rating of the 3-position maintained switch assembly supplied to Unit 2 would be maintained if the switch is not operated during a design level accident. The switch must be maintained in the proper position prior to and during the event. Test records and associated documentation were evaluated to provide the necessary evidence to assure reliable service.

c. Conclusions

The inspectors determined that the issue was effectively resolved and all subsequent testing and reporting successfully established the proper qualification characteristics for these components to withstand the environment and operate properly with design requirements. Based on the inspection results this item is closed.

**OA.1.31 (Closed) NRC BL 79-21: Temperature Effects on Level Measurements**

a. Inspection Scope

Background: BL 79-21 addresses the effect of increased containment temperature on the reference leg water column and the resultant effect on the indicated steam generator water level. This effect would cause the indicated steam generator level to be higher than the actual level and could delay protection signals and also provide erroneous information during post-accident monitoring.

The inspection scope was implemented to confirm whether the steam generator reference legs in Unit 2 are insulated and if not, to confirm that the analysis which was submitted for Unit 1 was also applicable to Unit 2.

The inspectors reviewed correspondence from TVA dated July 27, 1994 (ADAMS ML 073230681), to confirm that TVA withdrew its commitment on Unit 1 to insulate the steam generator level instrument reference legs. TVA justified the action with an analysis provided in FSAR 15.4.2.2. The inspectors reviewed TVA's response to the staff's Request for Additional Information, RAI 68 (ADAMS ML 102910008), which called for TVA to discuss the applicability of this generic issue to the Unit 2 design. TVA responded (ADAMS ML 103200146) that the Unit 2 design was similar to Unit 1 and was bounded by the Unit 1 analysis.

b. Observations and Findings

No findings of significance were identified. The Steam Generator level reference legs will not be insulated on Unit 2. The analysis for Unit 1 is applicable for Unit 2. The FSAR Section 15.4.2.2 has been revised accordingly.

c. Conclusions

The inspectors determined that the issue was effectively resolved. Based on the inspection results this item is closed.

**OA.1.32 (Closed) CDR 391/85-17: Redundant Tripping Devices for Containment Penetration Circuits Not Provided**

a. Inspection Scope

Background: The CDR was issued to correct a failure to provide redundant tripping devices (i.e. fuses) for electrical circuits in containment penetrations 27, 36, and 52. Specific circuits of concern served Unit 2 valves 2-FCV-43-251-A, 2-FCV-43-288-A, 2-FCV-43-310-A, and 2-FCV-43-319-A.

The inspectors evaluated the status and adequacy of corrective actions for the Unit 2 construction completion project. Specifically, the inspectors interviewed responsible design engineers and reviewed calculation EDQ00299920080019, "Electrical Penetration Protection Study Voltage Level V3," Rev. 3. The interviews and reviews were conducted to verify the characteristics of fuses for Penetrations 27, 36, and 52 were evaluated and sized in accordance with design criteria document WB-DC-30-27. The inspectors reviewed EDCR 54798, "Install Specified Fuses," Rev. A to verify that the EDCR provided for the installation of the fuse identification numbers (UNIDs) specified in calculation EDQ00299920080019. The Master Equipment List (MEL) update documents were reviewed to verify they correctly translated the specifications into the MEL.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that calculation EDQ00299920080019 demonstrated the fuses conformed to the protection curves established by the fault analysis.

In addition, the inspectors determined through interviews and a review of the MFL SP (Section OA.1.16) that EDCR 54798 is one of six EDCRs to be implemented under that program.

c. Conclusions

The inspectors determined that the design requirements for the specific electrical circuits identified in this CDR were properly derived and adequately specified to assure correct installation. Physical installation of the fuses will be accomplished under the MFL SP. Based upon the results of this inspection and the provisions to accomplish future actions under the MFL SP, this item is closed for Unit 2.

### **OA.1.33 (Closed) CDR 391/85-24: Non-independent power supply to AFW pumps**

#### a. Inspection Scope

Background: The original nonconformance involved a 50.55(e) condition where the system design inappropriately provided non-independent sources of power to the control logic circuits for the AFW pumps. A commitment was established to modify the power feeds to the control circuitry on the turbine-driven AFW pump so that power sources were independent of the power sources that fed the control circuitry on the motor-driven AFW pumps.

In this inspection, the inspectors evaluated the status and adequacy of the corrective actions implemented for Unit 2.

Specifically, the inspectors conducted interviews with electrical design personnel and reviewed EDCR 52343, "Install Foxboro SPEC200 Control System," Rev. A, to verify design requirements were specified to establish independent sources of control logic power. The inspectors also conducted a review of drawings 2-45W600-3-3, "Main & Auxiliary Feedwater Sys Schematic Diagram"; Rev.0, 2-45W600-3-4, "Main & Auxiliary Feedwater Sys Schematic Diagram"; Rev.0, and 2-45W600-3-12, "Main & Aux Feedwater Sys Schematic Diagram" Rev.0 to verify the 125 VDC supplies to the control power circuits were designed to be fed from independent Battery Boards.

#### b. Observations and Findings

No findings of significance were identified. The review of EDCR 52343, Rev. A, "Install Foxboro SPEC200 Control System," confirmed that provisions were established to separate the sources for control power to the turbine-driven AFW pump and the motor-driven AFW pumps. The inspectors also noted the EDCR provided guidance for re-terminating independent power feeds at the U1/U2 interface boundaries. The Unit 2 design was issued on June 24, 2010.

The inspectors observed that all of the drawings reviewed were designated "As Designed Only – Not Field Verified." Implementation of the future action was being tracked by the applicant's corrective action program as PER 172634, "Establish Independence between the Power Supplies to the Turbine-Driven AFW Pump and the Motor-Driven AFW Pump."

#### c. Conclusions

The inspector determined that design requirements for establishing independent sources of power to the AFW pump control circuitry have been adequately specified and that a future action still remains to verify conformance of the as-built installations under the applicant's design control process. Based upon the results of this inspection, the establishment of specific corrective action tracking, and the maintenance of an established independent quality oversight program, this item is closed for Unit 2.

### **OA.1.34 (Closed) CDR 391/85-32: Potential Excessive Reactor Vessel Level Instrumentation Indication Errors**

#### a. Inspection Scope

CDR 391/85-32 reported a deficiency with the Reactor Vessel Level Instrumentation System (RVLIS). The RVLIS deficiency involved a potential seismic failure of a

Westinghouse 7300 series function generator card (NCH) manufactured by Westinghouse. These cards generate the temperature compensation for the RVLIS level signal. The inspection scope was to confirm whether these cards were used in Unit 2 and if so, then to confirm that the required modification was implemented. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified. The Unit 2 RVLIS is being replaced. The replacement does not employ the 7300 series function generator.

c. Conclusions

The inspectors determined that the issue was effectively resolved. Based on the inspection results this item is closed.

**OA.1.35 (Closed) CDR 391/92-10: Inadequate Design Control Measures**

a. Inspection Scope

Background: A 1992 NRC inspection of the MFL SP issued Violation 92-27-06 for five examples of inadequate design control, including two instances where a calculation provided an incomplete design, an inadequate technical justification, an inadequate procedure, and conflicting design criteria documents. In two instances, the incomplete design resulted in a condition reportable under 10 CFR 50.55(e), where required protection of control circuits had not been provided for the normal and auxiliary 6900 VAC Shutdown Boards. The licensee's response and actions taken to disposition the violation on Unit 1 had been reviewed and accepted in Inspection Report 05000390/93-31.

In this inspection, the inspectors evaluated whether any further actions were required for the Unit 2 construction completion project.

Specifically, the inspectors conducted interviews with responsible engineering staff and reviewed calculation WBNEEBMSTI070005, "125 VDC Protection and Coordination Calculation," Rev. 49, to verify specifications had been issued for properly sized 15 A fuses for the normal and alternate feed breakers for medium voltage switchgear (6.9 kV) Shutdown Boards. Also, EDCR 54797, "Install Fuses," Rev. A, was reviewed to verify design requirements had been issued to install the control circuit fuses for the 6.9 kV Shutdown Power and 480 V Shutdown Power systems in accordance with the tabulations in calculation WBNEEBMSTI070005.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that physical installations of the specific fuses of concern were to be accomplished and verified under the MFL SP that has been established for Unit 2 (Section OA.1.16 above).

c. Conclusions

The inspectors concluded that the applicable programmatic issues, including in part, upgrading the baseline calculations, revising the associated program procedure, and reconciling the design basis criteria documents were adequately dispositioned as documented in Inspection Report 50-390/93-31.

In addition, the inspectors determined that the necessary design corrections for Unit 2 have been adequately defined.

Future actions to accomplish physical verifications of correct fuse installations will be tracked as a task under the MFL SP. Based upon the inspection results, this CDR is closed for Unit 2.

### **OA.1.36 (Closed) TMI Action Item II.K.3.25: Power for Pump Seals**

#### a. Inspection Scope

Background: This TMI action requires the applicant to demonstrate an acceptable design incorporating the supply of emergency power or other design capability that will maintain cooling to the RCP seals for two hours during a loss of offsite power.

The inspectors reviewed Unit 2 construction design activities for compliance with TMI action item II.K.3.25 and NRC requirements. The inspectors evaluated whether the design was properly translated into design drawings, calculations, and other design documentation of electrical components and associated items for Unit 2.

Specifically, the inspectors reviewed design drawings 1-45W749-1A, "Unit 2 480V 2A1-A Single Line" Rev.37, and 1-45W749-3A, "Unit 2 480V 2B1-B Single Line" Rev.38, to verify that measures were established to maintain cooling to RCP seals. Diesel Generator Loading Analysis, EDQ000-999-2008-0014 Rev. 6, was reviewed to verify design requirements were specified and analyzed for adequacy.

#### b. Observations and Findings

No findings of significance were identified. The inspectors determined that the design drawings addressed the TMI action item by specifying the component cooling water systems to be automatically powered by the Emergency Diesel Generators (EDGs). This design provided a means to maintain cooling of the RCP seals in the event of loss of offsite power. The inspectors also determined from the review of the engineering documents that the Unit 2 design was identical to the Unit 1 design.

The inspectors' review of the Diesel Generator Loading Analysis determined that the EDGs would be automatically connected to their respective 6.9kV buses in response to a loss of offsite power, and in turn, would provide power to start the centrifugal charging pump and component cooling water pump loads within 35 seconds. This sequence would be sufficient to restore cooling flow to the seals.

In comparison, the inspectors noted that the Safety Evaluation by NRR of WCAP-15603, "WOG 2000 RCP Seal leakage Model for Westinghouse PWRs" Rev.1, and Westinghouse Technical Bulletin, TB-04-22 "RCP Seal Performance-Appendix R Compliance and Loss of All Seal Cooling" Rev.1, identified a reference value of thirteen minutes for the estimated time that Westinghouse RCP seal leakage begins to increase and when seal cooling must be restored to prevent cold thermal shock to the seal package.

#### c. Conclusions

The inspectors determined that the design of the emergency power for RCP seal cooling was completed and was sufficient to satisfy the scope of action described in the TMI action. The inspectors were able to obtain appropriate design documentation, drawings,

and calculations for Unit 2 to verify adherence to SAR commitments and requirements. Based on the inspection results this item is closed.

### **OA.1.37 (Closed) URI 391/89-08-02: Identification of Cable Damage (IP 51063)**

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

Background: An inspection in 1989 revealed the presence of several cuts, nicks, and other deformities on the cable insulation. These cables were designated for the Unit 2 Reactor Protection System, Channel D. These cables had been pulled out of their respective conduit by the applicant to evaluate a concern for potential damage due to burning and welding in the vicinity of the conduit. In addition to the damages identified above, the following foreign objects were found in the conduit:

- 200' length pull rope was found "balled-up" in the conduit.
- A 1-1/2" anchor bolt, 1/2" in diameter, with traces of the initial cable pull lubricant adhering to it.
- Pieces of broken cable. In one instance, a length of cable 15' long was found which had been abandoned but which retained a cable number identical to another cable located in the conduit.

The applicant's cable issues CAP, Rev. 1, dated June 27, 1989, did not clearly provide specific details that would have identified cable problems on Unit 2 that were similar to those noted above. The URI was closed for Unit 1 in Inspection Report 50-390/95-72.

The inspection scope was to review the methods implemented by TVA in resolving a number of cable damage issues identified by the NRC in during the construction of both Unit 1 and Unit 2 nuclear plants.

Specifically, the inspectors evaluated the adequacy of TVA's response to an NRC Open Item No. URI 390, 391/89-08-02, document T20 910925 858 dated 9/25/1991. The review included TVA's letters to the NRC dated June 15, 1990 and Oct 11, 1990, both addressing cable damage issues and the methodology planned to correct the conditions.

In addition, the inspectors reviewed MAI-3.2, "Cable Pulling for Insulated Cables Rated Up to 15,000 Volts," Rev. 0021, including Appendix I, "Preparation for Pulling Cables." To evaluate the possibility of adverse issues, the inspectors reviewed Watts Bar Nuclear Plant Special Trend Report, "Spare/Abandoned Cable Problems, Damaged Cable, Misrouted Cables and Undocumented Splices" Rev. 3.

#### **b. Observation and Findings**

No findings of significance were identified. The inspectors determined that procedures established for the cleaning and verification of proper conditions of the raceway prior to any cable installation were adequate.

The inspectors' review of corrective action trends observed that additional instances of cable damage had been identified by the applicant; however, in each case, the damage was caused by cable damage mechanisms that were not associated with the foreign material intrusion concerns of this URI. The inspectors verified that the other instances of cable damage were appropriately evaluated and dispositioned by the applicant staff using their corrective action process.

c. Conclusions

Trending of the cable damage issues was covered appropriately. The changes in the procedures and the staff awareness of this issue provided adequate assurance the cable damaged from foreign material intrusion had been properly addressed. The inspectors concluded that concerns, pertaining to this URI on cable damage, were appropriately addressed for Watts Bar Unit 2.

**OA.1.38 (Closed) Inspection Follow-up Item (IFI) 50-391/91-14-04: Resolution of CAQR WBP890497 - Failure to Control Lifted Cables and Wires per Approved Procedures or Drawings (IP 51065)**

a. Inspection Scope

The inspectors reviewed the corrective actions associated with IFI 91-14-4, "Resolution of CAQR WBP890497." The inspectors reviewed the PER that was issued to track this issue and portions of an associated work-plan, ICRDS cable record 2M770B, and the original Condition Adverse to Quality Report (CAQR) WBP890497.

b. Observations and Findings

No findings of significance were identified. The inspectors observed that the issue identified in CAQR WBP890497 was tracked by the applicant in PER 144122. In 1979, a cable pull record for cable 2-3M-3-770-B from 1978 was manually changed to indicate conduit MC424B, which was different from the original design indicating conduit MC427B. The PER description indicated that in 1990, DCN M-09215-A was issued to replace the cables as part of the resolution to address cable damage due to pullbys. Work Plan K-M09215A-1, which was associated with this DCN, routed cable 2-3M-3-770-B through Conduit MC 427B, the original conduit indicated in the cable pull record. The inspectors observed that the work package had the proper QC signoffs indicating that the routing of cable 2-3M-3-770-B was in accordance with the work plan. The ICRDS record indicated that the cable was routed through the original conduit MC 427B.

c. Conclusions

The inspectors determined that the issue was effectively tracked in the applicant's corrective action program and that the corrective actions implemented were adequate. Based on the inspection of these items, this IFI is closed.

**OA.1.39 (Closed) NCV 2010602-01: Protection of Safety-Related Cable During Construction Activities**

a. Inspection Scope

The inspectors reviewed the corrective actions associated with PERs 218287 and 217958. These PERs addressed NCV 2010602-01, which involved measures not being implemented to protect safety-related feeder cable 2PL4816A from physical damage.

b. Observations and Findings

No findings of significance were identified. The inspectors' review of the PER corrective actions identified that staff training had been implemented to reduce the possibility of a repeat to the problems observed. The corrective action documentation included cable repair data sheets (i.e. MAI 3.3, Data Sheet 6) that were part of WO 09-812367-010.

The documented repair work was in compliance with specification G-38, "Installation, Modification, and Maintenance of insulated Cables Rated up to 15,000 Volts," including the required approval from QC.

c. Conclusions

The inspectors determined that the issues were effectively tracked in the applicant's corrective action program and that the corrective actions implemented were adequate. Based on the inspection of these items, this NCV is closed.

**OA.1.40 (Closed) Follow-up to Safety Evaluation for Cable Jamming CAP Sub-issue; Cable Jamming and Controls on Power Assisted Cable Pulls (TI 2512/016 and IP 51065)**

a. Inspection Scope

Background: A provision of the NRC's Safety Evaluation which accepted TVA's proposed resolution for the cable jamming CAP sub-issue was that no power-assisted mechanisms would be used to install single conductor Class 1E cables (ADAMS ML 092151155). If power-assisted pulls occurred, this could possibly subject the cable to higher sidewall bearing pressures than allowed by manufacturer instructions or construction specifications.

The inspectors interviewed electrical construction field engineers to determine whether single conductor power assisted cable pulls had been performed since Unit 2 construction resumed. In addition, the inspectors reviewed MAI-3.2, "Cable Pulling for Insulated Cables Rated Up to 15,000 Volts" Rev. 21, to verify construction procedures prohibited power assisted cable pulls or if power assisted cable were needed, that proper controls were specified. The inspectors have completed numerous inspections of cable installation activities since resumption of Unit 2 construction and have not observed any power assisted cable pulls.

b. Observations and Findings

No findings of significance were identified. Based on review of cable installation procedures, interviews with electrical field engineers, and observations during inspections of cable installation activities, the inspectors determined that TVA has effectively restricted the use of power assisted cable pulls on single conductor cables, therefore avoiding jamming and exceeding the sidewall bearing pressure limits.

c. Conclusions

Follow-up inspection of the cable jamming CAP sub-issue and review of the controls associated with power assisted cable pulling confirmed that TVA has properly addressed this issue.

**OA.1.41 (Closed) NCV 05000391/2008010-001: Failure to Document a Cable Raceway Separation Non-Conforming Condition as Required by Procedure WDP-GEN-1.**

a. Inspection Scope

This item involved a failure by the applicant's inspection personnel to properly document a deviation from electrical separation criteria where a conduit containing electrical circuits in Division B was routed too close to a cable tray containing electrical circuits in

Division A. The inspectors reviewed the applicant's actions to develop and implement corrective actions as documented in PER 158979. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the applicant conducted a thorough evaluation of the extent of the condition, developed a corrected walk-down inspection record of additional nonconforming locations that had been identified, and provided detailed input to design engineering for reconciliation of the newly identified problem locations.

c. Conclusions

The inspectors determined that the applicant's actions were adequate to close this NCV.

**OA.1.42 (Closed) Replacement Items Program (RIP) CAP (TI 2512/027)**

a. Inspection Scope

The inspectors reviewed the applicant's implementation of the Replacement Items Program (RIP) CAP for Unit 2. This CAP was established to address the possibility of replacement items (e.g., gaskets, bearing sleeves) of indeterminate quality being installed in safety-related equipment on Unit 2. Because many replacement items are common to both units, a number of Unit 2 replacement items were evaluated under the Unit 1 RIP CAP. Consequently, the scope of the Unit 2 RIP CAP was limited to replacement items that were not evaluated by the Unit 1 CAP, i.e. are unique to Unit 2. To determine which replacement items met this criterion, TVA performed a 100% review of all replacement items identified in the Quality Release Logs (QRLs). Any items marked as procured for use in Unit 2 were scoped into the Unit 2 RIP CAP. Items that were procured for both units were compared against the Unit 1 RIP CAP Closure Report to verify that they had been evaluated under the Unit 1 RIP CAP. TVA also reviewed historical documents such as PERs and finding identification reports (FIRs) to search for additional references to items of indeterminate quality.

The inspectors evaluated the applicant's process for scoping items into the Unit 2 RIP CAP. Specially, the inspectors performed an independent review of the QRLs and compared the items listed in the QRLs with those described in the Unit 1 RIP CAP Completion Report. The inspectors also reviewed a sample of historical documents to verify that the applicant had appropriately identified any references to items of indeterminate quality.

For those items that were scoped into the Unit 2 RIP CAP, TVA performed an evaluation to determine the current status of the item. Items that had not been installed ("surplused") or were installed in non-safety-related equipment were not evaluated further. Items that were installed in safety-related equipment were analyzed to determine whether they had been procured in accordance with 10CFR50, Appendix B. The results of these analyses were captured in Procurement Engineering Group (PEG) packages.

The inspectors reviewed a sample of the PEG packages for which items were determined to have been surplused or installed in non-safety-related applications to verify that the applicant had characterized them appropriately.

In addition, the inspectors reviewed 100% of the PEG packages for items that were determined to have been installed in safety-related applications. The inspectors evaluated the applicant's conclusions by interviewing the TVA personnel who prepared the PEG packages and by performing an independent review of purchase specifications, contracts, certificates of conformance, certified material test reports, and other documentation used as justification that the items in question were procured in accordance with 10CFR50, Appendix B. TVA concluded that several installed items were unsuitable for use in safety-related applications. The inspectors reviewed PERs, work orders, and service requests associated with these items to confirm that they have been or are scheduled to be removed from service. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on the insights gained during this inspection, there is reasonable assurance that the Unit 2 RIP CAP has been adequately implemented.

**V. Management Meetings**

**X.1 Exit Meeting Summary**

On January 12, 2011, the resident inspectors presented the inspection results to Mr. Masoud Bajestani 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

B. Anders, Cable Pull Lead Electrical Field Engineer, Bechtel  
G. Arent, Licensing Manager, Unit 2  
M. Bajestani, Vice President, Unit 2  
M. Bali, Electrical Design Manager, Bechtel  
R. Baron, Nuclear Assurance Project Manager, TVA, Unit 2  
D. Beckley, Electrical Design Manager, Bechtel  
B. Briody, Maintenance and Modifications Manager, TVA, Unit 2  
A. Broussard, Bechtel Site Manager  
B. Crouch, Licensing Manager, TVA, Unit 2  
T. Damico, Westinghouse MSIP Project Manager  
L. Davenport, Contracts/Procurement Manager, TVA, Unit 2  
M. Easter, Westinghouse Joint Test Team Manager  
S. Eder, Engineer, Facility Risk Consulting (FRC)  
T. Franchuk, Quality Manager, Bechtel  
E. Freeman, Engineering Manager, TVA, Unit 2  
W. Goodman, Procurement Manager, Bechtel  
R. Goyal, Senior Civil Engineer, Bechtel  
D. Helms, Lead Engineer CAPs & SPs, TVA, Unit 2  
M. Hickey, Bechtel Project Manager  
S. Hilmes, Lead Electrical Engineer, TVA, Unit 2  
I. Khan, Electrical Engineer, Bechtel Design  
R. Kuhn, Quality Assurance Manager, Bechtel  
M. Lackey, ECP Rep, TVA, Unit 2  
B. Mahoney, Construction, Bechtel  
D. Malone, Quality Assurance, TVA, Unit 2  
J. Mitchell, Field Procurement Manager, Bechtel  
T. Moran, Use-As-Is Special Program Owner  
J. Moseley, Westinghouse Site Director  
R. Mullens, NuVision Vice President Field Services  
D. Myers, Quality Assurance Manager, TVA, Unit 2  
M. Pitre, Bechtel Lead Field Welding Engineer  
J. Robertson, Engineering Manager, Bechtel  
S. Sawa, Training Manager, Bechtel  
J. Schlessel, Construction Manager, TVA, Unit 2  
C. Stephenson, Licensing, TVA, Unit 2  
H. Stevens, Senior Civil Engineer, Bechtel  
T. Taylor, Lead Electrical Field Engineer, Bechtel  
D. Tinley, Quality Assurance, TVA, Unit 2  
O. Welling, Field Engineer, Bechtel  
R. White, Radiography Level III, TVA

## INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction
IP 35061	In-Depth QA Inspection of Performance
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 46053	Structural Concrete - Work Observation
IP 46071	Concrete Expansion Anchors
IP 48051	Structural Steel and Supports – Procedure Review
IP 48053	Structural Steel and Supports – Work Observation
IP 49053	Reactor Coolant Pressure Boundary Piping – Work Observation
IP 49055	Reactor Coolant Pressure Boundary Piping – Records Review
IP 49063	Safety-Related Piping - Work Observation
IP 50053	Reactor Vessel and Internals Work Observation
IP 50073	Mechanical Components – Work Observation
IP 50075	Safety-Related Components – Records Review
IP 50090	Pipe Support and Restrain Systems
IP 51051	Electrical Components and Systems – Procedure Review
IP 51053	Electrical Components and Systems Work Observation
IP 51055	Electrical Components and Systems – Record Review
IP 51063	Electric Cable – Work Observation
IP 51065	Electric Cable – Record Review
IP 52051	Instrument Components and Systems – Procedure Review
IP 52053	Instrument Components and Systems – Work Observation
IP 52055	Instrument Components and Systems – Record Review
IP 53051	Containment Penetrations (Mechanical)- Procedure Review
IP 55050	Nuclear Welding General Inspection Procedure
IP 55100	Structural Welding General Inspection Procedure
IP 57060	Liquid Penetrant Testing Examination
IP 57080	Ultrasonic Testing Examination
IP 57090	Nondestructive Examination Procedure Radiographic Examination Procedure Review/Work Observation/Record Review
IP 73053	Preservice Inspection – Observation of Work and Work Activities
IP 64051	Procedures - Fire Prevention/Protection
IP 92717	IE Bulletins for Information and IE Information Notice Followup
TI 2512/016	Inspection of Watts Bar Nuclear Plant Cable Issues Corrective Action Program
TI 2512/019	Inspection of Watts Bar Nuclear Plant Design Baseline Corrective Action Program Plan
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 Sensing Lines Corrective Action Program Plan
TI 2512/027	Inspection of Watts Bar Nuclear Plant Replacement Items Corrective Action Program Plan
TI 2512/032	Inspection of Watts Bar Nuclear Plant Welding Corrective Action Program Plan
TI 2512/035	Inspection of Watts Bar Nuclear Plant Control Room Design Review Special Program Plan
TI 2512/037	Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program Plan
TI 2512/041	Inspection of Watts Bar Nuclear Plant Radiation Monitoring System Special Program Plan
TI 2515/150	Reactor Vessel Head and Vessel Head Penetration Nozzles

TI 2515/160 Pressurizer Penetration Nozzles and Steam Space Piping Connections (NRC Bulletin 2004-01)  
 TI 2515/172 Reactor Coolant System Dissimilar Metal Butt Welds, Rev 1  
 TI 2515/174 Hydrogen Igniter Backup Power Verification

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

#### Opened

05000391/2010605-01	URI	Insufficient End Clearance Of A Two Piece Clamp (Section C.1.3)
05000391/2010605-02	URI	Implementation of the Piping Refurbishment Program (Section C.1.9)
05000391/2010605-03	NCV	Failure to Perform Adequate QC Inspection (Section C.1.11)
05000391/2010605-04	NCV	Failure to Identify A Nonconformance (Section C.1.11)
05000391/2010605-05	URI	Evaluation of Quality Control Acceptance of Nonconforming Cable Support Installation (Section C.1.15)

#### Discussed

2515/172	TI	Reactor Coolant System Dissimilar Metal Butt Welds (Section OA.1.1)
85-38	CDR	Containment Spray System Pipe Supports (Section OA.1.2)
2512/035	TI	Control Room Design Review (CRDR) Special Program (SP) (Section OA.1.3)
80-20	BL	Applicant Actions on Three Mile Island (TMI) Action Items and NRC Bulletin (Section OA.1.4)
II.D.3	TMI	Valve Position Indication of Acoustic Monitoring on PORVs (Section OA.1.5)
II.E.3.1	TMI	Emergency Power for Pressurizer (PZR) Heaters (Section OA.1.6)
II.G.1	TMI	Emergency Power Supplies for PZR Relief Valves, Block Valves, & Level Indicators (Section OA.1.7)

2515/174	TI	Back-up Power for Hydrogen Igniters (Section OA.1.8)
2512/032	TI	Welding CAP Sub-Issue: Radiographs for ASME Piping Welds (Section OA.1.9)
2512/019	TI	Design Baseline Verification CAP (Section OA.1.10)
2515/160	TI	Pressurizer Penetration Nozzles and Steam Space Piping Connections in U.S. Pressurized Water Reactors and BL 2004-01 (Section OA.1.11)
2512/016	TI	Electrical Cable Issue CAP - Sub Issue: Cable Supports in Vertical Conduit (Section OA.1.12)
2515/016	TI	Electrical Cable Issue CAP - Sub Issue: Cable Supports in Vertical Trays (Section OA.1.13)
2512/016	TI	Electrical Cable Issue CAP - Sub Issue: Cable Splices (Section OA.1.14)
05000391/87-19-06	URI	Non-Safety Related Cables in Close Proximity to Safety-Related Cables (Section OA.1.15)
2512/037	TI	Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (Section OA.1.16)
2512/041	TI	Inspection of Watts Bar Nuclear Plant Radiation Monitoring System Special Program (Section OA.1.17)
86-11	CDR	Thermal Expansion of Liquid Sample Piping (Section OA.1.18)
78-04	BL	Environmental Qualification of Certain Stem Mounted Limit Switches inside Reactor Containment (Section OA.1.19)
2515/150	TI	Reactor Pressure Vessel Head and Vessel Head Penetration Nozzles (Section OA.1.20)
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.1.21)

Closed

48051	IP	Structural Steel and Supports – Procedures Review (Section OA.1.22)
53051	IP	Containment Penetrations (Mechanical) – Procedures Review (Section OA.1.23)
82-01	CDR	Excessive Movement of Containment Penetration Bellows (Section OA.1.24)
82-11	CDR	Design of HVAC Penetrations in Containment (Section OA.1.25)
80-21-06	CDR	Incorrect Valve Weights in Auxiliary Feedwater Piping (Section OA.1.26)
85-07	CDR	Incorrect relief valve thrust loads in the Safety Injection System Piping (Section OA.1.27)
82-55	CDR	Concrete Anchorage Free Edge Violation (Section OA.1.28)
2512/016 Sub-Issue	TI	Electrical Cable Issue CAP - Sub-issue: Cable Jamming (Section OA.1.29)
74-15	BL	Misapplication of Cutler-Hammer (Eaton) 3-position Maintained Switch Model 10250T (Section OA.1.30)
79-21	BL	Temperature Effects on Level Measurements (Section OA.1.31)
85-17	CDR	Redundant tripping devices for containment penetration circuits not provided (Section OA.1.32)
85-24	CDR	Non-independent power supply to auxiliary feedwater (AFW) pumps (Section OA.1.33)
85-32	CDR	Potential Excessive Reactor Vessel Level Instrumentation Indication Errors (Section OA.1.34)
92-10	CDR	Inadequate design control measures (Section OA.1.35)
II.K.3.25	TMI	Power for Pump Seals (Section OA.1.36)
05000391/89-08-02	URI	Identification of Cable Damage (Section OA.1.37)

05000391/91-14-04	IFI	Resolution of CAQR WBP890497 - Failure to Control Lifted Cables and Wires per Approved Procedures or Drawings (Section OA.1.38)
05000391/2010602-01	NCV	Protection of Safety-Related Cable During Construction Activities (Section OA.1.39)
Safety Evaluation (ML092151155)	OTHER	Follow-up to Safety Evaluation for Cable Jamming CAP - Sub-issue: Single Conductor Power Assisted Cable Pulls (Section OA.1.40)
05000391/2008010-001	NCV	Failure to Document a Cable Raceway Separation Non-Conforming Condition as Required by Procedure WDP-GEN-1(Section OA.1.41)
2512/027	TI	Replacement Items Program CAP (Section OA.1.42)

## LIST OF DOCUMENTS REVIEWED

### I. Quality Assurance Program

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

##### Procedures/Programs

25402-MGT-0003, Corrective Action Program, Revision (Rev.) 5

##### QA Audits and Surveillances

25402-WBN-SR-10-1263, HAAUP CAP Review – Small bore pipe supports  
 25402-WBN-SR-10-1279, I&C work order closure review  
 25402-WBN-SR-10-1294, Refurbishment of Valve, 2-TV-77-506  
 25402-WBN-SR-10-1304, EDCR 52582 closure  
 25402-WBN-SR-10-1312, In-process reactor coolant system pipe supports  
 25402-WBN-SR-10-1314, Feedwater support modification workorder documentation  
 25402-WBN-SR-10-1315, Instrument tube bending and installation  
 25402-WBN-SR-10-1316, RHR heat exchanger material storage controls  
 25402-WBN-SR-10-1317, Cable abandoning in North Fan Room  
 25402-WBN-SR-10-1318, Nuclear work process procedures deviation implementation by construction  
 25402-WBN-SR-10-1319, Structural welding  
 25402-WBN-SR-10-1321, Residual Heat Removal  
 25402-WBN-SR-10-1331, Pipe support calculation review

### II. Management Oversight and Controls

#### C.1.5 Structural Concrete – Work Observation (IP 46053)

##### Procedures

TVA Procedure MAI-5.10 “Concrete Placement, Surface Preparation, Placing, Finishing, Curing, and Testing,” Rev. 5  
 TVA Procedure MAI-5.4 “Concrete Removal, Repair, Grouting, and Dry Packing,” Rev. 11

##### Engineering Document Construction Release (EDCR)

EDCR 53554, “Install power and control cables for Flow control Valves 2-FCV-67-89-A, 2-FCV-67-97-A, 2-FCV-67-105-B, 2-FCV-67-113-B,” Rev. A

##### Unit 2 Specifications

General Engineering Specification G-2, “Plain and Reinforced Concrete,” Rev. 8  
 General Engineering Specification G-34, “Requirements for Repair of Concrete during Construction, Modification, Modification and Maintenance,” Rev. 7

#### C.1.6 Structural Steel and Supports – Work Observation (IP 48053 and 55100)

Procedures and Qualifications Records

25402-000-4MP-T040-S0036, Welding Standard Documentation of Welds WD-1, Rev. 6  
 25402-000-4MP-T040-S0049, Technical Specification for Welding Filler Metal WM-E7018(CVN), Rev. 1  
 25402-000-4MP-T040-S0051, Technical Specification for Welding Filler Metal WM-E8018-B2(CVN), Rev. 0  
 25402-000-4MP-T040-S0055, Technical Specification for Welding Filler Metal WM-E9018-B3(CVN), Rev. 1  
 25402-000-4MP-T040-S0079, Welder Performance Qualification Specification WQ-2, Rev. 1  
 25402-000-4MP-T040-S0133, Nondestructive Examination Standard VT-AWS D1.1, Rev. 2  
 25402-000-4MP-T040-S0203, UT-AWS D1.1, Rev. 1  
 25402-000-4MP-T040-W0724, Welding Procedure Specification P1-A-Lh (Structural-Plug/Slot), Rev. 1  
 25402-000-GPP-0000-N3701, Construction Completion Project Procedure, Rev. 3  
 25402-000-GPP-0000-N3221, Structural Steel Erection, Rev. 3  
 25402-000-GPP-0000-N6104, Materials Receiving, Rev. 5

Modification/Addition Instruction

MAI 5-2, Bolting For Structural Connections, Rev. 7  
 MAI 5-9, Fabrication and Installation of Structural and Miscellaneous Steel, Rev. 8

General Engineering Specifications

PS 4.M.4.4, G-29B-S01: ASME Section III and Non-ASME Section III (Including AISC, ANSI B31.1, and B31.5) Bolting Material, Rev. 5

Bechtel Certified Material Test Reports

CMTR E7018H4R Heat Number 080538  
 CMTR E7018H4R Heat Number 083295  
 CMTR E7018H4R Heat Number A900317  
 CMTR E7018H4R Heat Number C77369  
 CMTR E7018H4R Heat Number A900319  
 CMTR E7018H4R Heat Number 073055  
 CMTR E7018H4R Heat Number 31347  
 CMTR E7018H4R Heat Number 10439  
 CMTR E7018H4R Heat Number C78286  
 CMTR E7018H4R Heat Number 090112

Problem Evaluation Reports (PERs) and Service Requests (SRs)

SR 262746  
 SR 262930  
 SR 261613  
 PER 264643  
 PER 248149

Others

Welding Procedure Qualification Records: 1109, 1110, 1111, 1112  
 WB2CCP, Material Receiving Instruction Attachment D for PO 160694, item No. 6  
 Consolidated Power Certification for P.O. No. 160694, Dated 9/30/10  
 Steel Dynamics Test and Inspection Report No. 97741-0, Dated 7/20/10  
 Material Traceability and Transfer Record for WO 08-954513-011  
 Material Traceability and Transfer Record for WO 09-954482-001

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

#### Procedures

TVA Procedure MAI-5.1B "Wedge Bolt (WB) Anchor Installation," Revision (Rev.) 19  
 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 Specifications

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

#### TVA Design Criteria Document

WB-DC-40-31.9, "Criteria for Design of Piping Supports and Supplemental Steel in Category I Structures," Rev. 21  
 WB-DC-40-31.7, "Analysis of Category I and I(L) Piping Systems," Rev. 23

### **C.1.12 Electrical Components and Systems – Procedure Review (IP 51051) and Instrument Components and Systems – Procedure Review (IP 52051)**

#### Procedures and Programs

25402-000-GPP-0000-N6102, Bechtel Field Material Requisition and Purchasing, Rev. 0015  
 25402-000-GPP-0000-N6104, Bechtel Material Receiving, Rev.0005  
 GTE-02, Scheme Verification, Rev 0  
 NPG-SPP-03.1, Corrective Action Program, Rev. 0001  
 NPG-SPP-04.2, Material Receipt and Inspection, Rev. 0000  
 NPG-SPP-04.3, Material Storage and Handling, Rev. 0000  
 NPG-SPP-09.3, Plant Modification & Engineering Change Control, Rev. 0001

### **C.1.13 Electrical Components and Systems - Work Observation (IP 51053)**

#### Problem Evaluation Reports (PERs) and Service Requests (SRs)

PER 245251, BSL indicates AD drawing 0123D3645 for contact 84376 is Revision 901  
 PER 286370, Work Order did not Contain Instructions for Removal of Limit Switch  
 SR 285330, Repair Damaged Conduit at Penetration 293-049-G

#### Procedures and Programs

25402-000-GPP-0000-N1206, Work Order Processing, Rev. 12

## MAI-3.8, Installation of Electrical Components, Rev. 6

Design Control Documents

DCN-F-17798-A, Delete Cable Numbers and Reassign Cable Numbers from Splice to Pressurizer Heaters, Rev. 1  
 EDCR 53760, Work scope #2: Pressurizer Heater Ammeter Circuits, Rev. A  
 EDCR 54103, Work scope #2: Replacement of Circuit Breakers in Pressurizer Heater Distribution panels, Rev. A  
 EDCR 54179, Pressurizer Backup Heater Groups 2A and 2B Electrical Connection Diagram Changes for Addition of Cable Splice Boxes, Rev. A  
 FCR 55830-A, Incorporate Electrical Commodities and Revisions of EDCR 54179

Work Control Documents

10674500, Safety Injection System Boron Injection Tank Inlet Shutoff Valve  
 110717830, CCWP 2A Suction Valve  
 110717889, CCWP 2B Suction Valve  
 110717948, CCWP 2C Suction Valve  
 110822690, Control Air System Flow Control Valves  
 110836759, Safety Injection Pump  
 110842866, Containment Electrical Penetration Assembly  
 110870184, Safety Injection System Accumulator Fill Line Isolation Valve  
 110958240, Containment Electrical Penetration Assembly  
 110958531, Containment Electrical Penetration Assembly  
 110958541, Containment Electrical Penetration Assembly  
 111070697, Ice Condenser System Outlet Isolation Valve

Procurement Documents

25402-011-MRA-ENA1-00001, Rev. 0, Technical Bid Evaluation of Pressurizer Heater Breaker Panels, 480VAC  
 25402-011-MRA-EMP8-00001, Rev. 0, Pressurizer Heater Panel Assembly  
 25402-011-MRA-EMCO-00001, Rev. 0, Pressurizer Heater Current Transformer  
 PO 111601, Panel Assembly of Pressurizer Heater  
 PO 113448, Current Transformer of Pressurizer Heater  
 PO 130629, Power Distribution Panel of Pressurizer Heaters

**C.1.14 Electrical Components and Systems – Record Review (IP 51055)**Design Control Documents

1-45W749-1A, rev.37, "Unit 2 480V 2A1-A Single Line"  
 1-45W749-3A, rev.38, "Unit 2 480V 2B1-B Single Line"  
 EDCR 53287, Rev. A, Replace safety-related Class 1E MCC buckets and feeder breakers in existing compartments of MCC 480V Reac MOV BD 2A1-A  
 EDCR 53292, Rev. A, Replace safety-related Class 1E MCC buckets and feeder breakers in existing compartments of MCC 480V Reac MOV BD 2B1-B  
 EDCR 53756 Rev. A, System 068 I&C wrap EDCR for instrumentation in Rx Building, Work Scope #: 3-Replace PRZR PORVS  
 EDQ000-999-2008-0014 rev. 6, Diesel Generator Loading Analysis, 10/4/10

FCR-56292-A, Pressurizer PORVs, 8/13/10

Procurement Documents

25402-011-MRA-EY00-00009, Rev.0, Conduit Seals, Sealing Tape

Work Control Documents

WO: 09-954-102-004, Installation and Verification of Hand-switches

Procedures and Programs

25402-000-GPP-0000-N1206, Rev.12, Bechtel Work Order Processing Procedure, 10/8/10  
 MAI 3.3, Rev. 27, Cable Terminating, Splicing, & Testing for Cables Rated up to 15kV, 12/3/10  
 NPG-SPP-09.3 Rev. 0001, Plant Modification & Engineering Change Control, 10/8/10

Miscellaneous Documents

Safety Evaluation by NRR of WCAP-15603 rev.1-“WOG 2000 RCP Seal leakage Model for Westinghouse PWRs”, 5/20/03

Westinghouse Technical Bulletin, TB-04-22 rev. 1- “RCP Seal Performance-Appendix R Compliance and Loss of All Seal Cooling”, 8/9/05

TVA Letter to NRC “TVA Nuclear Mitigation Strategy Assessments and Closure Process for Phases 1, 2, & 3”, 2/26/07

TVA Letter to NRC “TVA Nuclear Supplemental Response- Mitigation Strategy Assessments and Closure Process for Phases 1, 2,&3”, 6/29/07

TVA Letter to NRC, “WBN Unit 2-Strategy Assessments and Closure Process for Phases 1, 2, & 3”, 10/14/10

**C.1.17 Concrete Expansion Anchors (IP 46071, 50090, and 51053)**

Procedures

MAI 5.1B, Wedge Bolt (WB) Anchor Installation, Rev. 19

Forms

Wedge Bolt (WB) Anchor Installation Data Sheet for Lot Numbers 110879601-100, 110879601-101, and 110879601-98

Wedge Bolt (WB) Anchor Installation Data Sheet for Conduit No. 2VC9545B, Lot Numbers 111567926-323, and 110879601-529-F56277A

Wedge Bolt (WB) Anchor Installation Data Sheet for Conduit No. 2VC9564B, Lot Numbers 111567968-388, and 110879601-518-F56277A

**C.1.18 Liquid Penetrant Examination of Safety Related Welds (IP 57060)**

NDE Reports

PT-162, weld 2-063B-D197-14

PT-190, weld 2-063C-T007-01C1R0

PT-199, weld 2-062B-T284-43

Misc Documents

PT (SR)-ASME, Revision (Rev.) 6

PER 225309, Historical PER: Foreign Material in Weld 2-063B-D197-11 by Primary and Backup Radiograph, 4/10/2010

WO 110935459, CCM PER 170933 SYS 063 2-PIPE-063-A ASME III

SR 251535, Through-wall Excavation Missed Weld due to Error in Layout of RT Repair Location for Weld 2-063B-D197-11, 9/15/2010

PER 252153, Through-wall Excavation Missed Weld due to Error in Layout of RT Repair Location for Weld 2-063B-D197-11, 9/16/2010

FSK-M-3071, Repair Weld 2063BD197-11 Isometric, Rev. 1

Drawing 47W435-14, Mechanical Safety Injection System Piping, Rev. 19

Drawing 47W811-1, Flow Diagram Safety Injection System, Rev. 4

Nondestructive Examination Request (WR-10) for WO-09-951671-003, Item CVCS 062, 12/4/10

**C.1. 19 Radiographic Examination Procedure Review (IP 57090)**Procedures

Bechtel procedure 25402-000-4MP-T040-S0126, "Nondestructive Examination Standard Radiographic Examination RT-ASME/ANSI Piping," Rev. 3

Work Orders

WO 111033394, Unit 2 Fuel Transfer Tube Repair per DCN 52660 Stage 2

WO 08-953311-000, Review of Work Controls for Removal of Valve 2-FCV-070-0143-A

**C.1.20 Structural Welding General (IP 55100)**PERs (Problem Evaluation Reports) and SRs (Service Requests)

SR 277153 "Incorrect weld filler material issued and used"

PER 257059

PER 253422

PER 257290

Others

Quality Surveillance, "Structural Welding Performance" Number 25402-WBN-SR-10-1319

**III. Operational Readiness Activities****F.1 Fire Protection (IP 64051)**Procedures and Standards

SPP-10.10, Control of Transient Combustibles, Rev. 4

SPP-10.11, Control of Ignition Sources, Rev. 3

SPP-10.9, Control of Fire Protection Impairments, Rev. 2W1

TI-210, Fire Protection Engineer Periodic Inspection, Rev. 0

### Service Request

SR 248965 Temporary power cables tied to fire header, September 10, 2010

### Work Orders (WOs)

WO 901220, Bechtel Procedure N2102, November 24, 2009  
 WO 09-954482-001, Install Platform 48W905-02PF05U2  
 WO 09-821865-000, Fire Extinguisher Inspection PMUG 0619V

### Others

WBN 0-FPS-510-0001A, Preventive Maintenance Instruction: Portable Fire Extinguishers Inspection (Package A). Revision 11

## **IV. Other Activities**

### **OA.1.1 Reactor Coolant System Dissimilar Metal Butt Welds (TI 2515/172, Rev 1)**

#### Procedures

Procedure PI-901210-02, Instructions for Marking Dissimilar Metal Weld Centerline on the Reactor Vessel Hot and Cold Leg Nozzles for MSIP at Watts Bar Unit 2, 10/13/2010  
 Procedure PI-901210-01, Watts Bar Unit 2 MSIP Reactor Vessel Inlet and Outlet Nozzles, 10/13/2010

#### Work Orders/Travelers

Traveler 901210-01, Inlet Nozzle Loop 1 Weld No. N-12-SE (Cold Leg) MSIP, Rev. 0  
 Traveler 901210-02, Outlet Nozzle Loop 1 Weld No. N-16-SE (Hot Leg) MSIP, Rev. 0  
 Traveler 901210-03, Inlet Nozzle Loop 2 Weld No. N-11-SE (Cold Leg) MSIP, Rev. 0  
 WO 111350955, Perform MSIP on Reactor Vessel Hot and Cold Leg Nozzles, Rev. 0

#### Problem Evaluation Reports (PER), Service Requests (SR), Nonconformance Reports (NCR)

PER 227824, Error in Weld Operation Sheets for the Reactor Vessel Safe End to RCS Piping Welds, 04/30/2010  
 NCR 901210-04, MSIP Tool Placement Out of Tolerance, 11/06/2010  
 SR 278430, Administrative Procedure Error, 11/04/2010  
 SR 278761, QC Hold Point Bypassed, 11/04/2010

#### Other

MSIP Parameters For RV Hot Leg and Cold Leg Nozzle to Safe End Weld, Rev. 0  
 PCI Calibrated M&TE List and Certificates of Calibration for MSIP, 10/27/2010  
 Report No. 4664-4-002, Analytical Verification of MSIP for RV Cold Leg Nozzle to Safe End Weld Watts Bar Unit 2, Rev. 0

Report No. 4664-4-001, Analytical Verification of MSIP for RV Hot Leg Nozzle to Safe End Weld  
Watts Bar Unit 2, Rev. 0

**OA.1.2 Construction Deficiency Report 391/85-38: Containment Spray System Pipe Supports (IP 50090, 37005, and TI2512/023)**

TVA Design Criteria Document

WB-DC-40-31.7, "Analysis of Category I and I(L) Piping Systems," Rev. 23

Drawings

Isometric Drawing 2-47W-437-204A Rev. 0 Containment Spray Piping System  
Isometric Drawing 2-47W-437-204B Rev. 0 Containment Spray Piping System  
Isometric Drawing 2-47W-432-206 Rev. 0 Containment Spray Piping System  
Isometric Drawing 2-47W-437-205A Rev. 0 Containment Spray Piping System

Walkdown Packages

Walk down Package No. WBN2-PD-072-1613-29 Piping System Hanger for N3-72-03A  
Calculation Hanger Number 47A437-5-45

Calculations

Calculation Calculations for pipe support No. 47A437-5-45 Rev. 3,  
EDMS/RIMS No. B41850321977

**OA.1.3 Control Room Design Review (CRDR) Special Program (TI 2512/35)**

EDCR 52361, MCR Panel 2-M-4, Rev. A  
EDCR 52362, MCR Panel 2-M-5, Rev. A  
EDCR 52363, MCR Panel 2-M-6, Rev. A  
DCN P-03373, Replace Beckman Controllers in AFWS, Rev. B  
EDCR 52343, Installing Foxboro SPEC200 Controllers, Rev. A  
DWG 2-47W605-53, Electrical Layout of Control Board Panel 2-M-4, Rev.0  
DCN P-05483, CRDR Upgrade of Annunciation System, Rev. B  
EDCR 52315, Replacing the Existing U2 MCR Statalarm Analog Annunciation System, Rev. A  
DCN P-03021, CRDR Implementation for Panel 1-M-6, Rev. F  
DWG 1-47W605-54, Electrical Layout of Control Board Panel 1-M-6, Rev. 0  
DWG 2-45B640-49, Boric Acid Blender Switch Contact Development

**OA.1.5 TMI Action Item II.D.3 - Valve Position Indication of Acoustic Monitoring on PORVs (IP 52055)**

Design Control Documents

EDCR 53760, Work scope #3: Acoustic Position Monitoring for RCS PORVs, Rev. A

Procurement Documents

25402-011-MRA-HAYS-00002, Rev.1-4, Acoustic Monitoring System

PO 127959, Acoustic Monitoring System

**OA.1.9 Welding CAP Sub-Issue: Radiographs for ASME Piping Welds (TI 2512/032, IP57090)**

RT-ASME III report # 91 WO# 10-951189-000

**OA.1.12 Cable Issues Correction Action Plan Sub-Issue: Cable Supports in Vertical Conduit (IP 51065 and TI 2512/016)**

PER 144105, Class 1E Cables Installed in Long Vertical Conduit Runs Do Not Have Cable Supports Installed Per the Required Spacing, 5/3/2008

PER 145108, SCAR Initiated Due To Repetitive Problems Associated With Support of Cable, 5/14/2008

EDQ00299920090003, Evaluation and Disposition of U2 Class 1E Cables for Support in Vertical Conduits and Cable Trays, Rev. 000

EDCR 55116, Support Cables in Vertical Trays and Conduits Identified by Calculation EDQ 00299920090003, Rev. A

G-38, Installation, Modification and Maintenance of Insulated Cables Rated Up To 15,000 Volts, Rev. 20 through Specification Revision Notice SRN-G-38-201

WB-DC-30-22, Electrical Raceways, Rev. 7

DG-E13.1.1, Cable Pull-Point Locations and Support Locations,

25402-SA-ENG-10-08, Cable Support in Vertical Conduit Self-Assessment, 6/27/2010

25402-WBN-SR-09-0751, Cable CAP – Support in Vertical Conduits and Cable Trays, 11/12/2009

National Electric Code Article 300.19, Supporting Conductors in Vertical Raceways, 1987

**OA.1.13 Cable Issues Correction Action Plan Sub-Issue: Cable Supports in Vertical Trays (IP 51065 and TI 2512/016)**

PER 144052, Class 1E Cables Installed In Long Vertical Cable Tray Runs Do Not Have Supports Installed Per Required Spacing, 5/3/2008

PER 145108, SCAR Initiated Due To Repetitive Problems Associated With Support of Cable, 5/14/2008

EDQ00299920090003, Evaluation and Disposition of U2 Class 1E Cables for Support in Vertical Conduits and Cable Trays, Rev. 000

EDCR 55116, Support Cables in Vertical Trays and Conduits Identified by Calculation EDQ 00299920090003, Rev. A

G-38, Installation, Modification and Maintenance of Insulated Cables Rated Up To 15,000 Volts, Rev. 20 through Specification Revision Notice SRN-G-38-201

WB-DC-30-22, Electrical Raceways, Rev. 7

DG-E13.1.1, Cable Pull-Point Locations and Support Locations,

25402-SA-ENG-10-09, Cable Support in Vertical Trays Self Assessment, 6/27/2010

25402-WBN-SR-09-0751, Cable CAP – Support in Vertical Conduits and Cable Trays, 11/12/2009

National Electric Code Article 300.19, Supporting Conductors in Vertical Raceways, 1987

**OA.1.14 TI 2512/016 Electrical Cable Issue CAP - Sub-issue: Cable Splices (IP 51063)**

Procedures and Programs

MAI-3.2 "Cable Pulling for Insulated Cables Rated up to 15,000 Volts," Rev. 21  
 MAI-3.3 "Cable Terminating, Splicing, and Testing for Cables Rated Up to 15,000 Volts," Rev. 0027

#### Design Control Documents

EDQ00299920090007, Evaluation of Unit 2 Class 1E Splices in Mild and Harsh Environment, Revision 000

WB-DC-30-5, Nuclear Power Group Design Criteria Document – Power, Control, and Signal Cables for Use in Category I Structures – (Unit 1 / Unit 2), Rev. 0022

G-38, TVA General Engineering Specification - Installation, Modification, and Maintenance of Insulated Cables Rated Up to 15,000 Volts, Rev. 0020

G-40, TVA General Engineering Specification – Installation, Modifications and Maintenance of Electrical Conduit Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting and Miscellaneous Systems, Rev. 15

DS-E13.6.2, TVA Electrical Engineering Design Standard – Use of Conduit Bodies in Conduit Systems

#### Work Control Documents

WO 110958372, Install Splices for Cable 2V6396B at Penetration 2-PENT-293-0052B

#### **OA.1.16 Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (TI 2512/037)**

#### Procedures and Programs

OPDP-7, Fuse Control, Rev.4

SMP-6.0, Watts Bar Nuclear Plant Unit 2 Administration, Conduct and Test Results Processing of Generic Test Instructions, Rev. 1

#### **OA.1.17 Inspection of Watts Bar Nuclear Plant Radiation Monitoring System Special Program (TI 2512/041)**

#### Problem Evaluation Reports (PERs) and Service Requests (SRs)

PER 143931, Design Input requirements not properly established for the RMS

#### Design Control Documents

EDCR 2-52340, Modifications of U2 Turbine Building RMS Loops, Rev A

EDCR 2-53241, Modifications of U2 Rx Building / Auxiliary Building RMS Loops, Rev A

#### Miscellaneous Documents

25402-SA-ENG-10-014, Focus Self Assessment for the RMS SP Plan

WB-DC-40-24, Rev 21, Radiation Monitoring (Unit 1/Unit 2)

WB-DC-30-4, Rev. 20, Exception No. EX-WB-DC-30-4-38, Rev. 5

#### **OA.1.20 Reactor Pressure Vessel Head and Vessel Head Penetration Nozzles (TI**

**2515/150, Rev. 3)**Procedures/Programs

Areva, ID Automated Ultrasonic Examination of Small Bore Dissimilar Metal Welds, Rev. 0 (54-ISI-824-000)  
 Areva, Automated Ultrasonic Examination of RPV Closure Head Penetrations Containing Thermal Sleeves, Rev. 5 (54-ISI-603-05)  
 Areva, Written Practice for the Qualification and Certification of NDE Personnel, Rev. 14 (54-ISI-30-014)  
 Areva, Administrative Procedure for Processing Nondestructive Examination Data, Rev. 31 (54-ISI-69-31)  
 Areva, Vision Test Procedure, Rev. 4 (54-ISI-29-04)  
 Areva, Visible Solvent Removable Liquid Penetrant Exam procedure, Rev. 44 (54-ISI-240-44)  
 Areva, Automated Ultrasonic System Linearity Measurements, Rev. 0 (54-ISI-842-00)  
 Areva, Software Configuration Control for R/D Tech and ZETEC Ultrasonic Software, 22164-9 Rev. 1  
 Areva, USA Blade Tool Operating Instruction, 22164P-11  
 Areva, Automated Ultrasonic Examination of Open Tube RPV Head Closure Head Penetrations, Rev. 9 (54-ISI-604-009)  
 Areva, NDE/QC Personnel Eye Examination Procedure, IEP-301, Rev 2, 2/5/08  
 Areva, Automated Ultrasonic Examination of RPV Closure Head Small Bore Penetrations, Rev. 5 (54-ISI-605-05)  
 URS Washington Division Procedure NDE-1, Rev. 20, Procedure for Training, Examination and Certification of Nondestructive Examination Personnel  
 TVA, Liquid Penetrant Examination of ASME and ANSI Code Components and Welds, Rev. 34  
 TVA, Qualification and Certification Requirements for TVA Nuclear Power Group (NPG) Nondestructive Examination Personnel, IEP-200, Rev. 11  
 TVA, NDE/QC Personnel Eye Examination Procedure, IEP-301, Rev. 2

Inspection Records

Areva RPV Head Penetration UT Data Sheets: CRDM Penetration 10, AHA Penetration 3  
 Areva RPV Head Penetration PT Data Sheet: JTS12310  
 TVA RPV Head Penetration PT Exam Reports: R-P-1008, R-P-1009, R-P-1010, and R-P-1011

Calibration Records

Areva, Temperature Meter, VH-10916  
 Areva, White light meter, VH-11833  
 TVA, Temperature Meter, 164997  
 TVA, White light meter, E31639

Qualification Records

Areva UT Level III, ID H9017  
 Areva UT Level II, ID J4369  
 Areva UT Level II, ID B4738  
 Areva PT Level II, ID S2381

TVA PT Level II, ID 2YMXFPQOQ  
WGI PT Level II, ID 46505

### Drawings

DRWG No. 30738.1539, Closure Head Assembly CRD Housing  
Areva Drawing No. 8023988 B, Rev. 3, Watts Bar Unit 1&2 RV Head Map  
Areva Drawing No. 6038273 B, Rev. 1, Bottom-Up UT Tooling AHA Coverage Plan

### Material Certifications

Magnaflux Cleaner (SKS-S), batch#09B02K  
Magnaflux Cleaner (SKS-S), batch#10E03K  
Magnaflux Developer (SKD-S2), batch#08M24K  
Magnaflux Penetrant (SKL-SP1), batch#09B06K  
Magnaflux Penetrant (SKL-SP1), batch#08G14K

## **OA.1.21 IE Bulletin 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**

### Miscellaneous

Mechanical Equipment List for System 067 (Essential Raw Cooling Water)  
Technical Evaluation No. WBC5330-3-07, Gaskets, Sheet Gasketing, Packing, Seals, and O-Rings (Non 10CFR50.49) Without Halogen and Sulfur Content Testing, Rev. 0  
CAQR WBP880236, 1-CKV-067-565B Flapper Assembly Hold-Down Bolt Failure, dated 03/18/1988  
DCN P-01180-B, Replace Flapper Assembly Hold-Down Bolts, dated 02/09/1995

### Bechtel Work Orders

08-953538-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0565A-A  
08-953539-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0565B-B  
08-953549-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0568B-B  
08-953548-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0568A-A  
08-953553-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0568C-A  
08-953558-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0568D-B  
08-953565-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0571A-A  
08-953567-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0571B-B  
08-953573-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0571C-A  
08-953574-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0571D-B  
08-953584-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0580A-A  
08-953585-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0580B-B  
08-953591-000, Replace Flapper Assembly Hold-Down Bolts for WBN-2-CKV-067-0580D-B

## **OA.1.26 Construction Deficiency Report (CDR) 391/80-21-06: Incorrect Valve Weights in Auxiliary Feedwater Piping**

TVA Design Criteria Document

WB-DC-40-31.7, "Analysis of Category I and I(L) Piping Systems," Rev. 23

Drawings

Drawing CP1-9-175 Rev B902 Masoneilan 4" Control Valve  
 Drawing CP 40-8-98 Rev 0 Masoneilan 3" Control Valve  
 Drawing Revision Authorization (DRA) No. 56138-065 Piping Support Modification  
 Isometric Drawing 2-47W4278-207 Rev. 1 Auxiliary Feed water System  
 Isometric Drawing 2-47W427-208 Rev. 0 Auxiliary Feed water System  
 Isometric Drawing 2-47W427-217 Rev. 0 Main Feed Water Supply and Auxiliary Feed water  
 Isometric Drawing 2-47W427-216 Rev. 0 Main Feed Water Supply and Auxiliary Feed water  
 Isometric Drawing 2-47W427-207 Rev. 1 Auxiliary Feed water System  
 Isometric Drawing 2-47W427-233 Rev. 1 Auxiliary Feed water System  
 Isometric Drawing 2-47W427-210 Rev. 0 Auxiliary Feed water System

Walkdown Packages

Walk down Package No. WBN2-PD-003-024-00 Rev. 1 Piping System for Analysis N3-031-16A  
 Walk down Package No. WBN2-PD-003-028-00 Rev. 2 Piping System for Analysis N3-032-20-A  
 Walk down Package No. WBN2-PD-003-026-00 Rev. 3 Piping System for Analysis N3-03-18A  
 Walk down Package No. WBN2-PD-003-029-00 Piping System for Analysis N3-03-21A  
 Walk down Package No. WBN2-PD-003-023-00 Rev. 2 Piping System for Analysis N3-03-15A

Calculations

Calculation Summary of piping analysis Problem No. N3-03-18A Rev. 4, EDMS/RIMS No. CEB811215011, EDMS Accession No. T93100302040, 2/25/10  
 Calculation Summary of Summary of piping analysis Problem No. N3-03-21A Rev. 3, EDMS/RIMS No. T95090123801, EDMS Accession No. T93091217004, 12/14/09  
 Calculation Summary of Piping analysis Problem No. N3-03-16A Rev. 5, EDMS/RIMS No. CEB810508050, EDMS Accession No. T93100129006  
 Calculation Summary of piping analysis Problem No. N3-03-20A Rev. 2, EDMS/RIMS No. B41850426954, EDMS Accession No. T93090930008, 9/25/09  
 Calculation Summary of piping analysis Problem No. N3-03-15A, EDMS/RIMS No. CEB 810804014

**OA.1.27 Construction Deficiency Report (CDR) 391/85-07: Incorrect relief valve thrust loads in the Safety Injection System Piping**TVA Design Criteria Document

WB-DC-40-31.7, "Analysis of Category I and I(L) Piping Systems," Rev. 23  
 Analysis Check list included in WBN-RAH-510 of the WBN Rigorous Analysis Handbook

Drawings

Drawing 47W435-11 Rev.10 Mechanical Safety Injection System Piping  
 Drawing 2-47W811-1 Rev. 4 Flow Diagram Safety Injection System

Walkdown Packages

Walk down Package No. WBN2-PD-063-033-02 Rev. 0 for System 063 Analysis N3-63-A30R  
 Walk down Package No. WBN2-PD-063-036-01 Rev. 0 for System 063 Analysis N3-63-A29R

Calculations

Calculation Summary for WBN Safety Injection System (063) calculation summary  
 WBNAPS2020 Rev. 8, EDMS/RIMS No. B26881219107

**OA.1.28 Construction Deficiency Report (CDR) 391/82-55: Concrete Anchorage Free Edge Violation**Walkdown Procedures

Watts Bar Unit 2 Construction Completion Project Walkdown Procedure for PIPING AND  
 PIPING SUPPORTS, WPD-PD-2, Rev. 9

Engineering Specification

General Engineering Specification, G-32 for Bolt Anchors Set in Hardened Concrete, Rev. 23

Walkdown Packages

Walkdown Package No. WBN2-PD-070-1996-10, Rev. 0  
 Walkdown Package No. WBN2-PD-003-2336-17, Rev. 0

NPG Calculations

Calculations for Pipe Support 47A464-6-18, EDMS/RIMS No. B26 89 0830 106, EDMS  
 Accession No. T93100515039, 5/11/10  
 Calculations for Pipe Support 03B-2AFW-R209, EDMS/RIMS No. B41 85 0325 982, EDMS  
 Accession No. T93100119003, 1/14/10

**OA.1.34 CDR 85-32 – Potential Excessive Reactor Vessel Level Instrumentation Indication Errors**Problem Evaluation Reports (PERs) and Service Requests (SRs)

PER 172694, Modify NCH cards which will restore RVLIS accuracy

Design Control Documents

EDCR 52351, Install the Westinghouse Common Q RVLIS

**OA.1.41 NCV 05000391/2008010-001, Failure to Document a Cable Raceway Separation Non-Conforming Condition as Required by Procedure WDP-GEN-1.**

Problem Evaluation Reports (PERs) and Service Requests (SRs)

PER 158979, Cable Separation Issues not identified during Walkdowns

**OA.1.42 Replacement Items Program CAP (TI 2512/027)**

General

WB2 RIP CAP Closure Report, 8/12/2010  
WB1 RIP CAP Closure Report, 10/25/1995

Related to TIICs

PEG Package WBCP108-RIP  
PEG Package WBCP110-RIP  
PEG Package WBCP120-RIP  
PEG Package WBCP122-RIP  
PEG Package WBCP124-RIP  
PEG Package WBCP126-RIP  
PEG Package WBCP127-RIP  
PEG Package WBCP127-RIP  
PEG Package WBCP128-RIP

Historical Documents

Finding Identification Report 91024414  
PER 144991  
PER 145020  
PER 178010  
PER 940999  
CATD-40300-WBN-05  
NCR-4341

Related to Removal of Unsuitable Items

PER 241560  
PER 302054  
W.O. 92-15891-00

## LIST OF ACRONYMS

ANI	authorized nuclear inspector
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BFN	Browns Ferry Nuclear Plant
CAP	Corrective Action Program
CAQ	condition adverse to quality
CCS	component cooling system
CFR	<i>Code of Federal Regulations</i>
CVCS	chemical and volume control system
CMTR	certified material test report
DCN	design change notice
DM	dissimilar metal
ECP	Employee Concerns Program
EDCR	engineering document construction release
FSAR	Final Safety Analysis Report
FW	field weld
GL	Generic Letter
HVAC	Heating, Ventilation, and Air Conditioning
ICRDS	Integrated Cables Raceway Design System
IMC	Inspection Manual Chapter (NRC)
IFI	Inspector Follow-up Item
IIR	Integrated Inspection Report (NRC)
IP	Inspection Procedure (NRC)
IR	Inspection Report (NRC)
MAI	Modification Addition Instruction
MS	main steam
MCC	motor control center
MOV	motor-operated valve
M&TE	measuring and test equipment
NCR	nonconformance report
NCV	non-cited violation
NDE	non-destructive examination
NPG	Nuclear Power Generation
NRC	Nuclear Regulatory Commission
PER	Problem Evaluation Report
PO	purchase order
PSI	Pre-Service Inspection
PT	Liquid Penetrant Testing (examination)
PWSCC	primary water stress corrosion cracking
QA	quality assurance
QC	quality control
RCP	reactor coolant pump
RCS	reactor coolant system
RHR	residual heat removal
RPV	reactor pressure vessel
RT	radiograph test (examination)
SI	stress improvement

SIS	safety injection system
SL	Severity Level
SP	Special Program
SR	Service Request
SQN	Sequoyah Nuclear Plant
SSC	structures, systems, and components
SWBP	sidewall bearing pressure
TI	Temporary Instruction (NRC)
TVA	Tennessee Valley Authority
UT	Ultrasonic test
WBN	WBN Nuclear Plant
WPS	Welding Procedure Specification
WO	work order

## **Specific Response to the Reposting Requirements for Reactor Coolant System Dissimilar Metal Butt Welds (TI 2515/172, Rev. 1)**

### a. Inspection Scope

The inspectors observed licensee activities related to MRP-139, "Primary System Piping Butt Weld Inspection and Evaluation Guideline", Rev 1 that were available for review during the inspection period, specifically, application of the MSIP to three reactor pressure vessel nozzles which are within the scope of MRP-139. Because Watt's Bar Unit 2 has not operated yet, an MRP-139 program has not been fully established, nor have the requirements been fully implemented.

### b. Observations

In accordance with requirements of TI 2515/172, Revision 1, the inspectors evaluated and answered the following questions:

#### (1) Implementation of the MRP-139 Baseline Inspections

1. Have the baseline inspections been performed or are they scheduled to be performed in accordance with MRP-139 guidance?

This question was addressed during a previous TI 2515/172 inspection as described in NRC Inspection Report 05000391/2010604 and was not reviewed during this inspection.

2. Is the licensee planning to take any deviations from the MRP-139 baseline inspection scope, categorization, schedule, or method requirements of MRP-139? If so, what deviations are planned, what is the general basis for the deviation, and was the NEI-03-08 process for filing a deviation followed?

This question was addressed during a previous TI 2515/172 inspection as described in NRC Inspection Report 05000391/2010604 and was not reviewed during this inspection.

#### (2) Volumetric Examinations

For each volumetric examination inspected,

1. Was the activity performed in accordance with the examination guidelines in MRP-139 Section 5.1 and consistent with NRC staff relief request authorizations for weld overlaid welds?

The applicant did not perform pre-MSIP volumetric examinations. Prior to the commencement of MSIP work, the inspectors discussed the applicant's basis for not performing the exams with the applicant. The inspectors were concerned that current industry guidance, as contained in ASME Code Case N-770, required a pre-MSIP UT exam and that the applicant was not going to meet this guidance; however, N-770 was neither a required nor a committed standard. Therefore, the applicant was not required to perform a pre-MSIP volumetric exam. The applicant

acknowledged the inspectors' concerns. The applicant planned to perform post-MSIP volumetric exams as part of the preservice inspection activities.

2. Was the activity performed by qualified personnel? (Briefly describe the personnel training/qualification process used by the licensee for this activity).

The applicant did not perform pre-MSIP volumetric exams.

3. Was the activity performed such that deficiencies were identified, dispositioned, and resolved?

The applicant did not perform pre-MSIP volumetric exams.

(3) Weld Overlays

No weld overlays were performed during this inspection period. The licensee does not have any weld overlay activities planned.

(4) Mechanical Stress Improvement (SI)

For each mechanical stress improvement inspected, was the activity performed in accordance with a documented analysis report for stress improvement processes and in accordance with demonstrated procedures? Specifically,

1. Are the nozzle, weld, safe end, and pipe configurations, as applicable, consistent with the configuration addressed in the SI analysis report?

Yes, the nozzle, weld, safe end, and pipe configurations were consistent with the configurations addressed in the SI analysis reports for the nozzles inspected.

2. Does the SI analysis report address the location that radial deformation is applied, the applied load, and the effect that plastic deformation of the pipe configuration may have on the ability to conduct volumetric examinations?

Yes, the SI analysis reports addressed the location radial deformation was applied.

Yes, the SI analysis reports addressed the maximum applied load to be used during the process; however this was not a critical parameter for determining the success of the process. The SI analysis required a specific range of plastic deformation, as measured by a decreased diameter at the tool location, be achieved to conclude that the process was successful.

No, the SI analysis did not specifically address the effect that plastic deformation would have on the ability to conduct volumetric examinations. The reasons for this were addressed during a previous TI 2515/172 inspection as described in NRC Inspection Report 05000391/2010604.

3. Do the licensee's inspection procedure records document that a volumetric examination per the ASME Code, Section XI, Appendix VIII was performed prior to and after the application of the SI?

No. See the answer to question (2) above.

4. Does the SI analysis report address limiting flaw sizes that may be found during pre-SI and post-SI inspections and that any flaws identified during the volumetric examination are to be within the limiting flaw sizes established by the SI analysis report?

No, the SI analysis report does not address limiting flaw sizes that may be found during pre-SI and post-SI inspections and that any flaws identified during the volumetric examination are to be within the limiting flaw sizes established by the SI analysis report. While not specified in the analysis, the licensee's contractor had specified a limiting flaw size of 30% through wall based on a November 2, 2009 NRC Memorandum (Subj: Evaluation of the Mechanical Stress Improvement Process as a Mitigation Strategy for Primary Water Stress Corrosion Cracking in Pressurized Water Reactors; ML092990638).

5. Performed such that deficiencies were identified, dispositioned, and resolved?

Yes, the process was performed such that deficiencies were adequately identified, dispositioned, and resolved. Issues identified during the MSIP activities were adequately addressed in both the applicant's and the certificate holder's quality assurance programs.

(5) Application of Weld Cladding and Inlays

No weld cladding or inlay activities were performed during this inspection period. The licensee does not have any weld cladding or inlay activities planned.

(6) Inservice Inspection Program

1. Has the licensee prepared an MRP-139 inservice inspection or equivalent (e.g. Alloy 600) program? If not, briefly summarize the licensee's basis for not having a documented program and when the licensee plans to complete preparation of the program.

This question was addressed during a previous TI 2515/172 inspection as described in NRC Inspection Report 05000391/2010604 and was not reviewed during this inspection.

2. In the MRP-139 inservice inspection or equivalent (e.g. Alloy 600) program, are the welds appropriately categorized in accordance with MRP-139? If any welds are not appropriately categorized, briefly explain the discrepancies.

This item requires additional inspection upon completion of the applicant's program.

3. In the MRP-139 inservice inspection or equivalent (e.g. Alloy 600) program, are the inservice inspection frequencies, which may differ between the first and second

intervals after the MRP-139 baseline inspection, consistent with the inservice inspections frequencies called for by MRP-139?

This item requires additional inspection upon completion of the applicant's program.

4. If any welds are categorized as H or I, briefly explain the licensee's basis of the categorization and the licensee's plans for addressing potential PWSCC.

This item requires additional inspection upon completion of the applicant's program.

5. If the licensee is planning to take deviations from the MRP-139 inservice inspection guidelines, what are the deviations and what are the general bases for the deviations? Was the NEI 03-08 process for filing deviations followed?

This item requires additional inspection upon completion of the applicant's program.

c. Findings

No findings of significance were identified.

**Specific Response to the Reposting Requirements for Pressurizer Penetration Nozzles and Steam Space Piping Connections in U.S. Pressurized Water Reactors (NRC BL 2004-01)(TI 2515/160, Rev. 0)**

The inspectors reviewed the licensee's responses to NRC BL 2004-01, dated September 7, 2007; September 29, 2008; and April 1, 2010. The inspectors verified that the licensee's inspection activities were consistent with their response for two pressurizer nozzle dissimilar metal welds (2-SE-12 and 2-SE-13).

Reporting Requirements are as follows:

a. For each of the examination methods used during the outage, was the examination:

1. Performed by qualified and knowledgeable personnel?

Yes. The licensee used a knowledgeable staff member certified as a UT Level III examiner. The examiner was certified per the Performance Demonstration Initiative (PDI) to PDI-UT-10, and had received appropriate ASME Section XI, Appendix VII annual training.

2. Performed in accordance with demonstrated procedures?

Yes. The licensee performed the UT of the pressurizer penetrations in accordance with procedure N-UT-82, Revision 3, "Generic Procedure for the Ultrasonic Examination of Dissimilar Metal Pipe Welds," which is consistent with PDI-UT-10.

3. Able to identify, disposition, and resolve deficiencies?

Yes. N-UT-82 is demonstrated in accordance with the requirements of ASME Section XI, Appendix VIII.

4. Capable of identifying the leakage in pressurizer penetration nozzle or steam space piping components, as discussed in NRC Bulletin 2004-01?

The UT procedure was not designed to detect leakage specifically, but cracking. The licensee is committed to performing a bare metal visual inspection of all affected pressurizer nozzles at the first refueling outage to identify leakage.

b. What was the physical condition of the penetration nozzle and steam space piping components in the pressurizer system?

Although the licensee did not perform a bare metal visual inspection, the inspectors verified that area examined was generally clean and free of debris or other obstructions which could impede the examination.

c. How was the visual inspection conducted?

No visual inspection was conducted. The licensee will conduct a bare metal visual inspection during the first refueling outage.

- d. How complete was the coverage?

The licensee was able to examine 360° around each penetration examined.

- e. Could small boron deposits, as described in the Bulletin 2004-01, be identified and characterized?

The plant has not been operational, therefore there is no possibility of boron being present at this time. The licensee will conduct a bare metal visual inspection during the first refueling outage.

- f. What material deficiencies (i.e., cracks, corrosion, etc.) were identified that required repair?

There were no deficiencies identified that required repair.

- g. What, if any, impediments to effective examinations, for each of the applied methods, were identified?

There were no impediments for an effective examination.

- h. If volumetric or surface examination techniques were used for the augmented inspections, what process did the licensee use to evaluate and dispose any indications that may have been detected as a result of the examinations?

The licensee performed a volumetric (UT) of the pressurizer penetrations in accordance with procedure N-UT-82, Revision 3, "Generic Procedure for the Ultrasonic Examination of Dissimilar Metal Pipe Welds," which is consistent with PDI-UT-10. All indications were dispositioned in accordance with the acceptance criteria available in this procedure.

- i. Did the licensee perform appropriate follow-up examinations for indications of boric acid leaks from pressure-retaining components in the pressurizer system?

Not Applicable. There were no indications of boric acid leaks from susceptible pressure-retaining components.