



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

October 29, 2010

Mr. Ashok S. Bhatnagar  
Senior Vice President  
Nuclear Generation Development and Construction  
Tennessee Valley Authority  
6A Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2010604**

Dear Mr. Bhatnagar:

On September 30, 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 October 14, 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) were reviewed by the NRC staff. This inspection determined that adequate corrective actions were taken to resolve the issues associated with two Electrical Cable CAP Sub-Issues (Silicone Insulated Rubber Cables and Cable Sidewall Bearing Pressure). Based on the results of this inspection, the subject CAP Sub-Issues 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 one NRC-identified finding which was determined to involve a violation of NRC requirements. However, because this finding was a Severity Level IV violation and was entered into your corrective action program, the NRC is treating it as a non-cited violation consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest the non-cited violation 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 05000391/2010604 w/attachment

cc w/encl: (See next page)

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cc w/encl: (See next page)

\*See previous concurrence

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SIGNATURE	Via Email	Via Email	Via Email	Via Email	Via Email	Via Email	Via Email
NAME	DHarmon	EHeher	NKarlovi	JLizardi	EMichel	ESanchez	TSteadhman
DATE	10/28/2010	10/28/2010	11/ /2010	10/28/2010	10/21/2010	10/19/2010	11/ /2010
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
OFFICE	RII:DRS						
SIGNATURE	Via Email						
NAME	RHamilton						
DATE	10/28/2010						
E-MAIL COPY?	YES NO						

cc w/encl:

Mr. Gordon P. Arent  
Manager  
New Generation Licensing  
Nuclear Generation Development  
and Construction  
WBN Nuclear Plant  
P.O. Box 2000  
Spring City, Tennessee 37381

Mr. Masoud Bajestani  
Vice President  
WBN Unit Two  
WBN Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, Tennessee 37381

Mr. Michael K. Brandon, Manager  
Licensing and Industry Affairs  
WBN Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, Tennessee 37381

Mr. Preston D. Swafford  
Chief Nuclear Officer  
and Executive Vice President  
Tennessee Valley Authority  
3R Lookout Place  
1101 Market Place  
Chattanooga, Tennessee 37402-2801

County Executive  
375 Church Street  
Suite 215  
Dayton, Tennessee 37321

W.D. Crouch, Manager  
WBN Unit 2 Licensing  
Watts Bar Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, Tennessee 37381

Mr. Gregory A. Boerschig  
Plant Manager, WBN Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, Tennessee 37381

Mr. M.J. Hellstern  
General Manager  
NGDC Governance & Oversight  
Tennessee Valley Authority  
3A Blue Ridge Place  
1101 Market Street  
Chattanooga, Tennessee 37402-2801

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

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

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

Mr. D. E. Grissette  
Site Vice President  
WBN Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, Tennessee 37381

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

Senior Resident Inspector  
WBN Nuclear Plant  
U.S. NRC  
1260 Nuclear Plant Road  
Spring City, Tennessee 37381-2000

TVA

4

cc email distribution w/encl:  
Greg Scott  
Tennessee Valley Authority  
Electronic Mail Distribution

Watts Bar 2 Licensing  
Tennessee Valley Authority  
Electronic Mail Distribution

Letter to Ashok S. Bhatnagar from Robert C. Haag dated October 29, 2010.

SUBJECT: WBN NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2010604

Distribution w/encl:

L. Raghavan, NRR

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E. Guthrie, RII DRP

R. Monk, RII WBN Unit 1 SRI

OE Mail (email address if applicable)

PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2010604

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: 1260 Nuclear Plant Rd  
Spring City TN 37381

Dates: July 1 – September 30, 2010

Inspectors: W. Bearden, Senior Resident Inspector, Construction Projects Branch (CPB) 3, Division of Construction Projects (DCP) Region II (RII)  
T. Nazario, Resident Inspector, CPB3, DCP, RII  
K. Miller, Resident Inspector, CPB3, DCP, RII  
W. Lewis, Resident Inspector, CPB3, DCP, RII  
C. Abbott, Construction Inspector, Construction Inspection Branch (CIB) 2, Division of Construction Inspection (DCI), RII, Section OA.1.7  
A. Artayet, Senior Construction Inspector, CIB3, DCI, RII Sections C.1.17 and OA.1.2  
J. Bartleman, Senior Construction Inspector, CIB3, DCI, RII Sections C.1.4 and OA.1.5  
J. Blake, Senior Construction Inspector, CIB3, DCI, RII Section C.1.17  
J. Calle, Senior Construction Inspector, CIB3, DCI, RII Section OA.1.6  
L. Castelli, Senior Construction Inspector, CIB1, DCI, RII, Sections C.1.3, C.1.12, C.1.13, C.1.14, C.1.15, C.1.16, OA.1.8, OA.1.9, OA.1.10 and OA.1.11  
G. Crespo, Senior Construction Inspector, CIB1, DCI, RII, Sections C.1.3, C.1.12, C.1.13, C.1.14, C.1.15, C.1.16, OA.1.8, OA.1.9, OA.1.10 and OA.1.11  
D. Failla, Construction Inspector, CIB3, DCI, RII, Sections C.1.6 and C.1.10

Enclosure

- R. Hamilton, Senior Health Physicist, Plant Support Branch 1 (PSB1), Division of Reactor Safety (DRS), RII, Section OA.1.4
- D. Harmon, Construction Inspector, CIB3, DCI, RII Sections C.1.17 and OA.1.2
- E. Heher, Construction Inspector, CIB2, DCI, RII, Section C.1.6
- N. Karlovich, Construction Inspector, CIB1, DCI, RII, Sections C.1.12, C.1.15, and C.1.16,
- J. Lizardi, Construction Inspector, CIB2, DCI, RII, Section OA.1.14
- E. Michel, Senior Construction Inspector, CIB3, DCI, RII, Sections C.1.11, C.1.20 and OA.1.1
- E. Sanchez, Reactor Engineer, CIB3, DCI, RII, Section C.1.9
- T. Steadham, Construction Inspector, CIB3, DCI, RII, Sections OA.1.13 and OA.1.15
- P. Van Doorn, Senior Reactor Inspector, CPB3, DCP, RII, Section OA.1.12

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; training and qualification of plant personnel; 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 one NRC-identified Severity Level (SL) IV non-cited violation (NCV).

#### **Inspection Results**

- The inspectors identified a SL IV, NCV of 10 *Code of Federal Regulations* (CFR) Part 50, Appendix B, Criterion IX, "Control of Special Processes," in that, the licensee failed to provide adequate procedures for the application of the Mechanical Stress Improvement Process (MSIP) to six pressurizer nozzle dissimilar metal (DM) welds. (Section OA.1.1)
- The inspectors concluded that concerns pertaining to the Corrective Action Program (CAP) Sub-Issues on silicone rubber insulated cables and on sidewall bearing pressure on cables have been appropriately addressed for Watts Bar Unit 2 and these items are closed. (Sections OA.1.8 and OA.1.9)
- Other areas inspected were adequate with no findings of significance identified. These areas included: various Unit 2 CAPs; Unit 2 Use-As-Is Special Program; electrical systems and components; nuclear welding; structural welding; nondestructive examination and inservice inspection activities; refurbishment activities; environmental activities; craft training; and fire protection.

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## REPORT DETAILS

### Summary of Plant Status

During the current inspection period, TVA performed construction completion activities on safety-related systems and also 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. Additionally, the inspectors reviewed five recent Bechtel QA surveillance reports regarding in-process quality control (QC) inspections and ongoing construction work activities. One Bechtel QA audit associated with construction field activities was also reviewed. Documents reviewed are listed in the attachment.

###### b. Observations and Findings

No findings of significance were identified.

###### c. Conclusions

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

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

###### a. Inspection Scope

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 July and August.

Additionally, the inspectors observed a classroom training session for construction supervisor personnel. Specifically, the inspectors observed Manager/Supervisory Safety Conscience Work Environment (SCWE) training conducted by the Unit 2 Bechtel ECP representative and a senior attorney from the TVA Office of General Counsel. The training session included discussions on protected activities, supervisory responsibilities, and federal laws/TVA requirements associated with employee protection.

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.

## **II. Management Oversight and Controls**

### **C.1 Construction Activities**

#### **C.1.1 Unit 1 and Unit 2 Construction Activity Interface Controls (IPs 64051, 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. This included the review of selected work activities which the applicant had screened as not affecting Unit 1 to verify the adequacy of that screening effort. Additionally, the inspectors independently assessed selected construction activities to verify that potential impacts on the operating unit had been identified and adequately characterized with appropriate management strategies planned for implementation. Furthermore, the inspectors performed independent walkdowns of selected construction work locations to verify controls to protect the operating unit provided an adequate level of protection and had been properly implemented. Documents reviewed are listed in the attachment.

Specific work activities observed included:

- Transfer activities associated with movement of shipping container for reactor coolant pump (RCP) 2 into Unit 2 containment
- Ongoing construction activities in 125VDC vital battery board room IV and cable spreading room
- Evaluation of temporary power cables supported by permanent fire protection piping in auxiliary building
- Concrete repair activities in the auxiliary building (discussed in additional detail in Section C.1.5)

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 Construction Refurbishment Process - Passive Commodities (IP 37002)**

a. Inspection Scope

The inspectors reviewed the results of the eddy current examination (ET) of one Unit 2 safety-related heat exchanger, completed tubing degradation evaluation, and selected records for ET activities performed on service water tubing associated with the 2B containment spray heat exchanger. The applicant's ET examinations and tubing degradation evaluation were performed to determine the effects of long term lay-up and to identify any degraded tubes that might be present in this heat exchanger. Based on the reviews conducted, the applicant determined that the heat exchanger remained in good condition and did not require replacement. The inspectors noted that only two of the stainless steel tubes were determined to require plugging. The degradation evaluation and records documenting ET examination of this heat exchanger are listed in the attachment.

The results of the ET examinations were compared to the applicable drawings and system design requirements to verify acceptable piping wall thickness readings. Qualification and certification records for examiners, equipment, and procedures for the ET examination activities were reviewed. Documents reviewed are listed in the attachment.

The following sample was inspected:

- IP 37002 Section 02.02.d - one sample

b. Findings and Observations

No findings of significance were identified. Although some examples of tube degradation were found during the ET examinations, repair activities are planned prior to startup of Unit 2. The applicant concluded that the condition of the heat exchanger was acceptable.

c. Conclusions

During review of examination results of the 2B containment spray heat exchanger to determine the effects of long term lay-up, the applicant determined that the condition of this heat exchanger was acceptable.

**C.1.3 Construction Refurbishment Process– Vendor Refurbishment (IP 37002, IP 35065)**

a. Inspection Scope

The inspectors performed a periodic inspection of instrumentation and control refurbishment activities associated with the Watts Bar Unit 2 (WBN2) solid state protection system (SSPS). The inspectors interviewed vendor representatives

responsible for the on-site refurbishment activities and personnel associated with receipt inspection of SSPS refurbished components.

The inspectors performed a walkdown to observe the storage facilities for the refurbished items to ensure compliance with the applicable storage level requirements. The storage facilities examined included warehouse 6 where the initial receiving inspection takes place, warehouse 8 where QC inspection takes place, and the storage facility inside the protected area for SSPS components issued to the field.

The inspectors reviewed receipt inspection documentation for conforming and non-conforming relays. The inspectors checked for proper segregation and identification of nonconforming items. The inspectors reviewed the certificate of conformance documentation to verify identification of conforming and non-conforming relays, and the inspectors also confirmed that documentation was reviewed by the vendors' QA. The inspectors examined test documentation records to ascertain that the acceptance criteria were identified and met. Documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 37002 Section 02.02.a.2 - one sample
- IP 37002 Section 02.02.c - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Adequate receipt and storage controls were established for the inspected samples.

**C.1.4 Instrument Components and Systems, and Installation Activities (IPs 52051, 52053, 52055, and TI 2512/026)**

a. Inspection Scope

The inspectors reviewed safety-related instrumentation components and systems by direct observation of work to verify related activities were performed in accordance with NRC requirements and applicant procedures. The inspectors reviewed multiple documents related to the design and installation of instrument sensing lines at WBN2.

Six engineering document samples were inspected and selected from those associated with the reactor trip system, engineered safety features actuation system, and other safety-related systems. Specifically, the inspectors reviewed engineering and construction work documents. The inspectors interviewed responsible personnel associated with preparation and issuance of Engineering Document Construction Release (EDCR) documents, work packages, and construction personnel involved with instrument components field work. Documents reviewed are listed in the attachment.

The inspectors walked down instrument sensing lines and associated supports after TVA had completed their walkdown of the instrument lines. This inspection was to ensure that TVA had performed adequate verification that the design requirements had been met for the instrument lines. Two field work package samples were selected from those associated with work on safety-related systems and were reviewed by the inspectors. Specifically, the inspectors reviewed work orders (WOs) and the physical condition of the components. The inspectors interviewed craft, management, and construction

personnel responsible for performing the installation and inspection of the instrument sensing lines and associated pipe supports. The following documents were reviewed for adequacy and completion:

- WO 110776372 – Safety Injection System instrument sensing line 2-SENL-063-0301B and associated 28 supports (EDCR-2 #53642)
- WO 111041572– Safety Injection System instrument sensing lines 2-SENL-063-0385A & -0386A; and Component Cooling System instrument sensing lines 2-SENL-070-0263A, -0264A, -0276A, & -0277A and the associated 9 supports for both systems (EDCR #53597)

Independent measurements were performed on seven instrument sensing lines to determine whether the installed instrument tubing met the proper slope requirements. Additionally, the inspectors reviewed in-process WOs for work conducted on safety injection system and residual heat removal system field-routed instrument sensing lines.

b. Observations and Findings

No findings of significance were identified.

In four cases the instrument lines did not meet the minimum slope requirements as specified in WBN Site-Specific Engineering Specification, Instrument and Instrument Line Installation and Inspection, N3E-934, Revision 8. TVA had previously identified these problems with certain Watts Bar Unit 2 instrument sensing lines not meeting the slope requirements and addressed this issue in PER 143705. The inspectors reviewed PER 143705 and found it to be acceptable.

The inspectors identified one piping support that did not meet the typical support drawing dimensions and had more lines attached to the support than the drawing allowed based on its size. TVA had previously identified this issue and addressed this issue with Support Variance Sheet No. I-51-35-618 and Field Operation Sheet (FOS) 2035. The inspectors reviewed FOS 2035 for the pipe support in question along with Support Variance Sheet No. I-51-35-618 and found them to be acceptable.

c. Conclusions

Adequate control had been exhibited in translating design engineering requirements into field work packages for the samples reviewed. In the case where four instrument sensing lines did not meet the minimum slope requirements and one piping support did not meet the typical support drawing requirements, the licensee had already performed adequate engineering justification to accept these conditions to use “as-is”.

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

a. Inspection Scope

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

- WO 110892898, Penetration WBN-0-304-A15825
- WO 09-954333-011, Repair of conduit sleeve WBN-0-SLV-304-A16132 A/B
- WO 110729350, Core Drill and Install Sleeves in Aux Bldg Elevation 757' WBN-0-MISC-304.



The inspectors also reviewed activities associated with Modification Addition Instruction (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 activities/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 which indicated mix, location, time placed, water additions, and temperature of the concrete mix and ambient conditions were accurate.
- 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 - one sample
- IP 46053 Section 02.03.f - one sample
- IP 46053 Section 02.03.h - two samples

Documents reviewed are listed 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 Pipe Support and Restraint Systems (IPs 50090, 46071, 35065, and TI 2512/023)**

a. Inspection Scope

The inspectors observed ongoing pipe support work to verify that licensing commitments were being met. The inspectors also observed anchor bolt drilling activities for supports 2-47A464-1-211 and 2-01A431-1 and verified activities were conducted in accordance with procedure 25402-000-GPP-0000-N3212, Drilled Anchors and Core Drilling Operations, Revision 2.

The inspectors interviewed two personnel engaged in the installation of safety-related pipe supports and restraints to verify that adequate training to perform special processes contained in relevant work performance and inspection procedures had been received.

The inspectors also witnessed and verified the following attributes for the two supports, including anchor bolt installations:

- The latest issue (revision) of applicable drawings or procedures was available to the installers.
- Significant modifications to supports were approved by appropriate personnel before implementation.
- Clearances between the pipe and restraints were as specified.
- Anchor bolt hole drilling including depth, perpendicularity to concrete surface, hole size, hole cleanliness, and rebar damage prevention
- Embedded depth of bolt and initial installation torque to properly set bolt
- Proper consideration of oversized holes in base plates (welded washers or bolts preloaded and monitored)
- Minimum spacing between bolts and minimum distance from embedded steel

The inspectors reviewed TVA QA Audit Report 2010N-32 LS for a limited scope audit of the pipe support supplier, Bergen –Power Pipe Supports and verified receipt inspection for pipe supports and snubbers contained in purchase orders (POs) 115495, 120282, and 93656. The inspectors reviewed the certificate of conformance and verified that necessary requirements specified in the procurement document were listed as required.

The following samples were inspected:

- IP 50090 Section 02.03.a - two samples
- IP 46071 Section 02.02.a - six samples
- IP 46071 Section 02.02.b - six samples

b. Observations and findings

No findings of significance were identified.

c. Conclusions

Pipe support and anchor bolt installation activities observed during the inspection period were performed in accordance with applicable procedures, specifications, and drawings.

**C.1.7 Reactor Coolant Pressure Boundary Piping - Work Observation (IPs 49053, 49055, 37002 and 55050)**

a. Inspection Scope

The inspectors reviewed selected construction work activities associated with weld repairs on reactor coolant pressure boundary piping to verify the adequacy of ongoing work. Specifically, the inspectors reviewed activities associated with weld repairs of ASME Section III, Class I pipe in the reactor coolant system. The inspectors observed selected weld excavation, weld repairs, weld surface etching, non-destructive examination (NDE) and other repair activities, along with cleanliness control measures. Additionally, the inspectors reviewed field drawings, procedures, and documentation of quality-related inspections. The following weld repairs were inspected:

<u>WO</u>	<u>Weld Number</u>	<u>Component</u>
10-951189-000	2-068E-W004-01 C0R0	Loop 4 Hot Leg Nozzle
10-951190-000	2-068C-W004-02 C0R0	Loop 4 RCP Nozzle Weld

Welding activities associated with the above repair activities are discussed in additional detail in Section OA.1.2. NDE activities are discussed in additional detail in Section C.1.18.

The inspectors also observed work activities associated with the reactor coolant system including loops 1 through 4 intermediate legs, engineering evaluations, visual inspections, chemical swipes, and NDE. The inspectors entered and visually examined the piping to verify the internal material condition was restored to design requirements and equipment vendor specifications. The inspectors also verified the following:

- Inspection (QC) and/or work performance verification, including specified frequency of inspections
- Construction and installation (specifically weld repair)
- 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- one sample
- IP 49053 Section 02.02 - one sample
- IP 49053 Section 02.03.a - five samples
- IP 49053 Section 02.03.c - one sample
- IP 49053 Section 02.03.e - two samples
- IP 49053 Section 02.03.f - four samples
- IP 37002 Section 02.02 d. - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

**C.1.8 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 verified that the work instructions and 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," Revision 0003. The inspectors also verified that work activities promptly identified any failures, malfunctions, deficiencies, deviations, defective material or equipment, and non-conformances in safety or quality-related structures, systems, or

components (SSCs), in accordance with 10 *Code of Federal Regulations* (CFR) 50, Appendix B, Criterion XVI.

The inspectors also verified the following:

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

The following areas were inspected:

- Observed feedwater (FW) check valve 2-CKV-003-0509 piping upstream/downstream [disassembled per WO 09-953001-000]
- Observed FW check valve 2-CKV-003-0508 piping upstream/downstream [disassembled per WO 08-952523-000]
- Observed safety injection (SI) check valve 2-CKV-063-0640S piping upstream/downstream [disassembled per WO 08-953251-000]
- Observed FW check valve 2-CKV-003-0511 piping upstream/downstream [disassembled per WO 09-953004-000]
- Observed FW check valve 2-CKV-003-0510 piping upstream/downstream [disassembled per WO 09-953002-000]

The following samples were inspected:

- IP 49063 Section 02.02.a - five samples
- IP 49063 Section 02.02.c - five samples
- IP 37002 Section 02.02.d - five samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Field refurbishment of passive components was properly performed and as-found material conditions were documented per the approved refurbishment program.

### **C.1.9 Reactor Vessel and Internals – Work Observation (IPs 50053 and 37002)**

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 inspection (QC) procedures were being met. These activities are controlled by procedure 25402-000-GPP-0000-N2102, "Housekeeping," Revision 8. The inspectors entered the RPV to observe the condition of the RPV and to ensure that housekeeping measures were in place. 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 inspectors also observed remediation and penetrant testing activities of the interior of the RPV. The penetrant testing activities are discussed in Section C.1.18 of this report. Inspectors independently verified that activities performed by Westinghouse and

PCI Energy Services (PCI) were in accordance with procedures, drawings, and specifications. Inspectors also verified that areas previously examined in accordance with PI-901220-04, "Instruction for the Construction Assessment and Documentation of the Reactor Vessel Inspection at Watts Bar Unit 2," Revision 4, had been documented accordingly.

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
- IP 37002 Section 02.02.a.1 - one sample
- IP 37002 Section 02.02.d - 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.1.10 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 piping system activities 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 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 verified that the work instructions and procedures 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 CCPP 25402-000-GPP-0000-N1302, "Watts Bar Unit 2 Completion Project Component Refurbishment Evaluation," Revision 0003. The inspectors verified that these instructions were being followed during system restoration and that appropriate QC holdpoints 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. Existing pumps were observed being reassembled following cleaning and inspection in accordance with the original manufacturer's instructions. The inspectors also verified that work activities promptly

identified any failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances in safety or quality-related SSCs, in accordance with 10CFR50, Appendix B, Criterion XVI. The inspectors interviewed four personnel and verified their ability to perform their assigned duties, QA/QC independence, and adequate management support for QA/QC functions.

The inspectors also observed the following activities:

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

The following areas were inspected::

- Observed setting of WBN-2-PMP-068-0073 (RCP#4) rotating assembly per WO 09-953327-000
- Observed final assembly of safety injection check valve 2-CKV-063-0560-S per WO 08-953220-000
- Observed final assembly of safety injection check valve 2-CKV-063-0644-S per WO 08-953254-000
- Observed final assembly of safety injection check valve 2-CKV-063-0662-S per WO 08-953225-000
- Observed partial reassembly of RHR Pump -2-PMP-074-0010-A per WO 08-953078-000
- Observed dimensional verification and partial reassembly of CS Pump -2-PMP-072-0027A per WO 08-953047-00.

The following samples were inspected:

- IP 50073 Section 02.02.a - six samples
- IP 50073 Section 02.02.b - six samples
- IP 50073 Section 02.02.c - six samples
- IP 50073 Section 02.03 - four samples
- IP 37002 Section 02.02.b - six 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.1.11 Inservice Inspection – Review of Program (IP 73051)**

a. Inspection Scope

The inspectors reviewed “Preservice Inspection Program Plan, Watts Bar Nuclear Plant Unit 2,” Revision 3, for compliance with ASME Section XI 2001 Edition through 2003

addenda. The PSI program is continually revised in an ongoing process, with each revision defining the welds to be examined for additional ASME Section XI examination categories. Examination categories with undefined weld populations for examination included B-K, B-L-2, C-A, C-B, C-C, C-D, C-F-1, C-F-2, C-G, D-A, F-A, snubbers (IWF-5000), and containment (IWE-2000). The inspectors reviewed the results of the Authorized Nuclear Inspector (ANI) review of "Preservice Inspection Program Plan, Watts Bar Nuclear Plant Unit 2," Revision 3. The inspectors verified that "Preservice Inspection Program Plan, Watts Bar Nuclear Plant Unit 2," Revision 3, was reviewed by appropriate applicant staff. Documents reviewed are listed in the attachment.

The inspectors performed the following samples:

- IP 73051 Section 02.01 - one sample

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.1.12 Electrical Cable – Work Observation (IP 51063)**

a. Inspection Scope

The inspectors assessed whether activities relative to safety-related electric cable systems were being controlled and accomplished in accordance with NRC requirements, safety analysis report (SAR) commitments, and applicant procedures. This was accomplished by inspecting supervision and independent evaluation of work performance, work in progress, and completed work. The inspectors reviewed cable installation/pull-back data sheets for WO 110983156 that covered QC installation inspection. The inspectors observed a safety-related cable pull (cable 2V6159B) that was performed by hand. This cable was identified as safety-related and routed from 1-PNL-275-R78-B to 2-PNL-278-M6/B2 which is associated with the balance of plant and main and auxiliary control system. The inspectors verified that the cable was routed in accordance with Integrated Cable and Raceway Design System (ICRDS) Cable Report. Inspectors verified that 2V6159B cable was protected from sharp edges during the pull, that the bending radius was not violated during the pull, that cable identification was preserved, division identification was incorporated into the cable during pulling activities, and that raceway completion to support this cable pull was adequate. Additionally, the inspectors observed in-process execution of WO 111154082 that specified a cable pull of 22 cables. The inspectors witnessed the conduit swab, cable identification and verification, and cable staging in preparation for the cable pull. Documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 51063 2.02.c - two samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors determined that adequate measures were in place to ensure the applicant was adequately prepared for both the cable pull with QC concurrence and the proper staging of the cables by the craft prior to the pull.

**C.1.13 Electrical Components and Systems – Record Review and Construction Refurbishment Process (IPs 51055 and IP 37002)**

a. Inspection Scope

The inspectors reviewed existing electrical distribution equipment testing records associated with two 480V shutdown boards and two 6.9 kV shutdown boards to determine whether procedures and testing complied with applicant and NRC requirements.

The inspectors reviewed records of Motor Control Center (MCC) individual device bucket fabrication packages and drawings, including as-built verification and construction testing.

The inspectors reviewed EDCR-2 Unit Difference Form – EDCR-2 53287 Revision A which identified the differences between existing ITE Motor Control Center components that are being replaced with new Square D and Siemens equipment of the same type and rating. Documents reviewed are listed in the attachment.

The inspectors inspected the adequacy of activities associated with the quality records that documented inspection, cleaning, and testing of the following components:

- 480V Shutdown Board 2A1-A (UNID: WBN-2-BD-212-A001-A / WO 07-811394-000);
- 480V Shutdown Board 2A2-A (UNID: WBN-2-BD-212-A002-A / WO 07-811410-000);
- 6.9kV Shutdown Board 2A-A (UNID: WBN-2-BD-211-A-A / WO 07-811411-000);
- 6.9kV Shutdown Board 2B-B (UNID: WBN-2-BD-211-B-B / WO 05-815707-000).

The inspectors reviewed three samples of records associated with the fabrication of different size MCC buckets including size 1 (27 amp) starter 12" high buckets, size 1 starter 18" high, and size 2 (45 amp) starter 24" high.

The following samples were inspected:

- IP 51055 02.02.d – four samples
- IP 37002 02.02.a.1 – four samples
- IP 37002 02.02.c – four samples

b. Observations and Findings

No findings of significance were identified.

The inspectors verified that new components, provided for the replacement of outdated components, were equivalent to the existing components in form, fit, and function.

The inspectors verified that the required tests were performed and that approved and qualified procedures were followed. The inspectors determined that individual unit wiring diagrams provided sufficient detail to make an accurate evaluation of the requirements imposed on the fabrication of the MCC buckets.



c. Conclusions

The inspectors determined that engineering drawings, procedures, test data and results associated with motor control center work were adequate to provide assurance of compliance with requirements. Differences between Unit 1 and Unit 2 components were adequately documented.

**C.1.14 Electrical Components and Systems – Work Observation (IP 51053)**

a. Inspection Scope

The inspectors reviewed WO 110710545 and in particular safety-related conduit 2PV4588B conduit associated with the control building raceway system. The inspectors reviewed the ICRDS report sheet and examined photographs taken of the actual conduit installed. The inspectors inspected conduit installation aspects including support spacing, item identification, number of elbows, mid-route flexible conduits, physical separation, and QC personnel inspection records.

The inspectors also observed installation of safety-related conduit and conduit supports performed under WO 09-954179-019 for a 1 ½" conduit, ID: 2V6065B (Conduit Support Number: 205, Electric Cable ID: 2V2123A). The installation was observed to determine if the components were installed in the proper location and orientation and by qualified craft personnel using suitable equipment and tools. The inspectors examined the associated mounting hardware and support to determine it was the appropriate material and properly located. The components were examined for the required identification.

The following samples were inspected:

- IP 51053 Section 02.02.d - 1 sample
- IP 51053 Section 02.02.e - 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors concluded that activities observed associated with the conduit installation were performed in accordance with procedures, and that all work associated with this installation was inspected, documented, and completed as required.

**C.1.15 Instrument Components and Systems - Work Observation and Record Review (IPs 52053 and 52055)**

a. Inspection Scope

The inspectors reviewed work associated with the safety-related instrumentation. The inspectors inspected completed work in the field for two safety-related transmitters and reviewed associated drawings. The inspectors reviewed a partial completion of WO 110791086 for the mechanical installation of two safety-related 1153 D series differential pressure transmitters, WBN 2-FT-070-0215B-A and WBN-2-FT-070-0215A-A, associated with component cooling water system (CCS). Inspectors verified that the instruments were installed in the correct orientation in the field, the bolts were torqued to the correct values, and calibrated instrumentation was used. The inspectors verified the applicant used appropriate procedures for the inspection of the installation which were

Modification/Addition Instruction (MAI) – 4.4B, “Instrument and Instrument Panel Installation,” Revision. 006, and Vendor Manual VTD-R369-0670, “Rosemount 1153 Series D,” January 2008.

The inspectors observed the receipt inspection of safety-related relays for use in the control rod drive system and reactor protection system. The relays were procured through PO 128908 and material receiving report 17210. The inspectors observed that the receipt inspection was done in accordance with procedure 25402-000-GPP-0000-N6104, “Materials Receiving,” and that appropriate characteristics, such as part number, rating, and physical damage, were checked.

The following samples were inspected:

- IP 52053 Section 02.02.a - one sample
- IP 52053 Section 02.02.d - two samples
- IP 52055 Section 02.02.c - two samples
- IP 37002 Section 02.02.a.2 - two samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that two samples of instrumentation installation were properly implemented.

**C.1.16 Instrument Components and Systems – Record Review (IP 52055)**

a. Inspection Scope

The inspectors reviewed the implementation of commitments the applicant made in the response to GL 88-14, “Instrument Air Supply System Problems Affecting Safety-Related Equipment.” The inspectors interviewed the systems engineer of the safety-related instrument air system for Unit 1. Watts Bar has a common air supply system, so components common to both units are in current use for Unit 1. The inspectors evaluated calculation WBN-MEB-EPM-MF-072589, “Determination of Fail Safe Position of Safety Related Components Utilizing Air as a Motive Force and Air Quality,” Revision 4. The inspectors verified that the loss of air position and the fail safe position for Unit 2 safety related valves was the same as Unit 1 based on the review of calculation WBN-MEB-EPM-MF-072589.

The inspectors reviewed PO 72402 for containment sump level transmitters 2-LT-63-180, 2-LT-63-181, 2-LT-63-182, and 2-LT-63-183 to verify that the appropriate requirements were included. The inspectors reviewed the environmental qualifications, including temperature, pressure, submergence, humidity, radiation, and seismic. The inspectors also verified that the appropriate 10 CFR 21 (part 21) and QA requirements were included in the PO. The inspectors reviewed environmental data drawing 47E235-42, Revision 11, and portions of EQ Binder WBNEQ-ILT-002, including Qualification Test Report Number PER 1006, Revision K, to verify that the appropriate environmental qualifications were included in PO 72402. The inspectors reviewed the material receiving report, MRR 5785, to verify that the certificate of conformance states that the transmitters were properly qualified.

The following samples were inspected:

- IP 52055 Section 02.02.a - four samples
- IP 52055 Section 02.02.d - one sample
- IP 37002 Section 02.02.a.2 - four samples
- IP 37002 Section 02.02.c - four samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that calculation WBN-MEB-EPM-MF-072589 was appropriately updated for unit 2 valves. The inspectors concluded that four samples of instrument procurement contained adequate requirements and that these samples were properly received.

### **C.1.17 Structural Welding General Inspection (IP 55100)**

a. Inspection Scope

The inspectors performed inspections of structural steel welding by observing in-process welding. Observed activities were compared to the requirements of Bechtel Procedure GWS-Structural Revision 3, American Welding Society (AWS) D1.1, "Structural Welding Code," 1973 edition, and Bechtel WPS-No. P1-A-Lh (Structural) Revision 1. Documents reviewed are listed in the attachment.

The inspectors confirmed by observation that the following attributes for shielded metal arc welding were followed, as applicable:

- 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.
- Back-gouging was performed according to procedure requirements.
- 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 following 12 welds were inspected during production:

- 47A056-218-201-300 251-FW-1, WO 11-0896316
- 47A056-218-201-300 256-FW-1, WO 11-0896316
- 47A056-218-201-300 256-FW-2, WO 11-0896316

- FSK-C-335-FW-2 Revision 0, WO 08-954513-004
- FSK-C-339-FW-13 Revision 0, WO 08-954513-006
- FSK-C-339-FW-14 Revision 0, WO 08-954513-006
- FSK-C-359-FW-12 Revision 0, WO 08-954513-011
- FSK-C-359-FW-2 Revision 0, WO 08-954513-011
- FSK-M-608-FW-1 Revision 1, WO 09-951298-001
- FSK-M-608-FW-2 Revision 1, WO 09-951298-001
- WME-096-FW-4 Revision 0, WO 10-951261-001
- WME-121-552-FW-1 Revision 0, WO 11-0713-799

The inspectors performed the following samples:

- IP 55100 Section 02.04 - twelve samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed structural welds were found to conform to the applicable requirements of the AWS code and Bechtel procedure requirements.

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

a. Inspection Scope

The inspectors continued to observe liquid penetrant (PT) examination activities associated with ongoing pipe welding of the ERCW system. Specific weld PT activities observed included:

<u>Report</u>	<u>Weld Number</u>	<u>Component</u>
PT-119	2-067C-T538-05A	ASME Section III Class 3, stainless 6 inch piping
PT-120	2-067-D182-07A	ASME Section III Class 2, carbon steel pipe/fitting
PT-121	2-067C-T450-30	ASME Section III Class 2, dissimilar metal (carbon steel to stainless) pipe

The inspectors observed the following PT examination activities associated with the reactor pressure vessel (RPV):

<u>Report</u>		
PT-901220-121 Internal Surface Cladding/ Grid L3,		Date: September 23, 2010
PT-901220-141 Internal Surface Cladding/ Grid C8,		Date: September 23, 2010
PT-901220-142 Internal Surface Cladding/ Grid D8,		Date: September 23, 2010
PT 901220-143 Internal Surface Cladding/ Grid E8,		Date: September 23, 2010
PT-901220-144 Internal Surface Cladding/ Grid F8,		Date: September 23, 2010

The inspectors reviewed the completed PT examination reports which documented the above NDE activities including PI-901220-04, "Instruction for the Construction Status Assessment and Documentation of the Reactor Vessel Inspection at Watts Bar Unit 2,"

Revision 2, which documented visual and PT examination results for grids A3, K6, F8, C10, and I10.

The inspectors reviewed the following completed PT examination reports to determine whether they met the requirements of the applicant's procedural requirements: PT-105 and PT-106, ASME Section III Class 1 RCS weld, 2-068-W004-02 C0R1, Cold Leg RCP#4 Nozzle.

The inspectors also performed the following:

- Verified that applicable drawings, instructions, or travelers clearly specified the test procedure to be used and verified a copy of that procedure was available in the areas in which the work was being performed.
- Verified sequencing and timing of the examination relative to other operations such as grinding, welding, or heat treating were specified.
- Reviewed personnel records and verified qualifications.
- Verified required equipment and materials were at the work station.
- Verified specific areas, locations, and extent of examination were clearly defined.
- Verified examined surfaces were cleaned at the conclusion of the examination.

Documents reviewed are listed in the attachment.

The inspectors performed the following samples:

- IP 57060 Section 02.02 - eight 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 Magnetic Particle Examination of Safety Related Welds (IP 57070)**

a. Inspection Scope

The inspectors observed ongoing magnetic particle (MT) examination activities for the completed pipe welds listed below. These welds were on the safety-related end of the spool piece assemblies that form the interface between the auxiliary feed water and fire protection systems. These activities were performed under WO 08-956892-005. These welds were ASME Section III Class III piping welds performed by Bechtel.

Specific MT examination observed included the following:

<u>Weld ID</u>	<u>Component</u>
2-003C-D105-12	6-inch Flange/Fitting
2-003C-D105-14	6-inch Fitting/Fitting

2-003C-D105-9	6-inch Flange/Fitting
2-003C-D105-11	6-inch Fitting/Fitting

The inspectors also observed ongoing MT examination of one completed 12 inch diameter component cooling system pipe weld 2-070B-D082-16. This activity was performed under WO 08-953303-002. This weld was also an ASME Section III Class III piping weld.

The above ongoing MT examinations were observed to determine whether they were conducted by properly qualified personnel and in accordance with ASME Boiler and Pressure Vessel Code, Section II, 1971 Edition with Addenda through Summer 1973. The inspectors verified the work package specified the appropriate NDE examination procedure to be used and that a copy of the procedure was available in the area in which the work was being performed. The inspectors reviewed Bechtel procedure MT-ASME, "Nondestructive Examination Standard Magnetic Particle Examination," Revision 5. The inspectors verified the required equipment and materials were available at the work station and weld numbers confirmed to be those specified in the work package. The inspectors verified that relevant indications were evaluated in accordance with the procedure requirements.

The inspectors also performed the following:

- Verified that applicable drawings, instructions, or travelers clearly specified the test procedure to be used.
- Reviewed personnel records and verified qualifications.
- Verified specific areas, locations, and extent of examination were clearly defined.
- Verified indications were evaluated in accordance with procedures

The following samples were inspected:

- IP 57070 Sections 02.02 - five samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the observed/reviewed MT examinations met applicable ASME Code and other regulatory requirements.

### **C.1.20 Radiographic Examination Procedure Review (IP 57090)**

a. Inspection Scope

The inspectors reviewed Bechtel procedure 25402-000-4MP-T040-S0126, "Nondestructive Examination Standard Radiographic Examination RT-ASME/ANSI Piping," Rev 3. The procedure was reviewed for compliance with ASME Section III, Appendix IX, 1971 Edition through Summer 1973 Addenda. Criteria used to evaluate the procedure included parameters related to penetrameter use such as penetrameter design, selection of essential hole, and number of penetrameter; image quality such as film density limits, and geometrical unsharpness limits; radiograph record keeping such

as film and source location, location markers, radiograph identification, reference to welding procedure, material type, and film manufacturer; radiograph quality such as limits on mechanical, chemical or other blemishes; use of intensifying screens; and methods to reduce and test for backscatter. Records of demonstration to the ANI were also reviewed. Documents reviewed are listed in the attachment.

The inspectors performed the following samples:

- IP 57090 Section 02.01 - one sample

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.1.21 Radiographic Examination Record Review (IP 57090)**

a. Inspection Scope

The inspectors reviewed radiographs for eight completed welds and one historical weld on safety-related piping. Nine radiograph examinations (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 inspectors also verified the following attributes:

1. Penetrameter type, size, placement
2. Penetrameter sensitivity
3. Film density, density variation
4. Film identification
5. Film quality
6. Weld coverage (overlap)

These welds represented ASME Section III Class I stainless steel piping welds in the Unit 2 reactor coolant system which require RT. Specific radiographs reviewed included the following:

<u>Weld ID</u>	<u>Component</u>
2-087B-W001-01	6.34-inch diameter pipe weld
2-087B-W001-02	6.34-inch diameter pipe weld
2-087B-W001-03	6.34-inch diameter pipe weld
2-087B-W001-04	6.34-inch diameter pipe weld
2-085-W001-A5-1-0	4.06-inch diameter pipe weld
2-085-W001-L1-1-0	4.06-inch diameter pipe weld
2-085-W001-E15-1-0	4.06-inch diameter pipe weld
2-085-W001-R11-1-0	4.06-inch diameter pipe weld

Above welds were associated with the completed RPV head penetration modification activities. Specifically, this modification eliminated the upper head injection (UHI) piping

and RPV head mounted core exit thermocouple (CET) system. Portions of the safety-related ASME Section III Class I piping was modified under EDCR 53125, WBN2 RPV UHI/CET Cap Installation, and WO 09-954257-000. The work involved removal of three UHI head adaptors and replacement with welded caps. The fourth UHI location was provided with a welded cap with a vent coupling for the reactor head vent system. In addition, elimination of the top-mounted CET system involved removing the CET head adaptors below the threaded flange joint and replacing them with 2.75 inch ID welded caps.

The inspectors also reviewed RT film associated with one historical ASME Class II weld performed during original construction, 2-074A-D023-20, 18 inch carbon steel RHR pipe weld.

The inspectors reviewed the RT film and examination reports. 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.

The following samples were inspected:

- IP 57090 Section 02.03 - nine samples

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.

## **T.1 Training and Qualification of Plant Personnel**

### **T.1.1 Craft Training (IPs 51051, 51061, 52051)**

a. Inspection Scope

The inspectors observed two classroom training sessions for electrical craft personnel and reviewed applicable procedures. Specifically, the inspectors observed cable installation training in accordance with 25402-000-GPP-0000-N3302, "Cable Installation." The inspectors observed both day shift and evening shift training sessions. The training sessions included discussions on cable installation and fabrication/use of cable pulling breaklines.

The inspectors observed one classroom training session for craft personnel who install instrumentation tubing. Specifically, the inspectors observed training in accordance with Craft Qualification Standard MMQ006.026, "Installation and Maintenance of Compression Tube Fittings."

The inspectors observed one classroom training session for craft personnel who perform electrical torquing activities on electrical connections and reviewed applicable work procedures. Specifically, the inspectors observed training in accordance with



Maintenance Instruction (MI)-57.103, "Torque Values for Electrical Terminations." This training also included a review of the use of measuring and test equipment (M&TE).

The inspectors also observed field training sessions for electrical craft to address recent cable and conduit installation problems which had been identified by the applicant. The inspectors observed both day shift and evening shift training sessions which was conducted by craft supervision and field engineering personnel. The training sessions included discussions on pre-cable pull walkdown checklists, footage considerations, cable installation/routing, bend radius, pull tension monitoring, conduit and cable tray supports, anchors, datasheets, and other work process requirements. Documents reviewed are listed in the attachment.

Samples inspected are as follows:

- IP 51061 Section 02.02.f - one sample
- IP 52051 Section 02.02.c - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

TVA's program for electrical cable and instrumentation tubing installation training of craft personnel was adequate.

### **T.1.2 Engineering Organization Training (IP 35960)**

a. Inspection Scope

The inspectors observed a classroom training session for engineering personnel. Specifically, the inspectors observed classroom training on use of the master equipment list (MEL). The training session was intended to be an introduction on the use of the applicant's new MEL database process by work package planning personnel.

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.

## **III. Operational Readiness Activities**

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

a. Inspection Scope

The inspectors conducted a walkdown of TVA's established fire protection/prevention controls for Unit 2 and inspected hot work activities inside the Unit 2 reactor building. Inspectors observed fire watches and verified that fire suppression devices were

available at or near the location of the hot work activities. The inspectors interviewed fire watch personnel to verify their knowledge of responsibilities as fire watches. The inspectors observed fire prevention aspects associated with ongoing welding activities. Specific documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 64051 Section 02.07 - ten samples
- IP 64051 Section 02.08 - two samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

TVA implemented adequate fire protection measures and controls to support Unit 2 construction activities and minimize impact on Unit 1 operation activities.

**IV. Other Activities**

**OA.1.1 (Open) 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 stress improvement process for six pressurizer dissimilar metal (DM) butt welds (2-WP-10-SE, pressurizer surge line nozzle; 2-WP-11-SE, pressurizer spray line nozzle; 2-WP-12-SE, pressurizer relief nozzle; 2-WP-13-SE, pressurizer safety nozzle; 2-WP-14-SE, pressurizer safety nozzle; and 2-WP-15-SE, pressurizer safety nozzle) 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; and non-destructive evaluation procedures, reports, and qualifications. See the attachment for a list of documents reviewed and specific responses to the reporting requirements for TI 2515/172.

b. Observations and Findings

Introduction:

On July 22, 2010, the inspectors identified a Severity Level (SL) IV, non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion IX, "Control of Special Processes," in that, the licensee failed to provide adequate procedures for the implementation of a stress improvement (SI) process. Specifically, the inspectors identified that the weld centerline markings, and subsequent tool location, for the pressurizer nozzles were marked incorrectly.

Description:

On July 20, 2010, the inspectors observed the application of the Mechanical Stress Improvement Process (MSIP) to the pressurizer spray line nozzle DM weld (weld #2-WP-11- SE). MSIP is an SI process intended to reduce or eliminate the possibility of primary water stress corrosion cracking (PWSCC) in DM welds (e.g., a weld between a carbon steel nozzle and a stainless steel safe end). The process involves temporarily installing a circumferential clamp on a pipe near a DM weld, then applying pressure to the clamp to squeeze the pipe inward uniformly around its circumference. The result is plastic deformation of the pipe, as measured by a reduction in the pipe diameter. This process induces compressive stresses at the inner diameter of the nearby DM weld. These compressive stresses effectively prevent PWSCC from occurring, and prevent existing cracks from propagating.

Location of the clamp was important to ensure adequate compressive stresses were produced at the inner diameter of the DM weld. The required clamp location along the pressurizer spray line piping was determined by a stress analysis calculation (4387-4-003-01, NuVision Engineering, "Analytical Verification of MSIP for Spray Nozzle to Safe End Weld for Watts Bar Units 1&2," Revision 1). This calculation established a reference point on the DM weld and an assigned optimal distance for clamp placement away from the reference point. The reference point for the spray line DM weld was defined as the DM weld centerline. The DM weld centerline was determined to be at the intersection of the carbon steel nozzle bevel, after application of the weld buttering; and the beveled surface of the safe end.

Correct placement of the clamp in the field requires that the same weld centerline used in the stress analysis calculation be marked on the exterior of the weld. Procedure PI-901153-01, "Watts Bar Unit 2 Mechanical Stress Improvement Process (MSIP) Applied to Pressurizer Nozzle to Safe End Welds," was the controlling procedure for the MSIP process. This procedure required the weld centerline to be located and marked. Per Westinghouse Interface Document (25402-011-V1A-MG00-01838-002), paragraph 5.5.3, TVA was required, in part, to "identify and mark the centerline of each dissimilar metal weld (excluding the buttering region)." Location and marking of the weld centerline in the field was performed by TVA personnel using TVA procedure N-GP-8, "Weld Reference System." N-GP-8 is a generic procedure used to establish a weld reference system for welds and areas receiving surface or volumetric examinations, and was not created specifically for the MSIP process. N-GP-8 directed TVA personnel to determine the weld centerline by locating the weld toes (performed with ET examination) at the carbon steel nozzle-to-butter interface and at the DM weld to safe end interface. The weld centerline was then marked at the midpoint between the two weld toes; however, this centerline marking did not correspond to the same centerline established in the stress analysis calculation because it did not account for the thickness of buttering, or any differences in the weld joint bevels between the safe end and the carbon steel nozzle (see Figure 1 of the attachment for an illustration of the surge line nozzle). A note in procedure PI-901153-01 required PCI QC personnel to verify dimensional measurements required as part of the procedure; however the procedure did not identify a technique (for example, direct measurement from a readily identifiable marking on the weld) or criteria to verify the location of the centerline weld, nor was a tolerance for the weld centerline location provided.

The resulting offset between the centerline marked in the field and the centerline location used in the stress analysis was approximately 0.0625" for the spray line DM weld.

After accounting for the additional error caused by the centerline offset, a review of MSIP performance and verification records for the spray line indicated that the clamp was placed within the allowable tolerance established by the stress analysis calculation ( $\pm 0.25$ "). Therefore, the MSIP application for the spray line was within the bounds established by the stress analysis calculation.

Review of the four other nozzles on top of the pressurizer (2-WP-12-SE, pressurizer relief nozzle DM weld; 2-WP-13-SE, pressurizer safety nozzle DM weld; 2-WP-14-SE, pressurizer safety nozzle DM weld; and 2-WP-15-SE, pressurizer safety nozzle DM weld) revealed identical offset errors in the weld centerline location. MSIP performance and verification records for these four nozzles indicated that the clamp was placed within the allowable distance after accounting for the additional error for centerline offset.

On July 22, 2010, the inspectors observed the process of identifying the weld centerline for the pressurizer surge line nozzle DM weld (2-WP-10- SE) using the same procedures described above. However, in this instance NuVision Engineering (contractor) personnel performed the process in conjunction with TVA personnel. Weld toe markings had previously been applied at the safe end weld toe (see Weld Toe B on Figure 1), but the carbon steel nozzle weld toe had not been marked (see Weld Toe A on Figure 1). The inspectors observed TVA personnel apply a low-stress "V" stamp to the carbon steel nozzle weld toe. This location was easily identifiable with the naked eye and, therefore, ET examination was not required. The inspectors then questioned NuVision Engineering personnel on the method to be used to locate the weld centerline and observed the identification of the weld centerline using a process of measuring the distance between the previously located toes of the weld and marking one half the distance between them. This process was consistent with procedure N-GP-8. The centerline mark was confirmed as correct by PCI QC personnel. However, the joint configuration of the surge line nozzle included a layer of weld butter on the carbon steel nozzle side (see Battering on Figure 1), which resulted in an offset between the field marked centerline and the centerline required by the stress analysis (4387-4-001-01, NuVision Engineering, "Analytical Verification of MSIP for Pressurizer Surge Nozzle to Safe End Weld Watts Bar Units 1&2," Revision 1) that was approximately 0.40", and outside the allowable tolerance of  $\pm 0.25$ " provided by the stress analysis calculation. The licensee did not apply MSIP to the pressurizer surge line, and began development of a detailed procedure specifically created to mark the correct weld centerline for the pressurizer surge line nozzle.

The inspectors determined that the licensee's incorrect marking of weld centerlines for the six pressurizer nozzles resulted from the licensee's failure to meet 10 CFR Part 50 Appendix B, Criterion IX, "Control of Special Processes." Specifically, the licensee did not provide a procedure with adequate guidance on how to establish the appropriate weld centerline, and QC checks were not documented with specific criteria or tolerances. The inspectors determined this finding was more than minor in accordance with Inspection Manual Chapter 2517, because it represented an uncontrolled work practice that could impact the quality of safety-related SSCs. This finding has a cross-cutting aspect in the area of Human Performance, H.2(c), because the licensee did not ensure complete procedures were available.

#### Enforcement:

Appendix B, Criterion IX, "Control of Special Processes" of 10 CFR Part 50, states, in part that, "measures shall be established to assure that special processes...are

controlled and accomplished...using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements.” Procedure PI-901153 required that the weld centerline be located and marked and that a QC inspector verify measurements required by the procedure. Contrary to the above, the licensee failed to provide adequate procedures to correctly locate and verify weld centerlines in the field, which would correspond with the weld centerlines in the associated stress analysis calculations for all six pressurizer nozzle DM welds.

Inaccurate placement of the MSIP clamp based on incorrect marking of the weld centerline could result in inadequate compressive stresses at the DM weld inner diameter, which could increase susceptibility of the weld to PWSCC. The licensee captured this violation in their corrective action program in PER 241073.

This finding was determined to be a SL IV violation using Section 6.5 of the Enforcement Policy. 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, NCV 5000391/2010604-01, Failure to Provide Adequate Instructions to Correctly Mark Weld Centerlines for MSIP.

c. Conclusions

The inspectors identified a SL IV NCV violation for the licensee’s failure to provide adequate procedures during implementation of the Mechanical Stress Improvement Process.

**OA.1.2 (Discussed) Welding CAP: Radiographs for ASME Piping Welds (TI 2512/032 IPs 55050, 57090, 57060)**

Background:

The Welding CAP was initiated in the mid 1980s to address several welding related issues. Sub-Issue 2, “Radiographs for ASME Piping Welds,” was initiated when radiographs showing rejectable indications were found to have been accepted by the same film interpreter.

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

A complete review of all Unit 2 historical radiographs and records was performed. This review resulted in 282 welds and their radiographs being rejected for indications or unacceptable film quality. Approximately 80 welds were found rejectable and required repair. Unit 2 repair actions were controlled under PER 170933.

a. Inspection Scope

The following technical and quality requirements were used to assess the Welding CAP activities and associated records:

- 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants

- The Watts Bar Unit 2 piping code of record (*ASME Boiler and Pressure Vessel Code*, 1971 Edition with addenda through summer 1973, Section III, Division 1, Rules for Construction of Nuclear Facility Components).
- Bechtel's Special Processes Manual (SPM), Revision 1 which includes program documents for control of weld repairs, such as general welding standards, weld repair documentation, welding procedures, welder qualifications, control of weld filler metals, and nondestructive examination (NDE) procedures.

Documents reviewed are listed in the attachment.

#### Program Inspection

The inspectors performed a program inspection of the contractor's (Bechtel) welding program to IP 55050, which is documented in NRC Inspection Report (IR) 0500391/2010603, Section C.1.15.

#### Document Reviews:

The following procedures were being used by the contractor (Bechtel) to perform activities associated with this CAP sub-issue. The inspectors reviewed them to verify compliance with the requirements of the code of record:

- Radiography: "RT-ASME/ANSI Piping," Revision 3 (25402-000-4MP-T040-S0126)
- Liquid penetrant: "PT(safety-related)-ASME," Revision 5 (25402-000-4MP-T040-S0125)
- Welding: "General Welding Standard GWS-1," Revision 6 (25402-000-4MP-T040-S0013)
- Welder Qualification: "Welding Performance Qualification Specification [ASME IX] WQ-1," Revision 4 (25402-000-4MP-T040-S0078)

The inspectors performed independent interpretation of radiographic films and/or reports for the following weld numbers to verify weld acceptability in accordance with the code of record:

- 2-072B-D043-02
- 2-074B-D033-03
- 2-072B-D043-04
- 2-063B-D193-11
- 2-041A-T003-07
- 2-070B-D077-06A C2
- 2-063B-D195-01
- 2-068E-W004-01 C0R1
- 2-068G-W002-01 C0R1
- 2-068C-W004-02 C0R1
- 2-063B-T097-13 C2R0
- 2-015A-T001-58 (NRC IR 05000391/2009-605 Section C.1.4)
- 2-015A-T001-49 (NRC IR 05000391/2009-605 Section C.1.4)
- 2-015A-T004-61 (NRC IR 05000391/2009-605 Section C.1.4)

The inspectors reviewed the following welding procedure specifications (WPS), Procedure qualification records (PQR), and welder performance qualification records (WPQ), to verify compliance with the code of record and applicable provisions of ASME Section IX, Welding and Brazing Qualifications:

- WPSs P8-T-Ag Rev. 0 and P43,P8-T-Ag Rev. 0
- PQRs 620, 621, 623, 1041, 1389
- WPQs for welder symbols: P-106, P-037, P-68, P-137, P-222, and P-223

Additionally the inspectors observed the qualification of welder P-223 to verify that Bechtel's qualification practices comply with the current edition of ASME Section IX.

The inspectors reviewed the qualification records of a TVA Level III in radiography as well as two Bechtel Level III's in radiography to verify compliance with the American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, 2006.

#### Work Observation: Repair of Weld Number 2-068E-W004-01

One of the weld repairs performed as a result of PER 170933 was on pipe weld number 2-068E-W004-01 (WO 10-951189-000) for FW-No. 1 of the RCS #4 hot leg. The excavation for this repair extended into the existing Inconel weld of the reactor safe-end. The inspectors reviewed the following documents associated with this repair:

- Bechtel's "Weld Repair Plan For TVA Weld 2-068E-W004-01," dated February 24, 2010.
- Lloyds Register Industrial Services General Certificate number 40 8788, dated October 28, 1974, to verify material classification of existing safe-end material as Inconel.
- The original RT films of FW-No. 1 for the RCS #4 hot leg along with the original supporting TVA Nondestructive Examination (NDE) Radiographic Evaluation Data Sheets Report No. 1401 dated January 9, 1978 when these RT films were deemed acceptable. The inspectors also reviewed later versions of TVA's NDE Radiographic Evaluation Data Sheet Reports No. 2-1236 dated July 7, 1988 for FW-No. 1. The original RT films were rejected by TVA during this 1988 review based on flaw size and improper penetrometer. The inspectors determined that FW-No. 1 was re-examined using radiography in accordance with PER 170933 summary of corrective action dated August 30, 2009. Radiographic re-examination was subcontracted to Ivey Cooper Services (ICS) and performed in accordance with Bechtel's NDE-RT procedure.

The inspectors reviewed Bechtel's #4 hot leg FW-No. 1 Radiographic Technique Report & Evaluation which was signed by two ICS NDE-RT Level II Radiographers on January 14, 2009, to determine if the film quality met the requirements of the ASME Code of record.

The inspectors reviewed Bechtel NDE Radiographic Interpretation Report 19, dated December 22, 2009, for FW-No. 1 of the # 4 hot leg, which documented the rejection of two defect locations for an elongated indication greater than 3/4" and slag inclusion (as recorded in PER 212688). This RT report was interpreted by

separate Bechtel and TVA NDE-RT Level III examiners. This review was conducted to determine if the acceptance criteria used in Report 19 to interpret the RT film met the requirements of the ASME Code of record and Bechtel's NDE standard for RT-ASME/ANSI, paragraph 6.0 "Acceptance Criteria."

- "Bechtel Technical Specification for Welding Filler Metal WM-ERNiCr-3", Revision 0, to verify that the Inconel weld filler metal used in the repair complied with the code of record and Bechtel's Special Processes Manual requirements.
- Certified material test reports for both 3/32" and 1/8" diameter inconel ERNiCr-3 bare rods to verify compliance with ASME Section II – Part C, SFA-5.14 and ASME Section III, NB-2400.
- Qualification records for welder P-222, who performed the repair, to verify compliance with the qualification requirements of the applicable edition of ASME Section IX.
- The Bechtel welding procedure used to the perform the weld (P43,P8-T-Ag Rev. 0) and associated qualification record (PQR #1389) to verify compliance with the applicable edition of ASME Section IX.

The inspectors also observed the excavation cavity prior to welding to verify compliance with the repair plan (listed above). The inspectors observed Bechtel's etching of the cavity wall to verify that Bechtel determined the exact extent of the Inconel area. The inspectors reviewed welding procedure P8-T-Ag, Revision 0, to confirm that it met applicable requirements for the stainless steel portion of the repair. The inspectors observed Bechtel perform the Inconel portion of the repair to verify compliance with welding procedure "P43,P8-T-Ag" Revision 0.

The inspectors reviewed Bechtel's PT NDE Report PT-123 to determine if the report met the requirements of the Bechtel NDE Standard PT(safety-related)-ASME III Piping for both repair locations on FW-No 1.

Work Observation: Repair of Welds 2-068G-W002-01-C0R1 and 2-068C-W004-02 C0R1

The inspectors observed in-process weld repair activities associated with the reactor coolant piping welding and reviewed Bechtel's weld repair controls and associated records for these repair activities.

Weld repairs were performed on the following two existing RCS pipe welds (ASME Section III, Class 1 piping):

- Field Weld (FW) 1, documented as 2-068G-W002-01 C0R1, between the No. 2 Steam Generator nozzle and the 40° elbow of the cross-over piping to the reactor coolant pump, and
- FW 2, documented as 2-068C-W004-02 C0R1, between the No. 4 reactor coolant pump (RCP) nozzle and cold leg pipe.



The inspectors reviewed TVA's Sketch (SK 304-2, Sheets 10 and 8) to determine if the field locations of FWs 1 and 2, located by the applicant and under repair, correctly corresponded to the areas identified for repair.

The inspectors reviewed the original RT films of the above FWs 1 and 2 along with the original supporting TVA NDE radiographic evaluation data sheets dated February 16, 1978, and February 27, 1978, respectively, when these RT films were deemed acceptable. The inspector also reviewed later versions of TVA's NDE radiographic evaluation data sheet report 2-1243 dated July 15, 1988, and report 2-1229 dated May 19, 1988, respectively for FWs 1 and 2. The original RT films were rejected by TVA during these 1988 reviews based on flaw size and unacceptable technique (i.e., incorrect penetrometer, poor density, and unsatisfactory geometric unsharpness). The inspectors determined that FWs 1 and 2 were re-examined using radiography in accordance with PER 170933 summary of corrective action dated August 30, 2009. Radiographic re-examination was subcontracted to ICS and performed in accordance with Bechtel's NDE-RT procedure.

The inspectors reviewed Bechtel's FW-No. 1 and 2 Radiographic Technique Report & Evaluation which was signed by two ICS NDE-RT Level II radiographers in mid-December of 2009 to determine if the film quality met the requirements of the ASME Code of record.

The inspectors reviewed Bechtel's Radiographic Interpretation Report 23 of December 18, 2009, for FW 1, which documented the rejection of two defect locations for lack of fusion (LOF) and elongated indication greater than 3/4". The inspectors also reviewed Report 20 of December 17, 2009, for FW 2, which documented the rejection of five locations for LOF, elongation indication greater than 3/4", and slag inclusion (as recorded in PER 2126989). These reviews were conducted to determine if the acceptance criteria used in Reports 20 and 23 to interpret the RT film met the requirements of the ASME Code of record and Bechtel's NDE standard for RT-ASME/ANSI, paragraph 6.0 "Acceptance Criteria." These RT reports were interpreted by separate Bechtel and TVA NDE-RT Level III examiners.

The inspectors reviewed a Bechtel field welding checklist (WR-5) document to determine if the weld repair locations and sizes were drawn on charts for each excavated repair cavity and met the requirements of the ASME Code of record paragraph NB-4132.

After Bechtel performed internal back-grinding of the partially welded thru-wall groove cavity of FW-No. 2, the internal portion of the repair cavity was examined using the solvent-removable red-dye PT testing method to verify removal of indications, prior to start of welding inside the pipe. The inspectors reviewed Bechtel's PT NDE Report PT-077 to determine if the report met the requirements of the Bechtel NDE Standard PT(safety-related)-ASME III Piping.

The inspectors reviewed Bechtel's Field Welding Checklist (WR-5), that documented repair activities of FW 2, to determine if this document met the requirements of Bechtel's WD-1 for weld repair. The inspectors also reviewed the contents of the WR-5 to determine if the recorded welding procedure (P8-AT-Ag), welder qualification (P-037), and weld filler metal (B200 and B201 with CMTR traceable heat numbers) met the requirements of Bechtel's SPM and GWS-1 for weld repair and the ASME Code of record.

The inspectors observed in-process repair welding of the external cavities to determine if welding practices and techniques met the requirements of Bechtel's GWS-1 welding standard and the ASME Code of record.

Work Observation: Repair of Weld 2-063B-T097-13-C2R0

The inspectors performed an inspection of weld repair activities associated with the second cut-out of a stainless steel 1-1/2" diameter schedule 160 field weld between a pipe and weld-neck flange for the safety injection piping of the boron injection loop 1. This is an ASME Section III, Class 1 safety-related weld repair in accordance with PER 170933 for Bechtel WO 111037282. The inspectors observed in-process welding and reviewed Bechtel's weld repair controls and associated records for this repair activity.

The inspectors reviewed TVA's Sketch (SK 435-13, Sheet 17 R5) to determine if the field location of FW-No. 13, located by the applicant and under repair, correctly corresponded to the areas identified for repair.

The inspectors reviewed Bechtel's Field Welding Checklist (WR-5), that documented repair activities of FW-No. 13, to determine if this document met the requirements of Bechtel's WD-1 welding standard for weld repair. The inspectors also reviewed the contents of WR-5 to determine if the recorded welding procedure (P8-AT-Ag), welder qualification (P-137 for smaller diameter qualification below 2.5" NPS and less), and weld filler metal (B200 and B201 with CMTR traceable heat numbers) met the requirements of Bechtel's SPM and GWS-1 welding standard, and the ASME Code of record. The inspectors reviewed the CMTRs for both the pipe and weld-neck flange and verified that the material chemical and mechanical properties and Class 1 upgrade was performed with the proper NDE-UT and PT examinations, respectively, in accordance with the ASME Section III, Article NB-2000 code of record.

The inspectors performed the following samples:

- IP 55050 02.01 - one sample
- IP 55050 02.02 - seven samples
- IP 55050 02.03 - six samples
- IP 55050 02.04 - three samples
- IP 57060 02.01 - one sample
- IP 57060 02.03 - one sample
- IP 57090 02.01 - one sample
- IP 57090 02.03 - 15 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed activities and associated records for this Welding CAP sub-issue and resulting reactor coolant system weld repairs 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.1.3 (Discussed) Quality Assurance Records CAP (TI 2512/28, IPs 50075, 55100, 55050)****a. Inspection Scope**

The scope of the applicant's QA Records CAP was described during the previous inspection of this CAP as documented in NRC Inspection Report 05000391/2010603.

The inspectors continued to review the applicant's implementation of the QA Records CAP. Specifically, the inspectors reviewed the results of sample assessments performed by the applicant to verify resolution of previously identified problems with retrieveability, storage, and completeness and to resolve quality and technical problems. Record types reviewed included welding and system cleanliness records. Additionally, the inspectors performed an independent sample selection of 12 system cleanliness records which were shown on the applicant's Engineering Construction Monitoring and Documentation (ECM&D) database as active records. For welding records, 35 records were selected from the Weld Monitoring Information System (WMIS) database as active records.

The inspectors also selected 14 additional welds from as-constructed weld diagrams, which were not listed in WMIS, and requested the applicant produce the applicable weld records. Additionally, inspectors selected one weld, 2-074A-D023-20, for detailed review of the RT film package associated with that weld record. Review of that RT film and RT record is included in Section C.1.21.

Specific QA records and applicant sample assessment reports reviewed are listed in the attachment.

**b. Observations and Findings**

No findings of significance were identified. The applicant was able to produce each of the above requested QA records from the Unit 2 records vault. The inspectors reviewed the original records and determined that the records were legible and complete.

The inspectors determined that the applicant's QA records sample assessment process had not addressed the retrieveability of records which were not stuated as active records on the ECM&D and WMIS databases. The inspector was informed that separate future sample assessment(s) would address those records.

The inspectors verified that TVA had adequately reviewed an appropriate size sample of each record type for welding and system cleanliness records for those records identified in the ECM&D and WMIS databases. The inspectors also performed a separate independent sample of weld records not shown as active on WMIS database with no missing records identified.

Record-related discrepancies were properly identified and entered into the corrective action program as appropriate. The applicant had not yet completed all planned QA record sample assessments at the end of the inspection period. Future QA record sample assessments are planned for various civil record types and to address retrieveability of records not shown as active on ECM&D.

c. Conclusions

The actions performed to resolve the issues associated with the QA Records CAP for Unit 2 welding and system cleanliness records were found to be adequately planned and implemented. Additional NRC review of future applicant QA record assessments will be needed prior to closure of this CAP.

**OA.1.4 Environmental Inspection (IP 80210)**

a. Inspection Scope

The inspectors performed a periodic inspection of the environmental activities associated with WBN2. The inspection consisted of a meeting with representatives of the various organizations responsible for the implementation of the environmental program at Unit 2, walkdowns of various structures and use areas, and documentation review.

The organizations represented during the meeting included TVA corporate, TVA's Watts Bar Units 1 and 2, and Bechtel. The inspectors discussed how the program requirements imposed by the National Pollution Discharge Elimination System (NPDES) permits on Unit 1 would cover many of the activities on Unit 2.

The inspectors performed a documentation review that included the Final Environmental Impact Statement Supplement, the Atomic Energy Commission Construction Permit for the plant, and the State of Tennessee NPDES permits which were the inspection basis documents. The review encompassed the annual non-radiological environmental operation reports for years 2008 and 2009 and various process and procedure documents that constituted the environmental program.

The inspectors performed walkdowns of various site areas both inside and outside the protected area. These walkdowns included the areas associated with fuel oil and chemical handling inside the protected area and areas associated with wastewater treatment and holdup such as yard ponds. Waste oil and asbestos areas were also looked at in the owner controlled area.

During the walkdowns, the inspectors noted extensive deployment of a floating oil control boom at various locations both inside and outside the protected area. The oil control boom had been deployed in response to a leak in a fuel oil tank fill line inside the protected area that was common to both units. The inspectors reviewed the documentation related to the fuel oil leak and interviewed various personnel who were involved in its initial discovery and mitigation. During walkdowns of the various yard holding ponds, the inspectors looked for any visible evidence of oil contamination of the water, residual contamination of the shores, and evidence of oil in the oil skimmers and spillways. Specific documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

The detailed written directives and procedures adequately documented the environmental program requirements. The program had clearly identified roles and responsibilities. There was sufficient documented audit and assessment activity to

establish that the supporting laboratories were appropriately responsive to the customers' needs. The construction site used the same condition reporting system as the operating unit with some differences in implementation to account for the differences in processes, organization, and plant status. The QA plans provided appropriate surveillance of the environmental program, and low level condition reports indicated an appropriate sensitivity to environmental requirements. The licensee's identification and subsequent response to the fuel oil leak was in accordance with the environmental program established for the Watts Bar site.

c. Conclusions

The inspectors concluded that the environmental programs required for Unit 2 construction activities were properly implemented.

**OA.1.5 (Discussed) Safety-Related Motor-Operated Valves Design Criteria and Capability (IPs 62708, 62710, TI 2515/109 and TI 2515/140)**

a. Inspection Scope

The inspectors reviewed documents associated with the design basis and design criteria for safety-related motor-operated valves (MOVs) and verification of operation capability. The inspectors reviewed calculations and other TVA documents pertaining to the licensee's response to address the following three NRC Generic Letters (GL):

- Safety-related MOV Testing and Surveillance (GL 89-10);
- Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves (GL 95-07);
- Periodic Verification of Design-Basis Capability of Safety-Related MOVs (GL 96-05).

The inspectors evaluated both the Watts Bar site and TVA corporate MOV program documents and calculations to ensure proper application and implementation of the requirements contained in GLs 89-10, 95-07 and 96-05.

The inspectors reviewed the following MOV program documents to verify their compliance with NRC requirements and inclusion of applicable licensing commitments:

- NPG Standard Department Procedure, MMDP-5, "MOV Program," Revision 9
- TVA Letter to the NRC, Response to Generic Letter (GL) 89-10 – Safety-Related Motor-Operated Valve (MOV) Testing and Surveillance for BFN, SQN and WBN, dated December 21, 1989
- TVA Nuclear Engineering Mechanical Design Standard, DS-M18.2.21, "Motor Operated Valve Thrust and Torque Calculations," Revision 17
- TVA Nuclear Engineering Mechanical Design Standard, DS-M18.2.22, "MOV Design Basis and JOG Review Methodologies," Revision 3
- NPG Calculation, MDQ0029992009-0310, Generic Letter 89-10 - MOV Population for Watts Bar (Unit 2), Revision 1
- NPG Calculation, MDQ0029992009-0311, "Evaluation of Gate Valves Subject to Thermal Binding and Bonnet Pressurization per NRC GL 95-07," Revision 1
- NEDP-7 QG, "Qualification Guides (QG)," Revision 19

b. Observations and Findings

No findings of significance were identified.

The inspectors noted that TVA's corporate program document MMDP-5, "MOV Program," Revision 9, had not yet been updated to include the WBN2 safety-related MOVs.

c. Conclusions

The TVA MOV program procedures and WBN2 MOV programmatic related documents met the intent of Generic Letters 89-10, 95-07, and 96-05.

**OA.1.6(Closed) Watts Bar 2 Violation 05000391/86-21-01**

a. Inspection Scope

The inspectors performed a review of documentation to determine if WBN2 Violation 05000391/86-21-01, Improper Weld Inspection, could be closed. This violation documented the acceptance of Weld 2062-A060-62-45 by a supervisor who was not certified as qualified to perform weld inspections. In response, WBN2 provided nonconformance report (NCR) 7027, documenting the completion of the required compensatory actions, which included verification that Weld 2062-A060-62-45 was inspected by a certified welding inspector and found acceptable. NCR 7027 was closed on February 10, 1987. The licensee submitted a letter to the NRC dated March 16, 1987, documenting completion of NCR 7027.

The inspectors reviewed the violation and documentation provided by the licensee to determine if any additional actions were needed to support closure of this violation.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that documentation provided by the licensee verified completion of the required corrective actions and that no additional inspections were required. Violation 05000391/86-21-01 is closed.

**OA.1.7(Discussed) Inspection of HVAC Duct and Supports CAP (TI 2512/025, IPs 37002, 50100)**

a. Inspection Scope

Background: The Heating, Ventilating, and Air Conditioning (HVAC) CAP was developed after TVA determined that adverse conditions involving HVAC duct and duct supports were programmatically characterized as having:

- Incomplete design basis
- Inadequate design documents
- As-built configurations not in conformance with existing design documents
- Inadequate or incomplete inspection documentation and incomplete instructions.

For Unit 1, TVA resolved these issues via the following four tasks:

- Completing the design basis by reviewing and revising the design criteria; issuing supporting calculations and updating the FSAR to be consistent with the upgraded design criteria
- Updating design output documents to be consistent with the completed design basis
- Revising construction, maintenance, and QA procedures to incorporate design output documents
- Developing bounding critical cases of existing installations and evaluating their adequacy, and performing unique evaluations or modifying installations when they could not be qualified by the critical case evaluations

The Unit 2 program uses the Unit 1 approach and also addresses TVA's past corrective action tracking documents (CATDs):

- 11103-WBN-06 – Duct support documentation and as-constructed drawing discrepancies require further evaluation and correction
- 80214-WBN-01 – HVAC support was final inspected and documented, but inspection was performed prior to approval of design drawing. (Although support ID has a Unit 2 designation, run of duct was determined to be common during the Unit 1 CAP. Thus, it was walked through, evaluated, and qualified under Unit 1 CAP).

In NUREG-1232, Volume 4, "Safety Evaluation Report on Tennessee Valley Authority: Watts Bar Nuclear Performance Plan," NRC staff determined that TVA's approach to resolve the CAP issues for Unit 1 was acceptable.

TVA letter dated September 6, 1991, "WBN – Nuclear Performance Plan," Volume 4, Revision 1, Section III.2.10, Heating, Ventilation, and Air Condition Duct and Duct Supports Corrective Action Program," proposed their approach for resolving the HVAC CAP. In a letter from R. R. Baron to the NRC dated October, 10 1995, TVA notified the NRC of the completion of the HVAC CAP on Unit 1. For the HVAC CAP, TVA stated in their September 26, 2008, letter to the NRC that the Unit 1 approach will be used for Unit 2.

NRC letter from P. D. Milano to Mr. Bhatnagar dated February 11, 2009, "Watts Bar Nuclear Plant, Unit 2 – Status of Regulatory Framework for the Completion of Corrective Action and Special Programs and Unresolved Safety Issues," provided the staff's assessment of TVA's approaches for resolving the CAPs and SPs. The staff concluded there was reasonable assurance that, when implemented as described, the HVAC CAP will be appropriately resolved for Unit 2.

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 HVAC Duct and Supports 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 HVAC Duct and Supports which were programmatically characterized by TVA.

MAI-4.3, "HVAC Duct Systems," Revision 9, was reviewed to ensure consistent implementation of design output documents. The inspectors reviewed design output documents as well as design basis documents. During Unit 1 construction, there were discrepancies in the design basis due to incomplete design criteria without adequate supporting documentation. The inspectors reviewed Design Criteria Document, WB-DC-40-31.8, "Seismically Qualifying Round and Rectangular Duct," to verify whether the design criteria were updated to address previous Unit 1 discrepancies, along with supporting Unit 1 calculations. The inspectors assessed whether the Final Safety Analysis Report (FSAR) was updated to be consistent with the design criteria, and to ensure that the facility is as described in the FSAR. The inspectors reviewed design output documents for adequacy; such as drawings and specifications. Specifically, G-95, "Installation, Modification and Maintenance of HVAC Duct"; N3M-914, "Quality Assurance Requirements for Construction, Construction Testing, and Inspection of Safety-Related HVAC Systems"; and N3C-942, "Structural Requirements for HVAC Ducts and Ducts Supports" were reviewed. During the review, the inspectors ensured that the design output documents addressed all design parameters and that issued modifications were implemented accordingly.

The inspectors determined that TVA engineering had developed bounding critical cases of existing installations and evaluated the supports against the design basis. For cases where the existing/as-built configurations could not be qualified by the bounding critical cases, modifications were generated in the form of an EDCR.

The inspectors were unable to observe sufficient completed field 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 may be required to evaluate the adequacy of the field implementation.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions associated with the HVAC CAP to verify the adequacy of the program. The inspectors concluded that the programmatic aspects of TVA's implementation plan were adequate. Additional inspections may be required to evaluate the adequacy of the field implementation for the HVAC CAP.

**OA.1.8 (Closed) Electrical Cable CAP - Sub-issue: Silicone Insulated Rubber Cables (IP 51065, TI 2512/016)**

a. Inspection Scope

Background:

Various concerns related to cable installation in the 1980s were identified at WBN by the TVA through Employee Concerns, Condition Adverse to Quality documents (CAQs), and NRC findings. Silicone rubber insulated cable failures at the Sequoyah Nuclear Plant (SQN) were determined to be possibly caused by "impact-induced damage." Silicone rubber cables manufactured by American Insulated Wires (AIW) appeared to be more susceptible to impact-induced damage than cables from Rockbestos and Anaconda. AIW silicone rubber insulated cables were removed from circuits required to be



environmentally qualified in accordance with 10 CFR 50.49 at SQN. Based on the susceptibility of the AIW silicone rubber insulated cables, TVA determined not use this type of cable in Class 1E circuits at WBN. TVA performed testing to qualify Rockbestos and Anaconda cables.

All cables removed from WBN and designated as SQN specimen (Rockbestos and Anaconda) successfully passed tests. Based on analysis, TVA concluded that the test results of the SQN specimen are applicable to WBN. The successful performance of the cables during these tests demonstrated that the installation methods for silicone rubber cables were adequate to have prevented significant impact-induced damage. The cables, as aged to conditions enveloping WBN requirements, demonstrated an ability to perform their intended safety function following the rigors of installation and removal.

The inspectors reviewed the applicant's actions to resolve the Electrical Cable CAP Sub-Issue: Silicone Rubber Insulated Cable, to confirm that the applicant's program complies with all commitments and NRC requirements. The inspectors reviewed numerous ICRDS reports to verify compliance with resolution to this cable sub-issue and that all safety-related AIW were removed or abandoned. The inspectors reviewed Self-Assessment Report 25402-SA-ENG-10-002 on the subject of Cable Issues CAP Plan (CP 1.1 Silicone Rubber Insulated Cables), calculations, cable test reports, and closure reports for Units 1 and 2.

b. Observations and Findings

No findings of significance were identified.

The inspectors determined that all American Insulated Wire were properly abandoned or removed and replaced with other approved cable types. The inspectors determined that testing and evaluation implemented by TVA in resolving this issue were adequate to bound WBN2.

c. Conclusions

The inspectors' review determined that TVA had taken adequate corrective actions to resolve the concerns pertaining to the electrical cable CAP sub-issue on silicone rubber insulated cables, therefore, this CAP sub-issue is closed.

**OA.1.9 (Closed) Electrical Cable CAP - Sub-issue: Cable Sidewall Bearing Pressure (SWBP) (IP 51065, TI 2512/016)**

a. Inspection Scope

Background:

Electrical Cable CAP Sub-Issue: SWBP was not properly addressed in the design and installation process at WBN. As a result, radial forces exerted on the insulation of a cable at a bend during pulling around a raceway bend or sheave may have exceeded allowable SWBP values. This excess in SWBP represented a condition which could adversely affect the insulating properties of the cable.

TVA's corrective actions included walk downs, calculations, comparisons with typical manufacturer's limits, testing, and independent reviews of test results. The test results established allowable SWBP values. In addition, General Engineering Specification G-38 was revised to restrict the expected pull tension during cable installation to ensure allowables WPB valves would not be exceeded.

The inspectors reviewed the actions to resolve the Electrical CAP Sub-Issue, SWBP, to confirm that the program complies with all applicant commitments and NRC requirements. The inspectors reviewed numerous ICRDS reports to verify compliance

with resolution to this cable sub-issue. The inspectors reviewed TVA Specification G-38, Revision 20, for the “Installation, Modification, and Maintenance of Insulated Cables Rated up to 15,000 volts.” The inspectors reviewed calculations of pulling tension and sidewall pressure; manufacturer Certificate of Conformance from Rockbestos Surprenant Cable Corporation for FWLIII Coaxial, Twin-axial, and Tri-axial Class 1E cables (150 #/ft); FRXLPE w/ CSPE Jacket 90C 600V (1000#/ft), and FRXLPE w/ CSPE Jacket 90C 300V (500#/ft) and verified the implementation of these SWBP limits in work orders and instructions.

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 SWBP and that limits applied are bound by calculations, testing and supplier information to provide adequate assurance the cables will perform within TVA’s requirements and NRC regulations.

c. Conclusions

The inspectors’ review determined that TVA had taken adequate corrective actions to resolve the concerns pertaining to the CAP sub-issue on cable SWBP, therefore, this CAP sub-issue is closed.

**OA.1.10 (Discussed) Electrical Cable CAP - Sub-issue: Cable Pullbys (IP 51065 , TI 2512/016)**

a. Inspection Scope

The inspectors reviewed the actions to resolve the Electrical CAP Sub-Issue, Cable Pullbys, to confirm that the program complies with all applicant commitments and NRC requirements. The inspectors reviewed numerous ICRDS reports to verify compliance with resolution to this cable sub-issue. The inspectors reviewed the TVA specification G-38 Rev. 20 for the “Installation, Modification, and Maintenance of Insulated Cables Rated up to 15,000 volts”; calculations of pulling tensions, walk down packages; EDCR packages; Unit 1 CAP Sub-issue on pullbys closure documents; and self-assessment 25402-SA-ENG-10-10.

b. Observations and Findings

No findings of significance were identified.

The inspectors determined that procedures established for the installation of all types of cables have properly addressed CAP sub-issue concerns associated with pullbys. These procedures are supported by calculations, testing, and supplier information to provide adequate assurance the cables will perform within TVA’s requirements and NRC regulations.

c. Conclusions

This inspection concluded that procedures pertaining to the CAP cable sub-issue on cable pullbys were appropriately addressed for WBN2. Inspection of cable replacement will continue.

**OA.1.11 (Discussed) Electrical Cable CAP – Sub-issue: Computerized Cable Routing System (CCRS) – Work Observation (IP 51063, TI 2512/016)**

a. Inspection Scope

The inspectors conducted observations of cable signal tracing activities that were implemented to address cable routing documentation deficiencies. In addition, the inspectors interviewed engineering staff responsible for the activity and reviewed applicable segments of WO 111044164 that established the signal tracing activities including resolution of identified discrepancies. The inspectors observed cable tracing of cable 2V9155B, B-train, associated with high pressure fire protection system, from electrical board 2B1-B / 2-MCC-213-B1, Section 17B-B to motor operated valve 2-FCV-26241-B. The inspectors observed the signal tracing activities to verify that the applicant was following proper peer to peer verification procedures and documenting the signal tracing information, noting all nodes through which the cable was routed. The inspectors observed the pre-job briefings to determine adequacy to cover staff qualifications, equipment calibration, equipment operating conditions, coordination with operations staff, and the use of appropriate tools. The inspectors interviewed staff members to verify that the data generated by the cable tracing will be used in engineering evaluations to update ICRDS information and determine cable rerouting requirements.

b. Observations and Findings

No findings of significance were identified.

The CAP plan associated with the Electrical CAP Sub-Issue: CCRS verification and validation is still in process. The inspector's review of the issues associated with this CAP noted a number of issues that include missing nodes, cables not included in the raceway systems, erroneous routing information, and new requests for cable tracing to verify actual cable routing. The inspector determined that these items are being addressed by the applicant and may be the subject of future NRC inspection.

c. Conclusions

This CAP remains open pending future review of the applicant's actions.

**OA.1.12 (Discussed) Inspection of Watts Bar Nuclear Plant Use-As-Is Special Program (TI 2512/43)**

a. Inspection Scope

The objectives of this inspection were to evaluate the applicant and contractor's initial implementation of the Use-As-Is Special Program (SP). This program was established due to the fact that TVA determined that there was inadequate documentation for Conditions Adverse to Quality (CAQs) with dispositions of "Use-As-Is" or "Repair." The applicant initiated a plan to review all selected CAQs to ensure:

- 1) CAQ documents with the disposition of Use-As-Is or Repair were tracked against affected documents.
- 2) CAQ documents provide sufficient justification for the Use-As-Is or Repair dispositions.
- 3) CAQ documents performing a document change can readily be linked to the drawing to indicate as-constructed configuration.
- 4) All design requirements which were not met as described by the CAQs were identified.

The inspector reviewed the applicant's Implementation Plan, Closure Report (including implementation details, the data base results matrix, self-assessment, and open items list), and closure documentation of 31 of 643 CAQs evaluated by the applicant. The closure documentation covered a variety of issues and included; documentation of welding, NDE, drawing changes, calculations, evaluations, initiation of new PERs, and open item tracking. In addition, the inspector conducted walkdowns of three items in the plant associated with applicant walkdowns and reviewed photographs of three additional walkdowns. The inspector also reviewed closeout notes for approximately 300 CAQs in the matrix.

The applicant had originally planned to review 38 CAQs for Unit 2 items which had been previously evaluated under the Unit 1 program for potential unique Unit 2 issues. The applicant subsequently decided this was not necessary. The inspector reviewed these CAQs to confirm no significant issues existed that could affect Unit 2. Closure information was reviewed for five of these CAQs.

The inspector also reviewed documentation for the implementation of corrective actions associated with the self-assessment and four additional PERs for adequacy of planned corrective actions.

b. Observations and Findings

No findings of significance were identified. Plans and actions to date were shown to be equivalent or exceeded those for Unit 1. For actions that were not yet complete, the applicant established an open item list and planned to confirm implementation of all actions. Corrective actions for the self-assessment were covered in PER 218423, one of which included a re-review of all CAQs previously reviewed with improved guidance. This corrective action included required review of the 38 CAQs which had previously been reviewed by the Unit 1 process. This action was not complete for these 38 CAQs and, therefore, was inappropriately closed. This problem is considered another example of previously issued NCV 5000391/2010607-01, Ineffective Measures to Assure Prompt Identification and Correction of Conditions Adverse to Quality. The applicant initiated PER 255649 for this problem.

c. Conclusions

Actions to date and planned for the Use-As-Is SP are equivalent or exceed Unit 1 actions. The applicant had completed the initial reviews for all CAQs with no significant items identified. The applicant had initiated documentation to track open actions. This SP remains open pending review of the applicant's cumulative effects analysis and review of the completion of open items.

**OA.1.13 (Discussed) Heat Code Traceability CAP (IPs 49055 and 49065, TI 2512/024)**

a. Inspection Scope

The inspectors reviewed the applicant's actions related to the Heat Code Traceability CAP implementation plan ("plan") for Unit 2 following the guidance in Temporary Instruction (TI) 2512/024. This CAP was designed to resolve issues related to traceability problems identified in the mid-1980s with pressure retaining loose piping, fittings, and flange bolting (materials) used in American Society of Mechanical Engineers

(ASME) applications. The overall objective of the CAP was to provide a re-verification of ASME Section III Code compliance of the installed hardware.

The Unit 2 plan was designed to address the following identified issues and to provide for recurrence control:

- ASME systems containing lower class ASME or ASTM material; and
- ASTM plate material attached to ASME pressure boundaries.

The inspectors reviewed records related to ASME Section III, Class 1, 2, and 3 pressure retaining materials to determine if the applicant was effectively implementing the Unit 2 plan. Specifically, the inspectors:

- Reviewed documentation on bolts for four separate flanges to ensure adequate traceability and ASME Code compliance of Class 1 flange bolting and to determine if the applicant's proposed resolution was in conformance with the ASME Code. The inspectors reviewed records to determine if the required performance tests, nondestructive tests, and other specification requirements were met and if the required inspections were performed;
- Reviewed the applicant/contractor system for reporting and dispositioning nonconforming materials associated with the reactor coolant pressure boundary piping and other safety-related piping, including seven nonconforming reports to determine:
  - whether the records adequately documented the status of the nonconformances;
  - whether the sample of records was legible and complete; and,
  - whether the records were being properly identified and stored.
- Reviewed the applicant's efforts to identify and resolve susceptible materials that were inaccessible for inspection to determine if the applicant's proposed resolution was in conformance with the ASME Code;
- Reviewed the applicant's efforts to locate and evaluate large bore spool pieces that were modified by TVA to determine if the applicant's proposed resolutions were in conformance with the ASME Code. The inspectors reviewed documentation on two spool pieces as part of this inspection activity;
- Reviewed the applicant's efforts to evaluate the adequacy of ASTM materials installed in Class 2 or 3 systems to determine if the ASME material reconciliation requirements for using ASTM materials in an ASME Class application were met. The inspectors reviewed the Unit 1 Heat Code Traceability Final Report to determine if the applicant's previous review of these ASTM materials included materials installed in Unit 2. The inspectors selected three ASTM materials and reviewed associated documentation as part of this inspection activity;
- Reviewed the applicant's efforts to review and evaluate integral attachments to Class 1, 2, or 3 piping. The inspectors selected three materials and reviewed associated documentation to determine if the materials met the applicable ASME Code requirements; and,
- Reviewed the applicant's efforts to identify all questionable heat lots of ASTM A106 material (previously identified during the Unit 1 Heat Code Traceability CAP final) that were installed in Unit 2. The inspectors performed an independent search of the applicant's N-5 database to determine if any of this material was installed in Unit 2.

The inspectors interviewed ASME N-5 personnel about TVA's implementation of the plan. The inspectors also reviewed Boundary Information Transmittals (BIT), material certification packages (weld map, certified mill test reports, certificates of compliance, weld fit-up data sheets, and examination record data sheets), historical condition reports, and the Unit 1 plan to evaluate the applicant's plan for Unit 2. Other documents reviewed are also included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The programmatic aspects of the applicant's implementation plan for the heat code traceability CAP were adequate. These inspection activities only reviewed a portion of the applicant's plan. Therefore, this CAP remains open.

**OA.1.14 (Discussed) Inspection of Watts Bar Unit 2 Electrical Conduit and Conduit Supports CAP Plan (TI 2512/018, IPs 51051, 51053, and 51055)**

a. Inspection Scope

Background: The Electrical Conduit and Conduit Supports CAP was developed after TVA determined that adverse conditions related to structural deficiencies with conduits and conduit supports fell into four primary categories:

- Design Basis discrepancies
- Design output not enveloping all design parameters
- Installed configurations not in compliance with design documents
- Discrepancies between as-installed configurations and inspection documentation

For Unit 1, TVA resolved these issues via the following tasks:

- Revising the design criteria
- Updating design output documents, including specifications, to factor in changes to design criteria, changes to typical support details, and new support details. Critical case attributes were defined, and critical case evaluations were performed to qualify installations
- Performing walkdowns, first, to support critical case evaluations, and then to identify configurations not enveloped by critical cases
- Modifying, as required
- Revising implementing procedures to ensure the adequacy of new or modified supports and prevent recurrence

The Unit 2 program uses the Unit 1 approach and also addresses TVAs past corrective action tracking documents (CATDs):

- 10400-WBN-03 – Deficiency identified concerning attaching new conduits to existing conduit supports or adding insulation to conduits without the review of additional loading
- 11102-WBN-01 – Erroneous Design Assumptions used during the design of Conduit Typical Support Drawing 47A056-85

- 22403-WBN-01 – Damping Valves as shown in FSAR Section 3.10.3 and Design Criteria WB-DC-40-31.10, Rev. 3, for the Conduit Support Design are different
- 22800-WBN-05 – Adequacy of Typical conduit Support Design shown on Drawing 47A056-66B, R2, is questionable due to torsional weakness of the unistrut channel
- 80209-WBN-01 – NCR #6464 issued to resolve 6 nonconforming conditions noted during reinspection of previously accepted conduits was not closed at the date this CATD was written
- 80209-WBN-05 – Inspection of Conduit/Junction Box Supports involving concrete anchor performed by electrical quality control inspectors prior to 1986 are unacceptable
- 22600-WBN-03 – The details in Figure 4.7-1 and drawing 47A057-6 RZ for the emergency light do not agree with the text of section 5.0 of WB-DC-40-31.11. Drawing 47A057 does not provide emergency light details for pendant mounted application as stated in drawing 45W1418-4, Rev. 10

In NUREG-1232, Volume 4, "Safety Evaluation Report on Tennessee Valley Authority: Watts Bar Nuclear Performance Plan," the NRC staff concluded that TVA's CAP plan, for Unit 1, was an acceptable methodology to ensure that the conduit runs are adequately supported for all plant design conditions."

TVA letter dated September 6, 1991, "WBN – Nuclear Performance Plan," Volume 4, Revision 1, Section III.2.4, Electrical Conduit and Conduit Support, proposed their approach for resolving this CAP. In a letter from R. R. Baron to the NRC dated October, 30 1995, TVA notified the NRC of completion of the Electrical Conduit and Conduit Supports Corrective Action Program. For the Electrical Conduit and Conduit Support CAP, TVA stated, in their September 26, 2008, letter to the NRC, that the Unit 1 approach will be used for Unit 2.

NRC letter from P. D. Milano to Mr. Bhatnagar dated February 11, 2009, "Watts Bar Nuclear Plant, Unit 2 – Status of Regulatory Framework for the Completion of Corrective Action and Special Programs and Unresolved Safety Issues," provided the staff's assessment of TVA's approaches for resolving the CAPs and SPs. The staff concluded there was reasonable assurance that, when implemented as described, the Electrical Conduit and Conduit Supports CAP will be appropriately resolved for Unit 2.

Inspection Activities: The objectives of this inspection were to gather information, related to the Electrical Conduit and Conduit Supports CAP, and evaluate the implementation of activities recently performed. The inspectors reviewed EDCR 52938, calculations WCG-2-361 and WCG-2-445, surveillance reports, and walkdown procedures. The inspectors held discussions with applicant staff to learn about the schedule, scope, and implementation of activities associated with this CAP. The inspectors conducted field observation of walkdowns, required by the CAP, to ensure that they were being implemented in accordance with appropriate procedures and instructions, and to verify whether these activities are being regularly observed by applicant's QA personnel. Walkdowns for conduits with identification numbers 2-3VC-293-2423, 2-2PM-293-6684, and 2-2PM-293-7148 were observed by the inspectors.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions associated with the Electrical Conduit and Conduit Supports CAP to verify the adequacy of the TVA's completed actions associated with this CAP. Due to the current progression of the CAP, the inspectors were not able to observe sufficient documentation and work activities to evaluate the adequacy of the programmatic aspects and field implementation of this CAP, therefore, additional inspection of this CAP will be conducted.

**OA.1.15 Follow-up on Traditional Enforcement Actions (IP92702)**

a. Inspection Scope

As described in NCV 05000391/2010602-02, the inspectors identified a SL IV NCV of 10 CFR Part 50, Appendix B, Criterion IV, "Procurement Document Control," for the applicant's failure to include all required information in procurement documents for safety-related, Seismic Category I conduit supports. The applicant documented this issue in their corrective action program as PER 219039 and performed a root cause evaluation (RCE) to determine the causes and to implement corrective actions.

The inspectors reviewed PER 219039 and the associated RCE to determine if the applicant identified the root and contributing causes, addressed the generic implications, and implemented adequate corrective actions. The inspectors referenced NRC IP 95002 to review the RCE associated with this PER to determine if:

- The problem was evaluated using a systematic methodology to identify the root and contributing causes;
- The RCE was conducted to a level of detail commensurate with the significance of the problem;
- The RCE addressed the extent of condition and the extent of cause of the problem.
- Appropriate corrective actions were specified for each root and contributing cause;
- Quantitative or qualitative measures of success were developed for determining the effectiveness of the corrective actions to prevent recurrence; and,
- The completed corrective actions adequately addressed the initial violation.

The inspectors reviewed the RCE, interviewed personnel, and performed an independent extent of condition and extent of cause review by sampling 24 purchase orders for review. The inspectors reviewed these purchase orders, associated drawings, site specifications, and applicable industry codes and standards to determine if all applicable technical requirements necessary to ensure adequate quality were included in the procurement documents.

b. Observations and Findings

As a result of the inspectors' concerns, the applicant performed a second extent of cause review which included a larger sample size than the first extent of cause review. The results of the second review indicated that the scope of generic implications was sufficiently bound by the original RCE and that no additional corrective actions were required.



c. Conclusions

The applicant adequately identified the root and contributing causes, addressed the generic implications, and implemented adequate corrective actions related to NCV 05000391/2010602-02. This NCV is closed.

**V. Management Meetings**

**X.1 Exit Meeting Summary**

On October 14, 2010, 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

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  
M. Lackey, ECP Rep, TVA, Unit 2  
I. Khan, Electrical Engineer, Bechtel Design  
R. Kuhn, Quality Assurance Manager, Bechtel  
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  
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 35065	Procurement, Receiving, and Storage
IP 35960	QA Program Evaluation of Engineering Organization
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 46053	Structural Concrete - Work Observation
IP 46071	Concrete Expansion Anchors
IP 49053	Reactor Coolant Pressure Boundary Piping – Work Observation
IP 49055	Reactor Coolant Pressure Boundary Piping Record Review
IP 49063	Safety-Related Piping - Work Observation
IP 49065	Safety-Related Piping – Records Review
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 50100	Heating, Ventilation, and Air Conditioning 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 51061	Electrical Cable – Procedure 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 55050	Nuclear Welding General Inspection Procedure
IP 55100	Structural Welding General Inspection Procedure
IP 57060	Liquid Penetrant Testing Examination
IP 57070	Magnetic Particle Examination
IP 57090	Nondestructive Examination Procedure Radiographic Examination Procedure Review/Work Observation/Record Review
IP 62708	MOV Capability
IP 62710	Power-Operated Gate Valve Pressure Locking and Thermal Binding
IP 64051	Procedures - Fire Prevention/Protection
IP 73051	Inservice Inspection - Review of Program
IP 80210	Environmental Protection – Initial and Periodic Inspections
TI 2512/016	Plant Cable Issues Corrective Action Program
TI 2512/018	Inspection of Watts Bar Nuclear Plant Electrical Conduit and Supports Corrective Action Program Plan
TI 2512/023	Inspection of Watts Bar Nuclear Plant Hanger Update Corrective Action Program Plan
TI 2512/024	Inspection of Watts Bar Nuclear Plant Heat Code Traceability Corrective Action Program Plan
TI 2512/025	Inspection of Watts Bar Nuclear Plant HVAC Duct and Supports Corrective Action Program Plan
TI 2512/026	Inspection of Watts Bar Nuclear Plant Instrument Sensing Lines Corrective Action Program Plan
TI 2512/028	QA Records Corrective Action Program
TI 2512/109	Inspection Requirements for Generic Letter (GL) 89-10, Safety-Related Motor- Operated Valve (MOV) Testing and Surveillance

TI 2512/140 Periodic Verification of Design-Basis Capability of Safety-Related MOVs (GL 96-05)  
 TI 2515/172 Reactor Coolant System Dissimilar Metal Butt Welds, Rev 1

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

#### Opened

05000391/2010604-01 NCV Failure to Provide Alternate Instructions to Correctly Mark Weld Centerlines for MSIP (OA.1.1)

#### Discussed

2512/032 TI Welding CAP (OA.1.2)  
 2512/028 TI QA Records CAP (OA.1.3)  
 2515/109 TI Inspection of Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance (OA.1.5)  
 2515/140 TI Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves (GL 96-05) (OA.1.5)  
 2512/025 TI HVAC Duct and Supports CAP (OA.1.7)  
 2512/016 TI Electrical Cable Issue CAP - Sub-Issue: Cable Pullbys (OA.1.10)  
 2512/016 TI Electrical Cable Issue CAP - Sub-Issue: Computerized Cable Routing System (OA.1.11)  
 2512/043 TI Use-As-Is Special Program (OA.1.12)  
 2512/024 TI Heat Code Traceability CAP (OA.1.13)  
 2512/018 TI Electrical Conduits and Supports CAP (OA.1.14)

#### Closed

1986-21-01 VIO Improper Weld Inspection (OA.1.6)  
 2512/016 TI Electrical Cable Issue CAP - Sub-Issue: Silicone Insulated Rubber Cables (OA.1.8)  
 2512/016 TI Electrical Cable Issue CAP - Sub-Issue: Cable Sidewall Bearing Pressure (OA.1.9)  
 05000391/2010602-02 NCV Failure to Specify Requirements for Safety-related Conduit Supports (Section QA.1.15)

## LIST OF DOCUMENTS REVIEWED

### I. Quality Assurance Program

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

##### Procedures/Programs

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

##### QA Audits and Surveillances

25402-WBN-SR-10-1111, HVAC Duct and Vertical Support CAP Vertical Slice  
 25402-WBN-SR-10-1121, Cable Pull Through Q Line Wall  
 25402-WBN-SR-10-1123, Plant Equipment Protection  
 25402-WBN-SR-10-1143, Cable Pull in 480V Board Room, Elevation 772'  
 25402-WBN-SR-10-0960, Eye exams records of project QC personnel  
 25402-WBN-SR-10-1271, In-process QC inspections  
 25402-WBN-SR-09-0480, CET column removal  
 25402-WBN-SR-09-0493, Receipt inspection of Westinghouse slit pins  
 25402-WBN-SR-09-0632, QC personnel certification  
 25402-WBN-AR-09-0005, Audit Report, construction field activities

### II. Management Oversight and Controls

#### C.1.1 Unit 1 and Unit 2 Construction Activity Interface Controls (IPs 64051, 50073)

##### Work Orders

WO 08-951009-003, Cable and conduit installation

##### Problem Evaluation Reports

PER 241056, Light fixture taped to fire sprinkler piping  
 PER 250753, Temporary power cables tied to fire header

#### C.1.2 Construction Refurbishment Process Watts Bar Unit 2- Passive Commodities (IP 37002)

Eddy Current Examination Report for Containment Spray Heat Exchanger 2B, August 2010  
 TVA RFI 1041, Containment Spray Heat Exchange Tube Plugging Criteria

#### C.1.3 Construction Refurbishment Process Watts Bar Unit 2 – Vendor Refurbishment (IP 37002, IP 35065)

##### Procedures

25402-000-GPP-0000N6104, TVA Watts Bar Nuclear Unit 2 Construction Completion Project Procedure Materials Receiving, Revision 5  
 NPG Standard Programs and Processes, NPG-SPP-4.2, Rev. 0000, Material Receipt and Inspection

Others

PER 234358, Material Segregation During Receipt  
 Material Inspection Form Doc. No 44294, CWA-015, MRR# WBC-10-126  
 Material Receiving Report WBC-10-126  
 TVA PO# 44294, Westinghouse Certificate of Conformance Number 40041794-1, Date 9/8/2010 "AR Relay"  
 TVA PO# 44294, Westinghouse Certificate of Conformance Number 40041794-2, Date 9/8/2010 "AR Relay"  
 TVA PO# 44294, Westinghouse Certificate of Conformance Number 40041794-3, Date 9/8/2010 "AR Relay"  
 TVA PO# 44294, Westinghouse Certificate of Conformance Number 40041794-4, Date 9/8/2010 "AR Relay"  
 TVA PO# 44294, Westinghouse Certificate of Conformance Number 40040148-1, Date 7/13/2010 "AR Relay"  
 TVA Watts Bar Unit 2 2TS1010, Rev. 1 Appendix D, M&TE Log, SSPS Train A Output Bay Relays.  
 OSD&D Report WBC-10-128  
 Materials Receiving Report WBC-10-128  
 Report of Unsatisfactory Over Short and Damaged Material (UOS&D) WBC-10-128  
 Material Inspection Form WBC-10-128  
 Material Withdrawal Request MWR# TS-0063  
 Material Withdrawal Request MWR# TS-0068  
 Material Withdrawal Request MWR# TS-0070  
 Material Inspection Form WBC-10-078  
 Material Receiving Report WBC-10-078  
 Field Change Request 55773-A pages 117 thru 124

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

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

**C.1.11 Inservice Inspection – Review of Program (IP 73051)**Corrective Action Documents

PER WBPER920195, Misclassified ASME weld, Rev 1  
 PER WBPER920195, Incomplete corrective actions, Rev 0  
 SR 240347, SG Tubing PSI ANI Report has not been issued, 8/26/2010

Drawings

ISI-2074-W-03, Watts Bar Nuclear Plant Unit 2 Residual Heat Removal System 074 (RHR) – weld locations, Rev 00  
 WBN E-2882 IC -24, Residual Heat Removal, Rev 8  
 WBN E-2882-208, Residual Heat Removal  
 WBN E-2882-206, Residual Heat Removal  
 WBN E-2882-207, Residual Heat Removal  
 WBN E-2882 IC-23, Residual Heat Removal, Rev 9  
 WBN E-2882-201, Residual Heat Removal, Rev 1  
 WBN E-2882-203, Residual Heat Removal

WBN E-2882-202, Residual Heat Removal

Other

“Preservice Inspection Program Plan, Watts Bar Nuclear Plant Unit 2,” Rev 3

**C.1.12 Electrical Cable – Work Observation (IP 51063)**

Electrical Design Standard DS-E15.4.1 Individual Color Coding of Conductors, Revision 3, 01/22/2001

**C.1.13 Electrical Components and Systems – Record Review and Construction Refurbishment Process Watts Bar Unit 2 (IP 51055 and IP 37002)**

Drawings:

1-45W724-3, Rev. 23, Wiring Diagrams 6900V Shutdown Board 2A-A Single Line, 09/16/08  
 2-45W749-1, Rev. 1, Wiring Diagram 480V Shutdown Board 2A1-A Single Line, 04/26/10  
 45B2755-4A, Rev. C, Wiring Diagrams 480V Reactor Vent BD 2A-A CONN DIAG – COMPT 4A, 12/8/86  
 45B2766-9D, Rev. 1, EDCR Number 53287-A page 161, 4/25/2010  
 45B2756-6D, Rev. 2, EDCR Number 53296 page 171, 4/28/2010  
 2-45W760-61-2, Rev. 0, EDCR Number 53296 page 195, 4/29/2010  
 45B2756-0, Rev. 8, EDCR Number 53296 page 213, 4/29/2010  
 T45B2756-6D, Rev. 1, Wiring Diagram 480V Reactor Vent BD 2B-B CONN DIAG – COMPT 6D, Unit 2 Auxiliary Building, 6/29/2010

Procedures

MI-57.200 Revision 9, 480 Volt Switchgear Inspection  
 MI-57.200 Revision 0010, 480 Volt Switchgear Inspection, 07-24-2008

Others

Problem Evaluation Report (PER) 244483, MCC Bucket vendor violated electrical spacing requirements, 8/17/2010.  
 WO No. 09-818571-000 – Routine Work Order UNID: WBN-2-BD-212-A002-A 480V Shutdown Board 2A2-A, Inspection of Switchgear Bus and MCC Perform MI-57200 for Compartment 7A, 09/15/2009.  
 WO No. 07-811411-000 – UNID: WBN-2-BD-211-A-A 6.9 kV Shutdown Board 2A-A, Inspect, clean, and test 6.9 kV Boards Perform MI-57.020, 01/10/2008.  
 WO No. 05-815707-000 – UNID: WBN-2-BD-211-B-B 6.9 kV Shutdown Board 2B-B, Inspect, clean, and test 6.9 kV Boards Perform MI-57.020, 01/10/2008.  
 WO No. 08-819045-000 – UNID: WBN-2-BD-211-B-B 6.9 kV Shutdown Board 2B-B, Perform Refurbishment / Initial Set-up for 6.9kV Shutdown BD 2B-B. 06/11/2009.  
 WO No. 07-811394-000 – UNID: WBN-2-BD-212-A001-A 480V Shutdown Board 2A1-A, Inspection of Switchgear Bus and MCC, Perform MI-57.200, 07/17/2007.  
 Dedication Plan for MCC Compartment Assemblies L9001TE-1 / 25402-011-V1A-ECM1-00116-007 Trentec MCC Buckets – ECM1 Bechtel J/N-25402, 8/4/2010

### **C.1.17 Structural Welding General Inspection Procedure (IP 55100)**

#### Bechtel Procedures

Welding Procedure Specification P1-A-Lh Rev. 1  
 GWS-Structural Rev. 3 (25402-000-4MP-T040-S0021)  
 WFMC-1 (Weld Filler Metal Control) Rev. 3  
 Welding Performance Qualification Specification [ASME IX] WQ-1 Rev. 4 (25402-000-4MP-T040-S0078)  
 Documentation of Welds, WD-1, Rev. 6 (25402-000-4MP-T040-S0036)

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

PER 244451- Air movement during welding  
 PER 244478 – Unattended Weld rod  
 PER 244525 – Weld cleanliness  
 SR 229776 – Material not stored properly  
 SR 248936 – Unistrut material not stored properly

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

#### NDE Reports

PT-119, weld 2-067C-T538-05A  
 PT-120, weld 2-067-D182-07A  
 PT-121, weld 2-067C-T450-30  
 PT-901220-121 Internal Surface Cladding/ Grid L3  
 PT-901220-141 Internal Surface Cladding/ Grid C8  
 PT-901220-142 Internal Surface Cladding/ Grid D8  
 PT 901220-143 Internal Surface Cladding/ Grid E8  
 PT-901220-144 Internal Surface Cladding/ Grid F8

#### Procedure

PT(safety-related)-ASME, Liquid Penetrant Examination, Rev. 6

LTR-MRCDA-10-76, Acceptance Criteria for Inspection of the Watts Bar Unit 2(WBT) Reactor Vessel Closure Head, Reactor Vessel, Steam Generators and Pressurizer, Date: May 17, 2010

PI-901220-04, Revision 2, Instruction for the Construction Status Assessment and Documentation of the Reactor Vessel Inspection at Watts Bar Unit 2 (including attachments)  
 PCI QA Traveler No. 901220-RV-03 (Blend) Watts Bar 2 Construction Completion Project, Date: August 10, 2010

PCI QA Traveler No. 901220-RV-04 (Clean) Watts Bar 2 Construction Completion Project, Date: August 10, 2010

PCI QA Traveler No. 901220-RV-01Watts Bar 2 Construction Completion Project, Date: April 9, 2010



LTR-MRCDA-10-125 WB2 Reactor Vessel Inspection Checklist Engineering Disposition, Date: July 15, 2010 (Including attachments)

GQP-9.7, Revision 13, Solvent Removable Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials, and Cladding

GQP-9.5, Revision 10, Water Washable Liquid Penetrant Examination and Acceptance Standards

### **C.1. 20Radiographic Examination Procedure Review (IP 57090)**

#### Procedures

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

#### **T.1 Training and Qualification of Plant Personnel**

##### **T.1.1 Craft Training (IPs 51051, 51061, 52051)**

#### Procedures and Standards

25402-000-GPP-0000-N3302, Cable Installation, Rev 2

MAI 3.2, Cable Pulling for Insulated Cables Rated up to 15000 Volts, Rev 21

MAI 3.7 Cable Pull Force Monitoring Breakline Fabrication, Verification, and Control, Rev 1

### **III. Operational Readiness Activities**

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

#### Procedures and Standards

SPP-10.9, Control of Fire Protection Impairments, Rev. 3

SPP-10.11, Control of Ignition Sources (Hot Work), Rev. 3

#### 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

N-GP-8, Weld Reference System, Rev 0005

PI-901153-01, Watts Bar Unit 2 Mechanical Stress Improvement Process Applied to Pressurizer  
Nozzle Safe End Welds – Project Instruction, Rev 1

N-UT-82, Generic Procedure for the Ultrasonic Examination of Dissimilar Pipe Welds, Rev 3

NDE Reports

Examination Data and Summary Sheet, 2-WP-11-SE, 2/20/2007

Problem Evaluation Reports Service Requests

PER 241073, NRC Identified/ASME Related: Pressurizer Top Nozzle MSIP Weld Centerline  
Markings, 7/22/2010

SR 218223, NRC Identified: Pressurizer MSIP Document Errors

PER 138993, MSIP Post-squeeze measurements not as expected

Other

25402-011-V1A-MG00-02840-001, WBT-D-1957 Westinghouse MG00, Project Instructions,  
MSIP Performance and Verification Record – Top Nozzles, 2-WP-15-SE PZR Safety Nozzle,  
7/21/2010

25402-011-V1A-MG00-02840-001, WBT-D-1957 Westinghouse MG00, Project Instructions,  
MSIP Performance and Verification Record – Top Nozzles, 2-WP-14-SE PZR Safety Nozzle,  
7/21/2010

25402-011-V1A-MG00-02840-001, WBT-D-1957 Westinghouse MG00, Project Instructions,  
MSIP Performance and Verification Record – Top Nozzles, 2-WP-13-SE PZR Safety Nozzle,  
7/21/2010

25402-011-V1A-MG00-02840-001, WBT-D-1957 Westinghouse MG00, Project Instructions,  
MSIP Performance and Verification Record – Top Nozzles, 2-WP-12-SE PZR Safety Relief  
Valve, 7/21/2010

4387-4-003-01, NuVision Engineering, Analytical Verification of MSIP for Spray Nozzle to Safe  
End Weld for Watts Bar Units 1&2, Rev 1

4387-4-001-01, NuVision Engineering, Analytical Verification of MSIP for Pressurizer Surge  
Nozzle to Safe End Weld Watts Bar Units 1&2, Rev 1

25402-011-V1A-MG00-01840-001, Westinghouse – MG00, WBT-D-1324, MSIP Parameters  
for Pressurizer Safety/Relief Nozzle to Safe End Weld, 1/16/2008

25402-011-V1A-MG00-01841-001, Westinghouse – MG00, WBT-D-1324, MSIP Parameters  
for Pressurizer Spray Nozzle to Safe End Weld, 1/16/2008

25402-011-V1A-MG00-01842-001, Westinghouse – MG00, WBT-D-1324, MSIP Parameters  
for Pressurizer Surge Nozzle to Safe End Weld, 1/16/2008

25402-011-V1A-MG00-01838-002, Westinghouse – MG00, WBT-D-2081, Interface  
Requirements WB2 MSIP, Rev 0

25402-011-V1A-MG00-02851-001, Westinghouse – MG00, WBT-D-1957, PCI Quality  
Assurance Traveler

LTR-A600-07-20, Westinghouse Letter from R.M. Orsulak to Mr. Manu Badlani, SUBJ: Watts  
Bar Unit 1 Pressurizer Nozzle MSIP, Application Drawings for Design Input

## **OA.1.2 Welding CAP Sub-Issue: Radiographs for ASME Piping Welds (TI 2512/032 IPs 55050, 57090, 57060)**

### Bechtel ASME Related Procedures and Qualifications

Welding Procedure Specification P8-T-Ag Rev. 0  
 Welding Procedure Specification P43,P8-T-Ag Rev. 0  
 Welding Procedure Qualification Records: 620, 621, 623, 1041, 1389  
 Welder Performance Qualification Records (By Symbol): P-106, P-37, P-68, P-222, and P-223  
 General Welding Standard GWS-1 Rev. 6 (25402-000-4MP-T040-S0013)  
 PT(safety-related)-ASME Rev. 5 (25402-000-4MP-T040-S0125)  
 WPMC-1 (Weld Filler Metal Control) Rev. 3  
 RT-ASME/ANSI Piping Rev. 3 (25402-000-4MP-T040-S0126)  
 Welding Performance Qualification Specification [ASME IX] WQ-1 Rev. 4 (25402-000-4MP-T040-S0078)  
 Documentation of Welds, WD-1, Rev. 6 (25402-000-4MP-T040-S0036)

### Radiography Film and Associated Reports (Documented by Weld Number)

2-072B-D043-02  
 2-074B-D033-03  
 2-072B-D043-04  
 2-063B-D193-11  
 2-041A-T003-07  
 2-070B-D077-06A C2  
 2-063B-D195-01  
 2-068G-W002-01  
 2-068C-W004-02  
 2-068G-W002-01  
 2-068C-W004-02

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

PER 212689  
 PER 170933 – Re-Review of Unit 2 TVA produced radiographs  
 PER 228031 – Weld repair on RCS pipe to nozzle safe end  
 SR 248613 – Discrepancy with RT Procedure

### Specifications

Bechtel Technical Specification for Welding Filler Metal WM-ERNiCr-3 Rev. 0

### Material Certification Records

Lloyds Register Industrial Services General Certificate number 40 8788, dated 28/10/74

### Drawings

TVA Dwg. SK 304-2 Sheet 10, Rev. 4 for Weld 2-068G-W002-01  
 TVA Dwg. SK 304-2 Sheet 8, Rev. 4 for Weld 2-068C-W004-02

Other Documents

Bechtel Weld Repair Plan For TVA Weld 2-068E-W004-01 dated 2/24/10  
 Bechtel WO# 10-951190-000 Field Welding Checklist (WR-5) for Repair Weld 2-068C-W004-02 C0R1 (with Supplements)  
 Report # PT-077 dated 06-28-2010 for WO# 10-951190-000 RCS-Loop #4-C/L, ASME Class 1 (TVA Class A) PT internal weld surface after back-grinding and prior to welding internal pipe cavity.

**OA.1.3 Quality Assurance Corrective Action Program (TI 2512/28, IPs 50075, 55100, 55050)**Procedures

TVA Construction Engineering Procedure CEP-1.40-3, Universal System Program, Rev. 2

TVA QA Record Sample Assessment Reports

Records Assessment, Weld Records, July 2010  
 Records Assessment, Cleanliness Records, July 2010

Corrective Action Documents

PER 233454, ASME/Hanger inspection records cannot be retrieved in timely manner

Other

Engineering Construction Monitoring and Documentation (ECM&D) Database  
 Weld Monitoring Information System (WMIS) Database

System Cleanliness Records

Flush Test Package WBN-QCT-436, Test Package Number 2-062-4.36-099, R0, Preoperational Cleaning of the Chemical Volume Control System Piping  
 Flush Test Package WBN-QCT-4.36, Test Package Number 2-062-4.36-100, R0, Chemical Volume Control System  
 Flush Test Package WBN-QCT-4.36, Test Package Number 2-063-4.36-087, R0, Preoperational Cleaning of Safety Injection System  
 Flush Test Package WBN-QCT-4.36, Test Package Number 2-063-4.36-094, R0, Preoperational Cleaning of the Safety Injection Accumulators and Associated Piping  
 Flush Test Package WBN-QCT-4.36, Test Package Number 2-063-4.36-105, R0, Preoperational Cleaning of System 63 Refueling Water Storage Tank, Boron Injection Tank, and Containment Sump  
 Flush Test Package WBN-QCT-436, Test Package Number 2-070-4.36-084, R0, Reflush Unit 2 Component Cooling Piping  
 Flush Test Package WBN-QCT-436, Test Package Number 2-072-4.36-091, R0, Preoperational Cleaning of the Containment Spray System  
 Flush Test Package WBN-QCT-4.36, Test Package Number 2-074-4.36-068, R0, Preoperational Cleaning of the Residual Heat Removal System  
 Inspection of Clean Systems, Package WBN-QCP-457, Flush Path Rework Boundary ID # 2-070-PCLN-859/0102A01, Visual Inspection of Grade C Cleaness Level

Inspection of Clean Systems, Package WBN-QCP-457, Flush Path Rework Boundary  
 ID 2-070-PCLN-859/0104A01, Visual Inspection of Grade C Cleaness Level  
 Inspection of Clean Systems, Package WBN-QCP-457, Flush Path Rework Boundary  
 ID 2-072-PCLN-812/0108A01, Visual Inspection of Grade B Cleaness Level  
 Inspection of Clean Systems, Package WBN-QCP-457, Flush Path Rework Boundary  
 ID 2-074-PCLN-810/0102A01, Visual Inspection of Grade B Cleaness Level

Weld Records (from ECM&D)

2-CLAW-T024-02; containment liner attachment weld; 1 ¼", Unit 2 containment vessel  
 2-CLAW-T025-53; containment liner attachment weld; ¼" plate to Unit 2 containment vessel  
 2-RWST-T001-01; refueling water storage tank; ½" pipe to RWST  
 2-RWST-T001-04; refueling water storage tank; ½" pipe to ½" cap  
 2-00X-T001-02A; associated with containment; ¾" cap to 5/16" pipe  
 2-00X-T001-01; associated with containment; 6" pipe  
 2-001A-D003-02; Main Steam; 32" pipe  
 2-001B-T014-04; Main Steam; 2" pipe to elbow  
 2-003A-T096-05; main feedwater; 2" pipe to 2" valve  
 2-003A-T152-03; main feedwater; 1" pipe to elbow  
 2-015A-T004-72; steam generator blowdown; 3x2 reducer to 3" pipe  
 2-015A-T004-99c; steam generator blowdown; 1" half-couple to 1" pipe  
 2-015A-T017-99; steam generator blowdown; 1" pipe to 1" flange  
 2-062B-D136-09; chemical and volume control; 3" pipe to valve  
 2-062B-D139-10T; chemical and volume control; ¼" lug  
 2-063B-D193-05; safety injection system; 3" pipe  
 2-063B-D199-10; safety injection system; 10" pipe  
 2-067C-T641-36; essential raw cooling water; 2" pipe to elbow  
 2-067C-T434-06; essential raw cooling water; ½" pipe to drain  
 2-068A-D144-01F; reactor coolant system; 6" pipe  
 2-068A-T036-10; 2" bypass manifold to 2" pipe  
 2-070A-D071-02c; component cooling water; 3" pipe  
 2-070A-T258-2; component cooling water; ½" coupling to ½" pipe  
 2-070A-T258-3; component cooling water; ½" pipe to valve  
 2-070A-T258-4; component cooling water; ½" valve to ½" pipe  
 2-070A-T258-5; component cooling water; ½" pipe to ½" coupling  
 2-070A-T258-6; component cooling water; ½" coupling to ½" pipe  
 2-070A-T258-7; component cooling water; ½" pipe to 2" pipe  
 2-070A-T258-8; component cooling water; 2" pipe to ½" pipe  
 2-072A-D041-07; containment spray system; 10" pipe  
 2-072B-T009-2; containment spray system; ¾" pipe to ¾" valve  
 2-072B-T009-3; containment spray system; ¾" valve to ¾" pipe  
 2-072B-T009-4; containment spray system; ¾" pipe to ¾" valve  
 2-074B-D031-11; residual heat removal system; 14" pipe  
 2-074B-D033-12; residual heat removal system; 8" pipe

Weld Records (not from ECM&D)

2-068G-T011-13; reactor coolant system; 2" pipe to 2" valve  
 2-068E-W-001-01; reactor coolant system; RPV #2 safe-end  
 2-063A-T006-18; safety injection system; ¾" valve to ¾" pipe  
 2-063A-T006-19; safety injection system; ¾" valve to ¾" pipe

2-063A-T006-20; safety injection system; ¾" valve to 2" coupling  
 2-063A-T006-21; safety injection system; 2" coupling to ¾" pipe  
 2-074A-D023-19A; residual heat removal system; lug to pipe  
 2-074A-D023-19B; residual heat removal system; lug to pipe  
 2-074A-D023-19C; residual heat removal system; lug to pipe  
 2-074A-D023-20; residual heat removal system; pipe to sump  
 2-074A-D023-22A; residual heat removal system; lug to pipe  
 2-074A-D023-22B; residual heat removal system; lug to pipe  
 2-074A-D023-22C; residual heat removal system; lug to pipe  
 2-062A-D112-FW-7C; chemical and volume control; 3" pipe to 3" valve

#### **OA.1.4 Environmental Inspection (IP 80210)**

##### Procedures

0-PI-ENV-3.5, Pond Sediment Sampling, Rev. 0  
 0-PI-ENV-1.0, Air Permit Compliance, Rev. 7  
 0-PI-ENV-3.1, NPDES Plant Effluents, Rev. 26  
 0-PI-ENV-3.4, Biotoxicity Sampling, Rev. 5  
 0-PI-ENV-3.6, Management of Sewage Samples, Rev. 1  
 0-PI-ENV-3.7, Inspection of Yard Holding Pond Dam, Rev. 0  
 0-PI-ENV-3.8, NPDES Passive Mix Zone Survey, Rev. 0  
 0-PI-ENV-14.1, Environmental Reports and Regulatory Submittals, Rev. 3  
 0-PI-ENV-14.3, Monthly Inspection for Environmental Compliance, Rev. 0  
 CHDP-2, Conduct of Chemistry and Environmental, Rev. 0  
 Environmental Compliance Manual (ECM-1) Chapter 1.0, Air Pollution Control Program, Rev.15  
 ECM-3, National Pollutant Discharge Elimination System (NPDES) Program, Rev. 14  
 ECM-4, Erosion/Storm Water Pollution Prevention Controls, Rev. 31  
 ECM-5, Handling, Storage, and Disposal of Used Oil and Hazardous Waste, Rev. 19  
 ECM-13, National Pollutant Discharge Elimination System (NPDES) Permit Application and New Permit Implementation, Rev. 2  
 EITP-100, Environmental Compliance, Rev. 6  
 EITP-101, Environmental Waste Management, Rev. 1  
 EITP-102, Environmental Shipping, Rev. 3

##### Records

Watts Bar Nuclear Plant (WBN) –National Pollutant Discharge Elimination System (NPDES) Permit No. TN0020168-Summer 2009 Compliance Survey for Watts Bar Nuclear Plant Outfall 113 Passive Mixing Zone, performed August 18-19, 2009  
 Watts Bar Nuclear Plant (WBN) – National Pollutant Discharge Elimination System (NPDES)Permit No. TN0020168-Discharge Monitoring Report((DMR) for December 2009  
 Watts Bar Nuclear Plant (WBN) – National Pollutant Discharge Elimination System (NPDES) Permit No. TN0020168-Discharge Monitoring Report((DMR) for April 2010  
 Index No: 86, Title: Watts Bar Nuclear Plant Units 1 &2, Environmental Information, Dated November 18, 1976  
 Index NO. 87, Final Environmental Impact Statement Watts Bar, Waste Heat Park Rhea County, Tennessee, July 31, 1981

##### Corrective Action Document

PER 2035091, While excavating soil on north side of the plant nitrogen skid, MODs personnel noticed a diesel odor and observed free liquid in the hole.

**OA.1.5 Safety-Related Motor-Operated Valves Design Criteria and Capability (IP 62708, IP 62710, TI 2515/109 and TI 2515/140)**

Procedures/Programs

NPG Standard Department Procedure, MMDP-5, MOV Program, Rev. 9, dated November 16, 2009

Engineering Documents

TVA Nuclear Engineering Mechanical Design Standard, DS-M18.2.21, Motor Operated Valve Thrust and Torque Calculations, Rev. 17, dated September 4, 2009

TVA Nuclear Engineering Mechanical Design Standard, DS-M18.2.22, MOV Design Basis and JOG Review Methodologies, Rev. 3, dated June 22, 2007

TVA Calculations

NPG Calculation, MDQ0029992009-0310, Generic Letter 89-10 MOV Population for Watts Bar (Unit 2), Rev. 1, dated September 17, 2009

NPG Calculation, MDQ0029992009-0311, Evaluation of Gate Valves Subject to Thermal Binding and Bonnet Pressurization per NRC GL 95-07, Rev. 1, dated September 19, 2009

Miscellaneous

NEDP-7 QG, Qualification Guides (QG), Rev. 19, dated July 13, 2010

TVA Letter to the NRC, Response to Generic Letter (GL) 89-10 – Safety-Related Motor-Operated Valve (MOV) Testing and Surveillance for BFN, SQN and WBN, dated December 21, 1989

**OA.1.6 Watts Bar 2 Violation 05000391/86-21-01)**

TVA Letter to NRC dated March 16, 1987 from J.A. Domer to S. Ebnetter  
NCR 7027

WBNP-QCP-4.23-4, Support Welding Inspection Verification Tag for Support ID 2062-A060-62-45 dated 11/25/86

PER 172746, Re-inspection of weld

**OA.1.7 Inspection of Watts Bar Unit 2 HVAC Duct and Supports Corrective Action Program (TI 2512/025, IPs 37002, 50100)**

Procedures and Standards

G-95, Installation, Modification and Maintenance of HVAC Duct

N3M-914, Quality Assurance Requirements for Construction, Construction Testing, and Inspection of Safety-Related HVAC Systems

N3C-942, Structural Requirements for HVAC Ducts and Ducts Supports

MAI-4.3, HVAC Duct Systems, Rev. 9

WDP-C-3, Walkdown Procedure for Civil, Rev. 3

Work Orders

WO 10-951214-001, EDCR 54280, Modify Reactor Building HVAC Duct Support: 108-1666, 108-1667, 108-1668, 109-1669, 109-1670, 109-1671, 109-1672, 110-1673, 108-1769, 108-3069, AND 108-3070 IAW DRA 54280-001, -002, -003, AND -004

WO 110739610, EDCR 54298, This WO is to correct G32 & G34 Violations on Ductwork Supports in the Reactor Building Annulus Area by Repairing Supports, Sys. 030

WO 09-953655-001, EDCR 53517, Modify Supports for Containment Ventilation, Sys. 030

WO 110739415, EDCR 54298, This EDCR 54298 is to Modify U/2 Spiral Welded Ductwork in the Reactor Building Annulus Area by Providing Flex Connectors to Relieve Thermal Duct Stress, Sys. 030

WO 110739734, EDCR 54298, This WO is to correct G32 & G34 Violations on Ductwork Supports in the Reactor Building Annulus Area by Repairing Supports, Sys. 030

WO 110739497, EDCR 54298, This EDCR 54298 is to Modify U/2 Spiral Welded Ductwork in the Reactor Building Annulus Area by Providing Flex Connectors to Relieve Thermal Duct Stress, Sys. 030

Walkdown Packages

WBN2-C-065-250-04

WBN2-C-030-250-33

WBN2-C-030-250-32

WBN2-C-030-250-23

WBN2-C-030-250-05

WBN2-C-032-250-03

Problem Evaluation Reports

PER 248162, NRC-identified holes in duct not covered

PER 248166, Dimensional-weld discrepancies

PER 248168, Dimensional discrepancy

Unit 1 DCNs

DCN-M-11824-A

DCN-M-16766-A

DCN-M-16767-A

DCN-M-16933-A

DCN-M-17049-A

DCN-M-17367-A

DCN-M-17399-A

DCN-M-17525-A

Design Packages (EDCR)

EDCR 55085 (Sys 065 Annulus Area)

EDCR 54298 (Sys 030 Annulus Area)

EDCR 54289 (RB LCCS)

EDCR 54280 (RB Cont Inst Rm)

EDCR 53517 (RB LC Purge Air Exh)



HVAC Duct Supports

Support ID# 400-2300 (2065-DW920-24H-2300)

Support ID# 400-2300 (2065-DW920-24H-2301)

Support ID# 111-1674 (2030-DW915-08H-1674)

Support ID# 111-1714 (2030-DW915-08H-1714)

Drawings

47W915-3 dated 11/20/75, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-5 dated 06/28/77, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-6 dated 06/04/75, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-7 dated 06/04/75, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-8 dated 07/28/77, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-12 dated 05/20/75, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-13 dated 08/23/77, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-16 dated 11/07/83, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-17 dated 04/22/85, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W915-26 dated 08/12/75, Powerhouse Reactor Building Units 1 & 2, Mechanical Heating, Ventilating and Air Conditioning

47W920-2H dated 09/27/83, Powerhouse Auxiliary Building HV & AC Hanger Location Drawing

47W920-3H dated 11/23/83, Powerhouse Auxiliary Building HV & AC Hanger Location Drawing

47W920-5H dated 11/23/83, Powerhouse Auxiliary Building HV & AC Hanger Location Drawing

47W920-24H dated 12/06/83, Powerhouse Auxiliary Building HV & AC Hanger Location Drawing

48N1290-1 dated 11/08/86, Auxiliary Building Units 1 & 2, Miscellaneous Steel Containment Purge Air Duct Shield & Supports

Unit 1 Calculations

WCG-1-599

WCG-1-692

WCG-1-695

WCG-1-696

WCG-1-699

WCG-1-703

WCG-1-704

WCG-1-1246

WCG-1-1244

WCG-1-1419

Unit 2 Calculations

WCG-2-439

### Miscellaneous Documents

Corrective Action Tracking Document (CATD) Closure Package, 80214-WBN-01  
 Corrective Action Tracking Document (CATD) Closure Package, 11103-WBN-06  
 Design Criteria, WB-DC-40-31.8, Seismically Qualifying Round and Rectangular Duct  
 Bechtel Surveillance No. 25402-WBN-SR-10-1111, HVAC Duct and Support CAP  
 Implementation – Vertical Slice

### **OA.1.8 Electrical Cable Issue Corrective Action Program (CAP) - Sub-issue: Silicone Insulated Rubber Cables (IP 51065 / TI 2512-16)**

Self Assessment Report Number: 25402-SA-ENG-10-002, Cable Issues Corrective Action Program Plan (CP 1.1-Silicone Rubber Insulated Cables)

### **OA.1.12 Inspection of Watts Bar Nuclear Plant Use-As-Is Special Program (TI 2512/43)**

Implementation Plan for Use-As-Is SP, dated 07/08/2009

Use-As-Is Special Program Closure Report, Rev. 0

Self-Assessment 25402-SA-ENG-10-001, Use-As-Is Special Program dated 01/27-29/2010

Closure package for CAQ NCR 1287 (damaged pipe cut off and re-welded with NDE inspection)

Closure package for CAQ NCR 1727 (repair welding, NDE, drawing documentation required)

Closure package for CAQ NCR 1792R (ice condenser seal angle replaced, welded, NDE inspected)

Closure package for CAQ NCR 2068R (check valve weld repaired, NDE inspected)

Closure package for CAQ NCR 2107R (tank plate attachments analyzed and NDE inspected)

Closure package for CAQ NCR 2435 (inspect valve for damage and re-inspect)

Closure package for CAQ NCR 2522 (damaged pipe welded, NDE inspected)

Closure package for CAQ NCR 2557 (repair welding, NDE, drawing documentation required)

Closure package for CAQ NCR 4740 (calculations required for support walkdown packages)

Closure package for CAQ NCR 5098 (laboratory testing required for plate material received)

Closure package for CAQ NCR 5571 (welding and NDE records required)

Closure package for CAQ NCR 5576R (drawing changes and calculations required for as-built spray headers)

Closure package for CAQ NCR 5757 (pipe schedule change required drawing change and analysis)

Closure package for CAQ NCR 6109 (documentation for welding and NDE of radiation plug)

Closure package for CAQ NCR 5929 (solenoid valve replacement to reduce valve closing times)

Closure package for CAQ NCR 6119 (minimum pipe wall thickness calculation)

Closure package for CAQ NCR 6122 (repair welding, NDE, drawing documentation required)

Closure package for CAQ NCR 6228 (evaluation of over pressurized tubing)

Closure package for CAQ NCR 6332 (gaskets required rework, system test)

Closure package for CAQ NCR 6631 (issue incorporated in to new PER 165251)

Closure package for CAQ NCR 6656 (engineering evaluation of improper hydrostatic test)

Closure package for CAQ SCR 6660-S (evaluation for marking of hanger component parts not performed)

Closure package for CAQ SCRWBNNNEB8638 (containment cooling question required new PER 143777)

Closure package for CAQ SCRWBNNWBP8790 (containment purge air ducting required evaluation, new PER 144090 issued)

Closure package for CAQ SCRWBNNMEB86102R1 (evaluation of potential valve damage)

Closure package for CAQ SCRWBNNNEB8655 (containment spray water runoff uncurbed paths)

Closure package for CAQ WBNEEB86104 (evaluation for exceeding shutdown board voltage limits)

Closure package for CAQ WBNMEB8610 (analysis of maximum projected ERCW water temperature)  
 Closure package for CAQ SCRWBNCB8703 (evaluation of seismic qualification of instrument racks and associated tubing)  
 Closure package for CAQ PIRWBNWBP8757R0 (conduit analysis for Refueling Water Storage Tank, new PER 143694 issued)  
 Closure package for CAQ PIRWBNMEB8531 (evaluation of reactor building seals)  
 Walkdown Package 1153, NCR 2998R for the Pressurizer Relief Tank thermowell  
 Walkdown Package 1157, NCR 4895 for Containment penetration sleeve 452  
 Walkdown Package 1160, NCR 5821R for Refueling Floor sleeve 2006  
 Walkdown Package 1235, NCR 6110R for Containment penetration sleeve 334  
 Walkdown Package 1282, NCR 2417R for damage to 480V MOV Board 2A1-A  
 Walkdown Package 1285, NCR 2072R for conductor damage on electrical penetration 2-PENT-293-51  
 PER 160962, Fit-up Inspection Missed on Thermowell Welds  
 PER 178160, System 62 (CVCS) Pressure Indicators Issue  
 PER 218423, Use-As-Is Self-Assessment Corrective Actions  
 PER 236794, Containment Sleeve Surface Cracks  
 PER 236940, CRD Seismic Support Mounting Plate

### **OA.1.13 Safety-Related Piping Record Review (IPs 49055 and 49065, TI 2515/024)**

#### Boundary Information Transmittals

BIT 1656, TVA Partial N-5 Number TVA-2-63-1-P3, March 9, 2009  
 BIT 1657, TVA Partial N-5 Number TVA-2-63-1-P3, March 9, 2009  
 BIT 371, TVA Partial N-5 Number TVA-2-62-1-P9, March 5, 2010  
 BIT 1781, TVA Partial N-5 Number TVA-2-62-1-P2, August 11, 2009  
 BIT 1360, TVA Partial N-5 Number TVA-2-68-1-P5, April 9, 2009  
 BIT 1361, TVA Partial N-5 Number TVA-2-68-1-P5, April 9, 2009  
 BIT 622, TVA Partial N-5 Number TVA-2-62-1-P4, October 24, 2008

#### Corrective Action Documents

CAQ WBP-880434, Rev. 2, June 14, 1991

#### Miscellaneous

Watts Bar Unit 2 ASME N-5 Database  
 Watts Bar Unit 2 Heat Code Database  
 Watts Bar Unit 2 Heat Code Traceability Closure Implementation Plan, Rev. 0  
 Watts Bar Unit 1 Heat Code Traceability CAP Plan Final Report, February 9, 1990  
 Weld No. 2-063B-T103-93 ASME Material Certification Package  
 Weld No. 2-074A-D023-19A ASME Material Certification Package  
 Weld No. 2-062B-T300-28A ASME Material Certification Package  
 Weld No. 2-015A-T002-20A ASME Material Certification Package  
 Weld No. 2-061A-D050-11 ASME Material Certification Package  
 Bolt No. 2-068-FB-F-2092 ASME Material Certification Package  
 Bolt No. 2-068-FB-F-2093 ASME Material Certification Package  
 Bolt No. 2-062-FB-F-2052 ASME Material Certification Package  
 Bolt No. 2-062-FB-F-2044 ASME Material Certification Package  
 Material No. 63-SI-123, Serial No. 12417 ASME Material Certification Package

**OA.1.14 Inspection of Watts Bar Unit 2 Electrical Conduit and Conduit Supports  
Corrective Action Program Plan (TI 2512/018, IPs 51051, 51053, and 51055)**

Service Requests

SR 255611, Misnumbered Limited Scope Walkdown Package

Conduit Supports Surveillance Reports

25402-WBN-SR-09-0581, Inspection of 1E conduit for one hole straps and support span, July 23, 2009

25402-WBN-SR-09-0614, One Hole Conduit Straps, Mismatched Components and Span, August 10, 2009

25402-WBN-SR-09-0564, In Process Work Order 08-812562-007 Conduit/Conduit Support Installation, July 15, 2009

25402-WBN-SR-09-0621, One Hole Conduit Straps in WO #08-956627-009, August 11, 2009

25402-WBN-SR-10-0946, Conduit Support Stop Work Notice, April 8, 2010

25402-WBN-SR-10-1047, In-Process electrical Conduit Supports (Aux 737'), May 25, 2010

25402-WBN-SR-10-1052, Electrical Conduit Support Fabrication on Backshift, May 27, 2010

EDCR

EDCR 52938, Evaluation of Unit 2 One Hole Clamp Conduit Supports for Span Limits and Using the Same Manufacturer of Strap and Spacer Components, Revision A

Electrical Conduit Supports

Raceway ID# 2-3VC-293-2423

Raceway ID# 2-2PM-293-6684

Raceway ID# 2-2PM-293-7148

Procedures

WDP-C-3, Walkdown Procedure for Civil, Rev. 3

Calculations

WCG-2-361, Walkthrough Procedure of Unique Evaluations for Electrical Conduit and Conduit Supports, Rev. 0

WCG-2-445, WBN2 Shakespace Walkthrough Screening Evaluation Guidelines, Rev. 3

**OA.1.15 Follow-up on Traditional Enforcement Actions**

Corrective Action Documents

PER 219039, Fabricated Support Deficiencies, 02/25/2010

PER 252186, Depth of PER 219039 Extent of Cause, 09/15/2010

Procurement Documents

PO 81367, Rev.0, Bent Plate

PO 80336, Rev.0, Bent Plates

PO 2071, Rev.0, Tube Steel

PO 62274, Rev.0, Support

PO 80299, Rev.0, Plate  
PO 73188, Rev.0, Pipe Hangers  
PO 73725-00288, Rev.0, Structural Steel  
PO 73725-00320, Rev.0, Structural Steel  
PO 84351, Rev.0, Structural Steel  
PO 114317, Rev.0, Structural Steel  
PO 30812, Rev.0, Structural Steel  
PO 43727, Rev.0, Pipe Supports  
PO 75159, Rev.0, Pipe Supports  
PO 80209, Rev.0, Pipe Supports  
PO 77684, Rev.0, ASME Pipe  
PO 78057, Rev.0, Orifice  
PO 43805, Rev.0, Plugs  
PO 62931, Rev.0, Angle Iron  
PO 67370, Rev.0, ASME Pipe  
PO 90703, Rev.0, Pipe Nipple  
FMR 25402-000-FMR-ANFF-00004, Rev. 0, Brackets  
FMR 25402-000-FMR-PH02-00010, Rev. 0, Pipe Support  
FMR 25402-000-FMR-SS30-00015, Rev. 2, Platform  
FMR 25402-000-WB2-09-0267, Rev. 0, Structural Steel

#### Procedures

25402-MGT-0003, Rev. 8, Bechtel Corrective Action Program, 08/19/2010  
25402-MGT-0004, Rev. 2, Bechtel Incident Investigation and Root Cause Analysis, 08/19/2010  
25402-000-GPP-0000-N6102, Rev. 11, Field Material Requisition and Purchasing, 03/23/2010  
25402-000-GPP-0000-N6102, Rev. 12, Field Material Requisition and Purchasing, 06/08/2010

#### Miscellaneous

Drawing 1-48A200-1, Rev. 2, Pipe Support General Installation Requirements and Tolerances, 09/15/1992  
Drawing 1-48A200-2, Rev. 1, Pipe Support General Installation Requirements and Tolerances, 09/15/1992  
General Engineering Specification G-43, Rev. 13, Installation, Modification, and Maintenance of Pipe Supports and Pipe Rupture Mitigative Devices, 01/03/1996  
General Engineering Specification G-89, Rev. 3, Requirements for Structural and miscellaneous Steel, 09/11/1995  
TVA Specification PF-2036, Rev. 9, Requirements for Structural Steel Tube Shapes  
Bechtel Project Qualified Root Cause Analysts, Dated August 11, 2010

## LIST OF ACRONYMS

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
AIW	American Insulated Wires
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
BIT	Boundary Information Transmittals
C/L	Cold Leg
C0R1	Cut-out # 0 and Repair # 1
CAP	Corrective Action Program
CATD	Corrective Action Tracking Documents
CAQ	condition adverse to quality
CCS	component cooling system
CET	core exit thermocouple
CFR	<i>Code of Federal Regulations</i>
CMTR	certified material test report
DCN	design change notice
DM	dissimilar metal
ECM&D	Engineering construction monitoring & documentation
ECP	Employee Concerns Program
EDCR	engineering document construction release
ET	eddy current examination
FMR	Field Material Requisition
FSAR	Final Safety Analysis Report
FW	field weld
GL	Generic Letter
HVAC	Heating, Ventilation, and Air Conditioning
ICRDS	Integrated Cables Raceway Design System
ICS	Ivey Cooper Services
IMC	Inspection Manual Chapter (NRC)
IFI	Inspector Follow-up Item
IP	Inspection Procedure (NRC)
IR	inspection report
JOG	Joint Owners Group
LOF	Lack of Fusion
MAI	Modification Addition Instruction
MCC	motor control center
MOV	motor-operated valve
MT	magnetic particle
M&TE	measuring and test equipment
NA	Nuclear Assurance
NCR	nonconformance report
NCV	non-cited violation
NDE	non-destructive examination
NDT	Nondestructive Testing
NPDES	National Pollution Discharge Elimination System
NPG	Nuclear Power Generation

NPS	Nominal Pipe Size
NRC	Nuclear Regulatory Commission
PCI	PCI Energy Services
PER	Problem Evaluation Report
PO	purchase order
PQR	Procedure Qualification Record
PSI	Pre-Service Inspection
PT	Liquid Penetrant Testing (examination)
PWSCC	primary water stress corrosion cracking
QA	quality assurance
QC	quality control
RCE	Root Cause Evaluation
RCP	reactor coolant pump
RCS	reactor coolant system
RHR	residual heat removal
RPV	reactor pressure vessel
RT	radiograph test (examination)
SCWE	safety conscience work environment
SI	stress improvement
SL	Severity Level
SP	Special Program
SPM	Special Processes Manual
SR	Service Request
SQN	Sequoyah Nuclear Plant
SSC	structures, systems, and components
SSPS	Solid State Protection System
SWBP	sidewall bearing pressure
TI	Temporary Instruction (NRC)
TVA	Tennessee Valley Authority
UHI	upper head injection
UT	Ultrasonic test
VIO	Violation
WBN	WBN Nuclear Plant
WBN2	Watts Bar Nuclear Plant Unit 2
WMIS	Weld Monitoring Information System
WPQ	Welder Performance Qualification
WPS	Welding Procedure Specification
WO	work order

## Specific Response to the Reposting Requirements for TI2515/172, Revision 1

### .Reactor Coolant System Dissimilar Metal Butt Welds

#### a. Inspection Scope

The inspectors observed licensee activities related MRP-139, "Primary System Piping Butt Weld Inspection and Evaluation Guideline," Revision 1 that were available for review during the inspection period, specifically, application of the Mechanical Stress Improvement Process (MSIP) to six pressurizer nozzles which are within the scope of MRP-139. Because Watts 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?

No, baseline inspections have not been performed nor are they scheduled to be performed in accordance with MRP-139 guidance. However, Watts Bar Unit 2 has never operated; therefore welds within MRP-139 scope have never been subject to conditions which would promote primary water stress corrosion cracking (PWSCC). The licensee has planned mitigation by MSIP of all typical Alloy 82/182 weld locations which are applicable to the site. Specifically, the six pressurizer nozzles and all reactor vessel inlet and outlet nozzles. As of this inspection, the six pressurizer nozzles have been mitigated with MSIP, and the licensee plans on mitigating the eight reactor vessel inlet and outlet nozzles with MSIP in November, 2010.

2. Is the licensee planning to take any deviations from the MRP-139 baseline inspection 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?

The licensee does not currently have a program (or programs) in place to address all MRP-139 requirements; however the inspectors did not note any planned deviations during the course of interviews or review of available documentation.

#### (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 inspector reviewed documentation for the pre-MSIP UT examination of the pressurizer spray nozzle, including review of the procedure (N-UT-82) and operator certifications for compliance with requirements of Section 5.1 of MRP-139. No findings of significance were noted. The examination was completed prior to the successful ASME Section III hydrostatic testing of the pressurizer. The licensee intends to complete the post-MSIP volumetric examination following successful completion of the ASME Section III pressurizer hydrostatic testing.

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

The pre-MSIP UT examination of the pressurizer spray nozzle was conducted by qualified personnel. The UT level II examiner was certified via EPRI's PDI program to PDI-UT-10 (Generic Procedure for the Ultrasonic Evaluation of Dissimilar Metal Welds) for detection and length sizing.

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

There were no noted deficiencies.

(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 spray line and the four relief/safely lines.

However, the actual field configuration of the surge line did not match the configuration used in the surge line SI analysis. The safe end length was approximately one inch longer in the field than in the analysis. The licensee identified this issue during a pre-job walk down, and captured the concern in their corrective action program in PER 241631.

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 is applied. However, the location of the DM weld centerline used in the SI analysis was not the

same as the location of the weld centerline marked in the field. See Findings section for additional details.

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. However, the procedure for conducting ultrasonic testing (UT) of the weld (PDI-UT-10, Rev E) specifically requires that the surface be such that there is no greater than 1/32" gap between the search unit and the examination surface over the entire length of the scan. Areas not meeting this requirement were required to be either documented as a limitation in the covered exam volume, or surface conditioned in accordance with the ASME Code.

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?

Yes, AR600-IR-09-1, "Interface Requirements, Watts Bar Unit 2 MSIP," Rev 0 required that volumetric examinations were to be performed prior to and after the SI application. The inspectors verified that the licensee performed pre-MSIP UT per the requirements of ASME, Section XI, Appendix VIII prior to the SI application. The licensee planned on conducting the post-SI UT following the ASME, Section III system hydrostatic testing and subsequent post-hydro NDE for vessels. The system hydrostatic testing is tentatively scheduled for July, 2011. This will allow the licensee to credit the examination as an ASME, Section XI preservice inspection.

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.

(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 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.

No, the licensee has not prepared an MRP-139 inservice inspection program. The licensee has contracted with Westinghouse to locate all Alloy-600 components which would be subject to MRP-139 requirements. This item requires additional inspection.

2. In the MRP-139 inservice inspection 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 licensee's program.

3. In the MRP-139 inservice inspection 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 licensee'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 licensee's program.

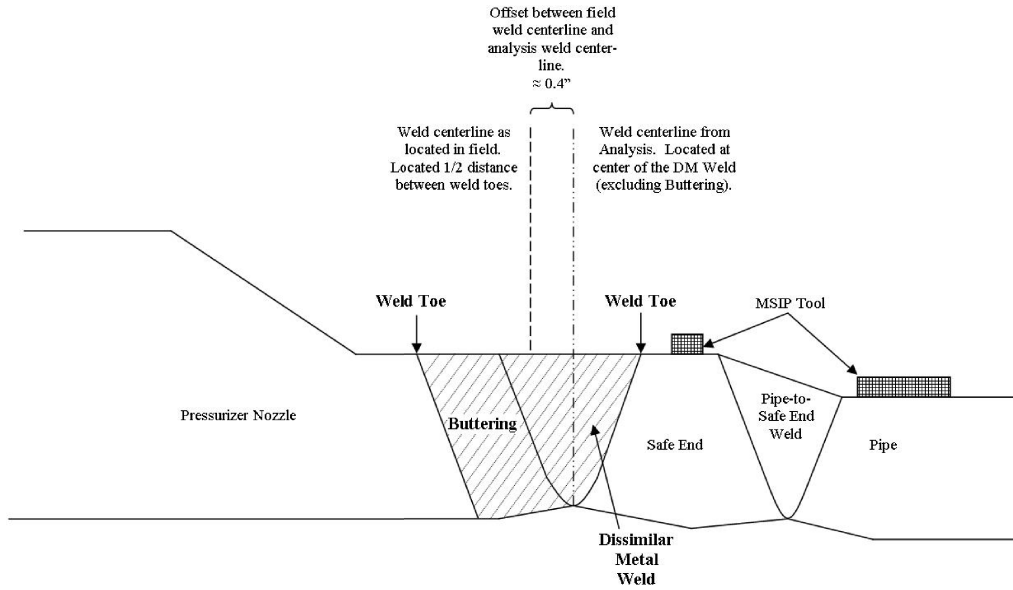
5. If the licensee is planning to take deviations from the MRP - 139 inservice inspection guidelines, what are the deviations and what are the general bases for the deviations? Was the NEI 03-08 process for filing deviations followed?

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

c. Findings

See Report Details of Section OA.1.1.

**FIGURE 1**



Pressurizer Surge Line Nozzle Dissimilar Metal Weld Centerlines.

Conceptual drawing for illustrative purposes only. Not to scale.