



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

May 16, 2011

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 05000391/2011603**

Dear Mr. Bhatnagar:

On April 2, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on April 13, 2011, with Mr. David Stinson and other members of your staff.

This inspection examined activities conducted under your Unit 2 construction permit as they relate to safety and compliance with the Commission's rules and regulations, with the conditions of your construction permit, and with fulfillment of Unit 2 regulatory framework commitments. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

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

Based on the results of this inspection, this report documents 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 05000391/2011603 w/attachment

cc w/encl: (See next page)

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 05000391/2011603 w/attachment

cc w/encl: (See next page)

PUBLICLY AVAILABLE       NON-PUBLICLY AVAILABLE       SENSITIVE       NON-SENSITIVE  
ADAMS:  Yes      ACCESSION NUMBER: ML111370702       SUNSI REVIEW COMPLETE

OFFICE	RII:DCP	RII:DCP	RII:DCP	RII:DCP	RII:DCP	RII:DCP	RII:DCI
SIGNATURE	GJK for	JBB for	JBB	GKK	Via email	GJK	TFN1
NAME	TNazario	WLewis	JBaptist	GKhourli	PVan Doorn	JLizardi	TFanelli
DATE	5/12/2011	5/12/2011	5/9/2011	4/28/2011	5/3/2011	5/12/2011	5/16/2011
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
OFFICE	RII:DCI	RII:DCI	RII:DCI	RII:DCI	RII:DCI	RII:DCI	RII:DPI
SIGNATURE	CTJ1	Via telecom	Via Telecom	Via telecom	CTJ1 for	Via telecom	GJK
NAME	CJones	DHarmon	JBartleman	LCastelli	NKarloviich	CSmith- Standberry	DSeat
DATE	4/28/2011	5/2/2011	5/4/2011	5/16/2011	5/16/2011	5/16/2011	5/12/2011
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY      DOCUMENT NAME: G:\CCI\INSPECTION REPORTS\WATTS BAR\IR 05000391-2011603.DOCX

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. David Stinson  
Vice President  
WBN Unit Two  
WBN Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, Tennessee 37381

Mr. C.J. Riedl, 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

Mr. 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. T. J. Neissen  
General Manager  
Quality Assurance  
Nuclear Generation and Development and  
Construction  
1101 Market Street  
Blue Ridge 3A  
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

Mr. Lawrence E. Nanney, Director  
Tennessee Department of Environmental  
Health & 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

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 May 16, 2011.

SUBJECT: WBN NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2011603

Distribution w/encl:

L. Raghavan, NRR

S. Campbell, NRR

P. Milano, NRR

C. Evans, RII

L. Douglas, RII EICS

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.: 05000391/2011603

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: 1260 Nuclear Plant Rd  
Spring City TN 37381

Dates: February 20 – April 2, 2011

Inspectors: T. Nazario, Senior Resident Inspector, Construction Projects  
Branch (CPB) 3, Division of Construction Projects (DCP)  
Region II (RII)  
W. Lewis, Resident Inspector, CPB3, DCP, RII  
J. Lizardi, Resident Inspector, CPB3, DCP, RII  
J. Seat, Resident Inspector, CPB3, DCP, RII  
J. Baptist, Senior Project Engineer, CPB3, DCP, RII, Sections  
C.1.9, OA.1.15  
K. VanDoorn, Senior Construction Inspector, CPB3, DCP, RII,  
Sections C.1.6, P.1.1, P.1.2, OA.1.1, OA.1.2, OA.1.4, OA.1.12,  
OA.1.20  
C. Jones, Senior Construction Inspector, Construction Inspection  
Branch (CIB) 1, Division of Construction Inspection (DCI), RII,  
Sections Q.1.3, C.1.7, OA.1.11, OA.1.17  
T. Fanelli, Construction Inspector, CIB1, DCI, RII, Sections C.1.8,  
C.1.13  
L. Castelli, Sr. Construction Inspector, CIB1, DCI, RII, Section  
C.1.14  
N. Karlovich, Construction Inspector, CIB1, DCI, RII, Sections  
Q.1.3, OA.1.3, OA.1.16  
C. Smith-Standberry, Construction Inspector, CIB1, DCI, RII,  
Sections C.1.8, OA.1.10  
J. Bartleman, Senior Construction Inspector, CIB 3, DCI, RII,  
Sections C.1.10, C.1.11  
D. Harmon, Construction Inspector, CIB3, DCI, RII, Sections  
OA.1.5, OA.1.6, OA.1.7, OA.1.8, OA.1.9, OA.1.13, OA.1.14

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

Enclosure

## EXECUTIVE SUMMARY

### Watts Bar Nuclear Plant, Unit 2

This integrated inspection included aspects of engineering and construction activities performed by TVA associated with the Watts Bar Nuclear (WBN) Plant Unit 2 construction project. This report covered a six-week period of inspections in the areas of quality assurance, identification and resolution of construction problems, construction activities, fire protection, and follow-up of other activities. The inspection program for Unit 2 construction activities is described in NRC Inspection Manual Chapter 2517. Information regarding the WBN Unit 2 Construction Project and NRC inspections can be found at <http://www.nrc.gov/reactors/plant-specific-items/watts-bar.html>.

### Inspection Results

- A Severity Level IV non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," was identified where established measures were not sufficient to assure that purchased equipment conformed to the procurement requirements. Specifically, engineering specifications for commercial grade dedications of purchased equipment did not sufficiently identify the specific criteria that were necessary for verifying the equipment conformed to the critical characteristics for nuclear service.
- The inspectors concluded that activities associated with the Ice Condenser (IC) system and components were adequate. Generic IC issues and specific IC issues associated with Unit 1 were properly evaluated and corrective actions were implemented to resolve these issues for Unit 2.
- The inspectors concluded that concerns pertaining to several Three Mile Island (TMI) action items, NCVs, unresolved items, and construction deficiency reports have been appropriately addressed for WBN Unit 2. These items are closed.
- Quality Assurance requirements for preoperational testing were established and were being met for this stage of the preoperational test program. TVA has established adequate programmatic controls for preoperational testing. These controls were in accordance with applicable commitments and regulatory requirements.
- Other areas inspected were adequate with no findings of significance identified. These areas included various Unit 2 corrective action/special programs; electrical systems and components; mechanical systems and components; nuclear welding; structural concrete and welding; nondestructive examination and in-service inspection activities; TMI action items; refurbishment; environmental activities; and fire protection.



## Table of Contents

<b>I. QUALITY ASSURANCE (QA) PROGRAM .....</b>	<b>1</b>
<b>Q.1 QA Oversight Activities .....</b>	<b>1</b>
Q.1.1 Identification and Resolution of Construction Problems (IP 35007).....	1
Q.1.2 Safety Conscious Work Environment (IP 35007) .....	1
Q.1.3 Quality Assurance Program Implementation during Construction and Pre- Construction Activities – (IP 35007).....	2
<b>II. MANAGEMENT OVERSIGHT AND CONTROLS .....</b>	<b>3</b>
<b>C.1 Construction Activities.....</b>	<b>3</b>
C.1.1 Unit 1 and Unit 2 Construction Activity Interface Controls.....	3
C.1.2 Structural Concrete – Work Observation (IP 46053).....	4
C.1.3 Magnetic Particle (MT) Examination of Safety-Related Welds (IP 57070).....	5
C.1.4 Safety-Related Piping – Work Observation (IPs 49063 and 37002).....	6
C.1.5 Concrete Expansion Anchors (IP 46071 and TI 2512/023).....	7
C.1.6 Construction Refurbishment Process – Watts Bar Unit 2 (IPs 37002 and 71111.07).....	8
C.1.7 Construction Refurbishment Process – Commercial Grade Dedication of Replacement and Refurbished Items (IPs 37002, and 43004).....	9
C.1.8 Construction Refurbishment Process – Safety Related MCC Bucket Replacement (IPs 37002, and 51055) .....	11
C.1.9 Safety-Related Components – Records Review Ice Condenser (IC) System (IP 50075).....	14
C.1.10 Safety-Related Components – Records Review (IP 50075).....	15
C.1.11 Mechanical Components – Work Observation and Construction Refurbishment ... Process (IPs 50073 and 37002) .....	16
C.1.12 Electrical Cable – Work Observation (IPs 51063, and 37002) .....	17
C.1.13 Electrical Components and Systems – Work Observation (IP 51053).....	18
C.1.14 Instrumentation Components and Systems – Record Review (IP 52055).....	20
C.1.15 Pipe Support and Restraint Systems (IP 50090 and TI 2512/023).....	21
<b>P.1 Pre-Operational Activities .....</b>	<b>23</b>
P.1.1 Pre-Operational Testing Quality Assurance (IP 35301) .....	23
P.1.2 Overall Preoperational Test Program Review (IP 70301).....	24
<b>T.1 Training and Qualification of Plant Personnel .....</b>	<b>25</b>
T.1.1 Craft Training (IP 46071) .....	25
<b>III. OPERATIONAL READINESS ACTIVITIES.....</b>	<b>26</b>
<b>F.1 Fire Protection (IP 64051) .....</b>	<b>26</b>
<b>IV. OTHER ACTIVITIES .....</b>	<b>26</b>
OA.1.1 (Discussed) Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break (MELB) Special Program (SP) (TI 2512/040).....	26
OA.1.2 (Discussed) Inspection of Watts Bar Nuclear Plant Microbiologically Induced .....	

OA.1.3	Corrosion Special Program (TI 2512/039) ..... 27 (Discussed) GL-83-28, Required Actions Based on Generic Implementation of .... Salem ATWS; and TI-2500/020, Inspection to Determine Compliance with ATWS Rule 10 CFR 50.62 (IP 35007) ..... 28	27
OA.1.4	(Discussed) TI 2515/105, Inspection of Licensee Activities in Reference to NRC Bulletin (BL) 88-04 – Potential Safety-Related Pump Loss ..... 28	28
OA.1.5	(Discussed) Construction Deficiency Report (CDR) 391/80-111: Faulty Fillet Welds (IP 55050)..... 29	29
OA.1.6	(Discussed) Welding Corrective Action Program (CAP) Sub-issue 4: Wall- Mounted Instrument Panels (IP 55100, and TI 2512/032)..... 28	28
OA.1.7	(Discussed) Welding CAP Sub-issue 5: HVAC Ductwork Welding (IP 55050, and TI 2512/032)..... 31	31
OA.1.8	(Discussed) Welding CAP Sub-issue 7: Temporary Attachments - Piping (IPs ..... 55050, 57070, and TI 2512/032)..... 32	32
OA.1.9	(Discussed) Welding CAP Sub-issue 12: North / South Valve Rooms (IPs 55100, 57070, 48053, and TI 2512/032,)..... 33	33
OA.1.10	(Discussed) Electrical Issues CAP Sub-Issue: Contact and Coil ratings of ..... electrical devices (TI 2512/020)..... 34	34
OA.1.11	(Discussed) Three Mile Island (TMI) Action Item II.F.1.2, Install a Capability for Post-Accident Sampling for Iodine and Particulates; and TMI Action Item III.D.3.3, Provide a Capability to Detect and Measure Radioiodine in Plant Areas (IP 35007) ..... 35	35
OA.1.12	(Closed) Generic Letter (GL) 96-06, Assurance of Equipment Operability and ..... Containment Integrity During Design Basis Accident Conditions ..... 35	35
OA.1.13	(Closed) CDR 391/87-08: Improper Fabrication, Inspection, and Documentation of Wall-Mounted Instrument Panels (IP 55100) ..... 36	36
OA.1.14	(Closed) URI 391/86-14-02: Deficiencies in Welds (IP 55050)..... 36	36
OA.1.15	(Closed) TMI Action Item II.K.3.30, “Revised Small Break Loss of Cooling Accident (SBLOCA) Methods to Show Compliance with 10CFR50 Appendix K” and II.K.3.31, “Plant-Specific Calculations to Show Compliance with 10CFR50.46” ..... 38	38
OA.1.16	(Closed) BL 90-01, Loss of Fill-Oil in Transmitters Manufactured by ..... Rosemount (IPs 35007, and 52055) ..... 39	39
OA.1.17	(Closed) CDR 391/86-46, Radiation Monitoring System Discrepancies (IP 35007) ..... 40	40
OA.1.18	(Closed) CDR 391/86-38: Failure to Implement Disposition of Previous ..... Nonconformance (IPs 35007, and 46071) ..... 41	41
OA.1.19	(Closed) CDR 391/94-06, Centrifugal Charging Pump 1A-A Performance..... Deficiency (IP 35007) ..... 41	41
OA.1.20	(Closed) URI 5000391/2010605-02, Implementation of Piping Refurbishment ..... Program (IP 35007)..... 42	42
<b>V. MANAGEMENT MEETINGS..... 42</b>		<b>42</b>
<b>X.1 Exit Meeting Summary..... 42</b>		<b>42</b>

## REPORT DETAILS

### Summary of Plant Status

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

### I. QUALITY ASSURANCE (QA) PROGRAM

#### Q.1 QA Oversight Activities

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

###### a. Inspection Scope

During this inspection period, the inspectors reviewed problem evaluation reports (PERs) as part of the applicant's corrective action program to verify that issues being identified under the corrective action program were being properly identified, addressed, and resolved by the applicant.

Previous problems with the corrective action program process were identified by the NRC and documented as non-cited violation (NCV) 05000391/2010607-01. Of these problems, two involved an incorrect date of occurrence. The applicant's review of this violation identified that the MAXIMO system inappropriately populated the date of occurrence with the date the service request was initiated. The inspectors reviewed the applicant's corrective actions for this problem which were documented in PER 246906. The applicant appropriately changed the software to delete the date-auto-populate feature.

###### 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 nine anonymous PERs initiated between January 31 and February 21, 2011, and a trend PER associated with an increased number of anonymous PERs. The inspectors verified that issues identified were appropriately captured and addressed in the corrective action program, reviewed

immediate corrective actions, and discussed these actions with TVA senior managers. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

During the inspection period, the inspectors did not identify any issues or concerns regarding the ability of the applicant to provide a safety-conscience work environment.

**Q.1.3 Quality Assurance Program Implementation During Construction (IP 35007)**

Corrective Action Program Dispositions for Conditions Adverse to Quality (CAQs)

a. Inspection Scope

The inspectors reviewed a sample of seven electrical and instrument PERs to assess the adequacy of the applicant's actions to resolve conditions adverse to quality. The inspectors reviewed the PERs to verify that the applicant's activities met the requirements of the applicant's program and NRC regulations.

The inspectors interviewed responsible applicant personnel, evaluated the PER corrective action plans, and examined objective evidence of completed actions as recorded in work documents and through direct observations in the plant. The inspectors determined whether conditions adverse to quality were identified completely, accurately, and in a timely manner commensurate with their safety significance.

The sample selected for inspection included the following PERs:

- PER 278291, Design error on Motor Control Center (MCC) compartments would cause a breaker trip while in thermal overload bypass
- PER 288104, Work performed without approved design output
- PER 293172, Third motor received and third motor found with metal shavings on the motor fly wheel
- PER 293175, NRC Part 21 ENS 46449: Rosemount Model 1152 dP Transmitters
- PER 294381, Wrong switch installed in work order (WO) 08-951060-005
- PER 296360, Cables not installed in accordance with latest design output document
- PER 305830, Raychem heat shrink kit was not installed according to the installation instructions

b. Observations and findings

No findings of significance were identified.

c. Conclusion

The inspectors determined that the sample of identified conditions adverse to quality had been evaluated and corrected in a manner consistent with the applicant's procedures and in conformance to applicable NRC regulations.

## QA Oversight of Electrical and Instrument Construction Activities

### a. Inspection Scope

The inspectors reviewed a sample of seven QA surveillance reports to verify that the applicant provided an appropriate level of independent oversight of construction activities. The inspection included determinations whether surveillance conclusions were substantiated by objective evidence, whether results were reported to affected organizations and appropriate levels of management, and whether identified problems were evaluated and tracked for correction.

The sample selected for inspection included the following surveillance reports:

- 25402-WBN-SR-10-1198, Instrument Sensing Line Slope Issues as Addressed in Selected EDCRs, dated November 6, 2010
- 25402-WBN-SR-10-1243, Master Fuse List Calculation Review, dated November 6, 2010
- 25402-WBN-SR-10-1348, Quality Control (QC) Inspections Stipulated in Work Orders, dated October 26, 2010
- 25402-WBN-SR-10-1326, Electrical Penetration cable replacement in the Reactor Building, dated October 20, 2010
- 25402-WBN-SR-10-1335, Backshift Conduit Installation, dated October 19, 2010
- 25402-WBN-SR-10-1367, Very Low Frequency Diagnostic and High Potential Testing, dated November 6, 2010
- 25402-WBN-SR-10-1369, Cable Signal Tracing, dated November 6, 2010

### b. Observations and findings

No findings of significance were identified.

### c. Conclusions

The inspectors determined that the selected sample of QA surveillance reports met the applicant's program requirements and applicable NRC regulations.

## **II. MANAGEMENT OVERSIGHT AND CONTROLS**

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

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

##### 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 walk-downs of selected construction work locations to verify controls to protect the operating unit provided an adequate level of protection and had been properly implemented.

Specific work activities observed included:

- Cable pull for cable 2V6015 under WO 111036902.
- Essential raw cooling water (ERCW) pipe flush with limiting condition for operation (LCO) entry under WO 110798681

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

- Valve refurbishment activities under WO 08-953588-000

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

**C.1.2 Structural Concrete – Work Observation (IP 46053)**

a. Inspection Scope

The inspectors observed installation of reinforcing bars in hardened concrete in the roof of the ERCW tunnel. The inspectors witnessed embedment of reinforcing bars, concrete grout placement, and reviewed pre-placement and mixing activities to confirm that the production and placement were performed as specified by WO 111750428 and Field Change Request 57092.

The inspectors also reviewed Modification/Addition Instruction (MAI) 5.4, “Concrete Repair, Grouting, and Dry Packing,” and interviewed personnel involved with these concrete activities. Documents reviewed are included in the attachment.

The following samples were inspected:

- IP 46053 Section 02.03.a – 1 sample
- IP 46053 Section 02.03.h – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Installation of reinforcing bars was completed in accordance with applicable drawings, procedures, and specifications.

**C.1.3 Magnetic Particle (MT) Examination of Safety-Related Welds (IP 57070)**

a. Inspection Scope

The inspectors observed ongoing MT examination activities for historic thermocouple locations associated with WOs 111858952 and 111851625. The inspectors also observed MT examination activities for completed pipe welds associated with WO 08-953303-000.

Specific MT examinations observed included the following:

<u>Work Order</u>	<u>Weld ID</u>	<u>Component</u>
111858952	2-001A-D003-06	32-inch Pipe/Tee, Class II, System 001/ Main Steam
	2-001A-D001-07	32-inch Pipe/Tee, Class II, System 001/ Main Steam
111851625	2-003B-D003-12	16-inch Pipe/Nozzle, Class II, System 003B/Main Feedwater
08-953303-000	2-070B-D089-12	6-inch Pipe/Flange, Class II, System 070/Component Cooling Water
	2-070B-D089-13	6-inch Pipe/Flange, Class II, System 070/Component Cooling Water
	2-070B-D089-14	6-inch Pipe/Flange, Class II, System 070/Component Cooling Water
	2-070B-D089-15	6-inch Pipe/Flange, Class II, System 070/Component Cooling Water

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

The inspectors also reviewed the following records associated with the MT examination observations listed above:

<u>Report</u>	<u>Weld ID</u>
MT-137	2-001A-D003-06
MT-160	2-001A-D001-07
MT-150	2-003B-D003-12
MT-149	2-070B-D089-12 2-070B-D089-13 2-070B-D089-14 2-070B-D089-15

The inspectors reviewed these records to verify compliance with procedural requirements and reviewed the qualification records for one MT examiner. Documents reviewed are included in the attachment.

The following samples were inspected:

- IP 57070 Section 02.02 – 4 samples
- IP 57070 Section 02.03 – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the MT examination activities observed and the records reviewed met applicable procedures, ASME Code, and regulatory requirements.

#### **C.1.4 Safety-Related Piping – Work Observation (IPs 49063 and 37002)**

a. Inspection Scope

The inspectors observed work activities associated with the construction refurbishment and acceptance of safety-related piping systems and passive components within the ERCW system. The inspectors observed activities to verify 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. The inspectors assessed whether personnel were adequately qualified for the roles they performed and that procedures detailed necessary actions and were followed by the craft. The inspectors also assessed whether work activities promptly identified any failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances in safety or quality-related systems, structures, and components (SSCs), and that material identification and control measures were in place and appropriately implemented. Documents reviewed are included in the attachment.



The following area was inspected:

- Flushing for internal cleanliness of Unit 2 portions of the ERCW system

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Cleanliness flushing was performed per the associated WO and cleaning plan instructions.

**C.1.5 Concrete Expansion Anchors (IP 46071 and Temporary Instruction (TI) 2512/023)**

a. Inspection Scope

The inspectors observed installation activities of 5/8 inch and 1/2 inch anchor bolts for the following heating, ventilation, and air conditioning (HVAC) system and pipe supports:

- HVAC support 112-1675 associated with WO 110800545
- HVAC support 112-1676 associated with WO 110800545
- Pipe Support 63-2SISR-021 associated with WO 111099108
- Pipe Support 2-ISLS-998-3854 associated with WO 110835773
- Pipe Support 2-ISLS-997-4918 associated with WO 111071159

The inspectors reviewed the associated WO packages, drawings, and procedures. The inspectors discussed with the field personnel the scope of work and procedure implementation. Concrete anchor installation classroom training of craft personnel was also observed as discussed in Section T.1.1, Craft Training, of this report. Additional documents reviewed are included in the attachment.

The inspectors observed ongoing anchor installation activities to verify the following:

- Anchor bolt hole drilling including depth, perpendicularity to concrete surface, hole size, and rebar damage prevention
- Embedded depth of anchor bolt
- Thread engagement of nut and projected length of bolt above the concrete surface meets acceptance criteria
- Initial installation torque to properly set bolt
- Torque-tension relationship of bolt installation
- Proper consideration of oversized holes in base plates
- Minimum edge distance from concrete and steel lined openings
- Minimum spacing between bolts
- Minimum distance from embedded steel
- Bolt marking/stamp and diameter
- Number of washers used on a bolt

The following samples were inspected:

- IP 46071 Section 02.02.a – 14 samples
- IP 46071 Section 02.02.b – 18 samples

- IP 46071 Section 02.03 – 164 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

**C.1.6 Construction Refurbishment Process – WBN Unit 2 (IPs 37002 and 71111.07)**

a. Inspection Scope

The inspectors reviewed implementation of the passive refurbishment program. This included reviews of the status and results for the ERCW system, PERs associated with passive refurbishment, partial system reviews for the ERCW and safety injection (SI) systems with the associated inspection reports, and field observations of portions of the ERCW system. The inspection of the SI system report included records for six heat exchangers supplied by ERCW and also included the refueling water storage tank (RWST). The inspectors also reviewed the latest revisions to procedures associated with passive refurbishment.

The following samples were inspected:

- IP 37002 Section 02.02.d – 3 samples
- IP 37002 Section 02.02.e – 15 samples
- IP 37002 Section 02.02.f – 6 samples
- IP 71111.07 Section 02.02.b.2 – 6 samples

b. Observations

The inspectors identified an unresolved item (URI):

Introduction: No findings of significance were identified. The inspectors identified a URI associated with potential inadequate coordination of refurbishment activities to assure system quality.

Description: No problems were identified with the partial ERCW system evaluation. The planned inspections and additional optional inspections had been performed on the ERCW system. The inspectors noted that the applicant had identified three areas of heavy rust on ERCW piping, which were annotated on the mark-up drawing for tracking purposes. Two of these areas were listed on PER 287685. The PER description stated “suggest pipe to be hydrolased for inspection, valve is presently cut out and needs to remain out until hydrolase is complete”. The system valves had been reinstalled without any pipe being hydrolased making it very difficult to hydrolase. The applicant verbally indicated that they now thought this condition was mud versus heavy rust, which could be removed by a flush. Flushing is typically not adequate to remove heavy rust and heavy rust does not meet cleanliness requirements. The inspection report, for the third area examined, demonstrated that the area could be easily cleaned which indicated that flushing may be adequate; however, a PER had not been generated to document the

condition and corrective actions. The applicant initiated PER 347130 as a result of the inspectors' observation.

The passive engineering evaluation for the SI system credited WOs for conducting chemical swipes internally and externally on the RWST. Chemical swipes are a required method of inspection for tanks in the applicant's program. The inspectors' review of WO 111115929, credited for the internal swipe, disclosed that the WO was closed without performance of the swipe. The WO step stated "N/A-too small of area to swipe".

In addition, the inspectors noted previous opportunities were available to identify this issue via PER 241773, initiated in July 2010, which highlighted coordination problems and the initial evaluation for PER 296296, conducted on January 19, 2011, which stated that there was not a timely interface and communication between passive refurbishment personnel and other groups.

The above observations and the URI described in Section OA.1.20 of this report indicate that there have been weaknesses in coordination of activities for passive refurbishment activities. Further review of this problem is necessary to evaluate the significance of the refurbishment coordination problems. This is URI 05000391/2011603-01, Potential Inadequate Coordination of Refurbishment Activities to Assure System Quality. The applicant initiated PERs 349123 and 352596 to address this issue.

c. Conclusions

The inspectors identified possible weaknesses in coordination of passive refurbishment activities potentially affecting system quality.

**C.1.7 Construction Refurbishment Process – Commercial Grade Dedication of Replacement and Refurbished Items (IPs 37002 and 43004)**

a. Inspection Scope

To perform the inspections specified in IP 37002, the inspectors used the guidance of IP 43004 to (1) verify that dedicating entities established adequate controls for the acceptance of commercial grade items; and (2) verify that the dedicating entities properly developed and implemented plans for commercial-grade dedications.

To accomplish the above tasks, the inspectors interviewed procurement engineering personnel, reviewed documentation created for procurement contract 83848, and reviewed the following procurement data sheets (PDS):

- PDS CQD463L, Oil Level Sight Glass, manufactured by Cincinnati Valve Co.
- PDS CDP309G, Air Pressure Regulator, manufactured by Leslie Controls Inc.
- PDS CDV598Q, 100 Amp Circuit Breaker, manufactured by Heinemann Electric
- PDS CEW199V, 15 Amp Circuit Breaker, manufactured by Heinemann Electric
- PDS CEF784K, Differential Pressure Switch, manufactured by Dwyer Instruments Inc.
- PDS CPG320D, 16 AWG Electrical Cable, manufactured by Belden Wire and Cable

The following samples were inspected:

- IP 37002 Section 02.02.a.2 – 6 samples
- IP 37002 Section 02.02.c – 3 samples

Documents reviewed are included in the attachment.

b. Observations and Findings

The inspectors identified the following Severity Level (SL) IV NCV:

Introduction: A SL IV NCV of 10 CFR 50, Appendix B, Criterion VII, “Control of Purchased Material, Equipment, and Services,” was identified where established measures were not sufficient to assure that purchased equipment conformed to the procurement requirements. Specifically, engineering specifications, for commercial grade dedications of purchased equipment, did not sufficiently identify the specific criteria that were necessary for verifying the equipment conformed to the critical characteristics for nuclear service.

Description: The inspectors’ review of activities for dedication of commercial grade items identified the following:

- The PDS for Stock Code CDP309G, Leslie pressure regulators (1) identified seismic performance as a required characteristic but did not provide a method to verify seismic qualification, and did not provide a justification for omitting verifications; (2) identified volumetric response as a critical characteristic but did not provide criteria to evaluate the characteristic; and (3) identified physical dimensions as a critical characteristic but did not provide legible criteria in the PDS package for verifying the dimensions.
- The PDS for Stock Code CDV598Q, 100 Amp Heinemann circuit breakers, (1) identified the manufacturer’s part number as a critical characteristic but provided an excerpt from the manufacturer’s catalog that did not correlate to the specified part number; and (2) identified physical dimensions as a critical characteristic but did not provide legible criteria in the PDS package for verifying the dimensions.
- The PDS for Stock Code CEF784K, Dwyer differential pressure switches, identified physical dimensions as a critical characteristic but did not provide legible criteria in the PDS package for verifying the dimensions.

The inspectors determined that the PDS documents had been obtained in electronic format from the applicant’s document control system and that the legibility of the source documents was unreadable. The inspectors’ review of an actual purchase record for procurement contract 83848 and receipt acceptance records for a purchase of Dwyer differential pressure switches determined that dimensional criteria also were not legible on the PDS that was attached to the purchase order (PO) package. Despite the illegible criteria, the record of the acceptance test stated that dimensions were accepted based upon “nominal dimensions as indicated in vendor documentation.” The inspectors determined that the degraded legibility of the PDS and the recorded statement indicated the PDS was not used to determine the acceptance criteria for the dimensions.

The inspectors concluded that the finding was more than minor in accordance with Inspection Manual Chapter (IMC) 2517 because it represents an inadequate process,

procedure or quality oversight function which, if left uncorrected, could adversely affect the quality of the fabrication, construction, testing, analysis, or records of safety-related components. The finding was of very low safety significance because the conditions were identified by the inspectors before the dedicated items had been placed into nuclear service. No cross cutting aspects were identified by the inspectors. The applicant issued Service Request 347282 to address the condition.

Enforcement: 10CFR50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," requires, in part, that measures shall be established to assure that purchased material, equipment, and services conform to the procurement documents. Documentary evidence that material and equipment conform to the procurement requirements shall be available at the nuclear power plant and shall be sufficient to identify the specific requirements, such as codes, standards, or specifications met by the purchased material and equipment.

Contrary to the above:

- (1) On November 12, 2009, Rev. 4 of the engineering specifications for dedication of commercial grade purchases of Stock Code CDP309G, Leslie pressure regulators, was not sufficient to identify the specific requirements that must be met by the purchased equipment, including critical characteristics for seismic performance, volumetric response, and physical dimensions.
- (2) On September 1, 2009, Rev. 7 of the engineering specifications for dedication of commercial grade purchases of Stock Code CDV598Q, 100 Amp Heinemann circuit breakers, was not sufficient to identify the specific requirements that must be met by the purchased equipment, including critical characteristics for manufacturer's part number and physical dimensions.
- (3) On September 6, 2007, Rev. 3 of the engineering specifications for dedication of commercial grade purchases of Stock Code CEF784K, Dwyer differential pressure switches, was not sufficient to identify the specific requirements for the critical characteristics for physical dimensions that must be met by the purchased equipment.

Because this was a SL IV violation and because it was entered into the applicant's corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy NCV 05000391/2011603-02; Failure to Sufficiently Identify Critical Characteristics for Commercial Grade Dedications.

c. Conclusions

The inspectors identified one NCV for failure to adequately identify the critical characteristics for dedication of commercial grade items.

**C.1.8 Construction Refurbishment Process – Safety Related MCC Bucket Replacement (IPs 37002 and 51055)**

a. Inspection Scope

The inspectors interviewed responsible engineers and craft personnel and observed MCC buckets for in-progress replacement activities. In addition, the inspectors reviewed:

- PERs associated with MCC bucket replacements listed in the attachment of this report.
- Seismic Equivalency Analysis for vendor replacement MCC buckets L9001.S1.
- Trend Summary Package (corrective actions for vendor related quality problems), PER 243820.
- Receipt document packages for MCC buckets 78698-MRR-18444 and 78698-MRR-19616.
- QA surveillance reports that document the applicant's observations of the MCC buckets construction and assembly at the vendor facilities, 25402-011-YQA-ECM1-(10016, 10017, and 10018).

Specifically, the inspectors evaluated the applicant's corrective actions regarding quality problems associated with safety-related MCC bucket replacements. Documents reviewed are included in the attachment.

The following sample was inspected:

- IP 37002 Section 02.02.d – 1 sample

b. Observations and Findings

The inspectors identified the following URI:

Introduction: The inspectors identified a URI associated with the applicant's corrective actions to resolve CAQs with vendor components.

Description: NRC Inspection Report 05000391/2010607 documented NCV 05000391/2010607-01 which involved multiple problems with implementation of the corrective action program. One of the problems involved CAQs identified with a safety-related vendor that spanned multiple disciplines and components. The applicant initiated PER 243820 dated August 11, 2010, to address these CAQs. Actions associated with this PER established that CAQs were also identified for the vendor-supplied MCC buckets. The inspectors determined, during interviews, that the applicant had identified non-conformances associated with MCC buckets prior to installation using work steps in their installation WOs as a barrier to inadvertently installing MCC buckets with non-conformances. The non-conformances included vendor-related improper terminations, inoperable safety devices, and improper crimping of terminal connections as documented in PERs 280772 and 299689, dated November 2010 and December 2010 respectively. QC receipt inspections did not detect these non-conformances. The use of these WO work steps continued to detect non-conformances until the applicant removed the work steps from installation WOs to minimize the duplication of efforts between the installation and preoperational startup teams. The removal of these work steps occurred before December 2010 when the corrective actions for PER 243820 were completed. The preoperational startup team also detected non-conformances that were not identified by receipt inspections as documented in PER 323458 (wiring mismatch under compression plate/clamp connections dated February 14, 2011).

During interviews with responsible preoperational start up team members, the inspectors determined that the procedures did not require a thorough inspection of vendor wiring, and that the removal of the work steps from the installation WOs increased the risk that non-conformances will remain undetected.

The inspectors were concerned that the applicant had not performed an evaluation to justify installation of buckets with a history of non-conformances into an energized switchboard shared with Unit 1. After PER 243820 corrective actions were completed, the inspectors detected the same types of non-conformances as identified above during installations (vendor related improper terminations and foreign material in the safety-related MCC buckets). The applicant documented these inspector findings as non-conformances in PER 321192 dated February 9, 2011. The applicant's engineers inspected a sample (25) of the remaining MCC buckets in their QC warehouse and determined that the samples were free of non-conformances. The inspectors, however, identified non-conformances that included lugged and non-lugged wires terminated under the same compression plate. The applicant confirmed that they had overlooked these non-conformances. The applicant combined the inspector's observation into PER 323458 where the preoperational startup team had identified a similar non-conformance.

The inspectors reviewed Material Receiving Reports (MRRs) 78698-MRR-18444 and 78698-MRR-19616, to determine if the receipt inspections had identified any non-conformances that were later detected in the MCC buckets. The inspectors determined that the QC receipt inspections had not identified a non-conformance since PER 241599 identified them and this was before PER 243820 was initiated. Since the QC receipt inspections had identified similar non-conformances early in the project, the inspectors are unclear if the receipt inspection process had changed during this period.

The inspectors evaluated the quality of the documents and MCC buckets provided by the vendor and determined that a spot welding CAQ identified in the level B PER 243820 that had been associated with the other vendor components was not evaluated on the MCC buckets. The inspectors determined during interviews with responsible personnel that the applicant had not inspected spot-welds on the MCC buckets. The inspectors noted that the applicant's MRRs do not identify any information associated with welding on the MCC buckets. It was not clear to the inspectors what welding specifications were provided to the vendor. The inspectors noted that the vendor proposal (attached to the MRRs) dated November 11, 2009, specifies seismic qualification will be accomplished by testing. However, the MRRs list an analysis (Report L9001.S1 Rev. 4 Seismic Equivalency Analysis for Vendor Replacement Buckets and Applicant 1E Buckets September 7, 2010) as the method of qualification. Based on the vendor's analysis, the inspectors could not determine that the MCC buckets were equivalent to the original ones. The vendor's analysis specifies that the design differences between new and original MCC buckets tend to make the new ones more rigid; however, the analysis states that the new MCC buckets are made of a weaker and less rigid sheet metal that is thinner than the original buckets. The analysis also did not mention welds or consider them in the equivalency evaluation of the MCC buckets. The inspectors were unable to find, in the MRRs, a supplier deviation disposition request (SDDR), as required by the applicant PO 78698, Rev. 0, to approve and control any design changes such as qualification method and the use of weaker materials in the MCC buckets.

The inspectors reviewed and evaluated the vendor's 10CFR21 evaluation (letter subject: Review of PER 243820 for 10CFR21 Reporting Requirements, dated November 11, 2010) and determined that it did not adequately address the CAQs identified with the MCC buckets. The vendor letter states that CAQs identified in their MCC buckets were not uncommon in reverse engineering projects and that a formalized prototyping process was not in place to identify the CAQs prior to the applicant receiving them. In addition, the vendor in Report L9001.S1 identifies four other MCC bucket designs that they built using the same quality standards and practices. The inspectors were unable to

determine if the other MCC bucket designs were built for other licensees as basic components, and if the applicant evaluated the possibility of the CAQs affecting them.

These items mentioned above are identified as URI 05000391/2011603-03, Corrective Actions Associated with Adverse Conditions in Motor Control Center Buckets. To resolve the URI, the inspectors need to determine if the quality problems associated with the MCC buckets and the vendor have been properly resolved or have pending actions that will resolve the CAQs. The inspectors need to review the criteria used for receipt inspection, the technical justification for the seismic qualification, the welding specifications for the MCC buckets provided to the vendor and the quality of the welds applied to the them, and the licensee review of the vendor 10CFR21 justification.

c. Conclusions

The inspectors identified the URI because of concerns that the applicant had established corrective actions for vendor-related CAQs, but had not fully reviewed, identified, and corrected the associated CAQs for the MCC buckets.

**C.1.9 Safety-Related Components – Records Review Ice Condenser (IC) System (IP 50075)**

a. Inspection Scope

The scope of this inspection was to verify that generic industry IC issues and issues identified during Unit 1 construction were adequately addressed on Unit 2. The primary issues of focus were:

- IC basket design, construction, and installation,
- IC floor slab protection,
- IC floor drain design and installation, and
- IC intermediate deck door (IDD) repair and installation

The inspectors interviewed engineering and craft personnel and reviewed documentation to ensure that historical items and current construction issues were properly translated into design documents, work instructions, and subsequently field implementation. The inspectors reviewed present and historic design change notices (DCNs), engineering document construction releases (EDCRs), PERs, and WOs to verify that the applicable issues were identified, planned, and worked for Unit 2 ice condenser construction. Previous inspection efforts focused on actual work observation activities associated with IC basket integrity inspections, IC basket screw verification/installation, IC basket foreign material exclusion removal, IC component storage and handling, IDD skin repair, IDD frame construction, IC floor drain piping installation (welding), and general IC component assembly. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified. The inspectors verified that the primary issues of focus were adequately addressed and resolved similar to the methodology performed on WBN Unit 1.



c. Conclusions

The inspected activities associated with the IC system and components were adequate. Generic IC issues and specific IC issues associated with Unit 1 were properly evaluated and corrective actions were implemented to resolve these issues for Unit 2.

**C.1.10 Safety-Related Components – Records Review (IP 50075)**

a. Inspection Scope

The inspectors observed diagnostic testing of a motor-operated valve (MOV) and reviewed the WO package and associated maintenance instruction (MI) to verify the adequacy of the valve and actuator performance through the use of diagnostic testing. The inspectors reviewed the following documents used to conduct the MOV testing activity:

- WO 111485321, for MOV diagnostic testing of 2-FCV-067-0067-B, Emergency Diesel Generator (EDG) Heat Exchanger B1 & B2 Supply Valve from Header B; and
- TVA Watts Bar Nuclear Plant, MI 0.006, MOVATS Testing of Motor Operated Valves, Rev. 17, dated May 6, 2009.

b. Observations and Findings

The inspectors identified the following URI:

Introduction: The inspectors identified a URI related to a MI used to conduct MOV diagnostic testing.

Description: On March 10, 2011, the inspectors observed the diagnostic test performed on MOV 2-FCV-067-0067-B which provides cooling water to the 2B-B EDG. After review of WO 111485321 which was used to perform the diagnostic test on 2-FCV-067-0067-B, the inspectors identified problems with procedure MI-0.006. Procedure MI-0.006 which was included as part of the WO and had the following problems identified by the inspectors: 1) Several attachments contained in the MI had incorrect numbering that appeared to be caused by the attachment being modified on a computer to add field data and the incorrect numbering being introduced into the version of the attachment that was part of the WO. This resulted in the MI not matching the same revision contained within TVA's master document system; 2) Steps were performed and checked off as completed even though the referenced sections did not exist or were mis-labeled within the instruction; and 3) One page was copied so that two sets of data were available to support testing along with handwritten notes.

As a result of the inspector's questions, the applicant initiated Service Request 336501, which later led to the initiation of PER 338383. The inspectors concluded that additional inspection is needed to properly evaluate the extent to which the applicant's procedures and usage, comply with 10 CFR 50 Appendix B, Criterion V, and its process for controlling procedure revisions and usage. This issue was identified as URI 05000391/2011603-04, Control of Revision to Procedure Used to Perform Valve Testing.

c. Conclusions

The inspectors concluded that additional inspection would be required to resolve questions associated with errors observed with the MI used to perform diagnostic testing of MOVs.

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

a. Inspection Scope

The inspectors observed work activities associated with the construction inspection and refurbishment process of safety-related mechanical components to ensure that these components will be in compliance with the original licensing and design basis and meet or exceed vendor specifications. The inspectors reviewed documents to verify that the work instructions and procedures identified requirements and provisions for ensuring that the material condition of safety-related mechanical components was evaluated and documented prior to final assembly of associated components (such as valves) in accordance with CCPP 25402-000-GPP-0000-N1302, "Watts Bar Unit 2 Completion Project Component Refurbishment Evaluation," Rev. 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 installation activities to verify that tolerances/clearances were met; appropriate drawings and work procedures were available; and holdpoints were observed. The inspectors observed a sample of existing safety-related valves being reassembled with new gaskets, diaphragms, packing, etc. in accordance with the original manufacturer's instructions. The inspectors also observed four safety-related gate valves that were modified by drilling holes in the valve bonnets and bodies to address pressure locking concerns as outlined in NRC Generic Letter (GL) 95-07. The inspectors interviewed one QA personnel to verify their ability to perform their assigned duties, QA/QC independence, and adequate management support for QA/QC functions.

The following areas were inspected:

- Observed disassembly, refurbishment and visual inspection of chemical and volume control (CVCS) air-operated valve (AOV) actuator 2-FCV-062-0035-A per WO 08-953657-000.
- Performed visual inspection of drilled hole locations in the valve bonnet and valve body of containment sump supply valve to residual heat removal (RHR) MOV 2-FCV-063-0072-A per WO 08-953177-000.
- Performed visual inspection of drilled hole locations in the valve bonnet and valve body of containment sump supply valve to RHR MOV 2-FCV-063-0073-A per WO 08-953179-000.
- Performed visual inspection of drilled hole locations in the valve bonnet and valve body of containment sump supply valve to containment heat removal spray (CS) MOV 2-FCV-072-0044-A per WO 08-953327-000.
- Performed visual inspection of drilled hole locations in the valve bonnet and valve body of containment sump supply valve to CS MOV 2-FCV-072-0045-B per WO 08-953328-000.

The following samples were inspected:

- IP 37002 Section 02.02.b – 2 samples
- IP 50073 Section 02.02.c – 4 samples
- IP 50073 Section 02.03 – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The activities observed related to field refurbishment of safety-related active mechanical components were adequate. These activities were completed in accordance with applicable approved refurbishment program and procedures. TVA identified deviations were documented using the appropriate field change request process.

### **C.1.12 Electrical Cable – Work Observation (IPs 51063, and 37002)**

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 the repair of cable 2V2911B according to DRA 55117-095 and performed under WO 110966674. Additionally, the inspectors observed safety-related cable pulls (cable 2V6449A under WO 111094429 and cable 2V6015 under WO 111036902) that were performed by hand. The inspectors observed that the cables were routed in accordance with the Integrated Cable and Raceway Design System Cable Report.

Inspectors observed that the cables were protected from sharp edges during the pull, that the bending radius was not violated during the pull, that cable identification was preserved, that division identification was incorporated into the cable during pulling activities, and that raceway completion to support this cable pull was adequate.

The following samples were inspected:

- IP 51063 2.02.c – 2 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

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

#### Acceptance of Purchased Items

##### a. Inspection Scope

The inspectors reviewed Unit 2 construction design and work activities associated with electrical control activities for compliance to NRC requirements and construction permit commitments. Qualification documentation, commercial grade dedication packages, design change packages, work order packages, procedures, and completed work activities, were observed to assure that work practices and qualification methods were adequate.

Inspections were conducted to verify that receiving inspection and procurement documents properly identified received instrument and electrical components, applicable engineering and functional specifications of received items and components were met, and that required electrical component characteristics, performance tests, environmental and seismic qualification tests and other quality specification requirements were met or noted. Documents reviewed are listed in the attachment.

##### b. Observations and Findings

The inspectors identified the following URI:

Introduction: The inspectors identified a URI related to seismic qualification testing of a safety-related control relay (with auxiliary contacts attached) received and installed at WBN Unit 2.

Description: The inspectors reviewed completed work to verify installation of a Westinghouse/Cutler-Hammer relays. The inspectors evaluated component specifications and qualification documentation received with a Cutler-Hammer relay (Model AR880AR and Serial Number 00136380-1-4), and associated with PO 101393-1. The inspectors reviewed the qualification report by ATC Nuclear, QTR10T3000-06, Rev. 0 (MR: 25402-011-V1D-EMR0-00026-001) dated December 13, 2010, for adequate seismic qualification testing and commercial-grade dedication to verify that quality specification and testing requirements of the vendor and the applicant were met.

The inspectors noted that during the seismic qualification process, it appeared as though the test specimen (00136380-1-1) failed the seismic qualification test due to detected chatter in excess of 2 milliseconds (ms). The vendor initiated a Notice of Anomaly (NOA) 10T3000-2 report dated June 30, 2010, identifying chatter in excess of 2ms. A Supplier Disposition Deviation Request (SDDR) 10T3000-6 dated July 7, 2010 referenced the NOA regarding the identified chatter. The applicant rejected the SDDR based on TVA Seismic Specification CEB-SS-5.10, which informs that in no case is spurious function (e.g., contact chatter more than 0.002 sec duration) permissible. The applicant requested a retest of the relay with a faster sampling rate used for the data acquisition system (DAS) and the vendor recorded this on the NOA dated November 8, 2010. The TVA seismic specification also specifies that a fragility test to determine the contact chatter fragility levels shall be performed and transition testing is required when unacceptable chatter occurs at the required response spectra. No record of a fragility test or transition test was included in the qualification report so the inspector concluded that these tests were not completed. In addition, there were no test results or test data supporting the NOA included within the qualification report. According to TVA's seismic

specification, test results and conclusions including reduced and raw test data should be included in the qualification report.

According to NOA 10T3000-3 dated November 5, 2010, while being retested and during the second safe shutdown earthquake attempt, the specimen lost structural integrity. The vendor's disposition of the failure was noted as fatigue due to extreme over testing. The vendor also determined that the test specimen (00136380-1-1) would be scrapped and another specimen (00136380-1-7) retested. The vendor's QA representative approved this disposition on December 10, 2010. There was no customer disposition, SDDR, or approval by the applicant to complete the seismic test using a new specimen. The post-seismic datasheets of the new specimen (00136380-1-7) indicated that chatter was within specifications; however, these test results were recorded on both NOAs in reference to the initial test specimen (00136380-1-1) in the verification of disposition section. The verification stated that the item was retested and no chatter in excess of 2 ms was observed, and is dated December 13, 2010 on NOA 10T3000-2 and December 10, 2010 on NOA10T3000-3.

The qualification report section, "Qualification Program Test Anomaly," references the two NOAs in a statement that concludes that the first test specimen (00136380-1-1) experienced chatter during the initial seismic test and in accordance with the customer's request a retest was performed. It further explains that during this retest, "it was determined that the chatter seen during the initial testing was due to aliasing of the DAS", but the inspector could not verify this statement because it was not reflected in any of the details of the qualification report and there was no supporting technical evaluation performed. In addition, the summary states that, "the sampling rate was increased during the retest and it was observed that all chatter was less than 2ms". The inspector could not verify this statement with objective evidence because there was no test data in the qualification report to support that less chatter was detected in the first specimen (00136380-1-1). Through interviews, the inspectors determined that the chatter detected in the new specimen (00136380-1-7) was less than 2ms but not in the first specimen (00136380-1-1). Therefore, the inspectors were concerned that an unsupported statement was included in the qualification report.

The Certificate of Conformance, dated December 13, 2010, has a statement explaining that, "One NOA was initiated during qualification that required review and approval by TVA", and "SDDR 10T3000-6 was approved by TVA and is included with the shipment". The inspectors reviewed this SDDR and noted that it was rejected by TVA. This statement was modified by lining it out and included an added statement, "Not Applicable. NOA was resolved". It is not clear to the inspectors why this modification occurred or who was responsible for the change because the modification is not initialed.

According to TVA's seismic specification, the disposition of an anomaly is required by the vendor. It appeared as though the vendor did not follow the procedure to accurately document the aliasing in the DAS in a SDDR and provide technical justification to support their conclusion that aliasing caused the failure of the initial test specimen. The applicant did not verify the accuracy of the documentation and the adequacy of the seismic test performed. This issue is identified as URI 05000391/2011603-05, Potential Inadequate Disposition and Verification of Relay Seismic Qualification Test Failure.

c. Conclusions

The inspectors determined that the URI identified involves a seismic qualification test failure of a relay, the potential inadequate disposition by the vendor and inadequate oversight by the licensee. This item is pending the applicant's disposition of relay failure

by recovering technical justification to support the conclusion of the first relay, as well as test records to support the observation of less chatter during the retest including test results of the second relay.

#### Installation of Electrical Conduits

##### a. Inspection Scope

The inspectors reviewed three WOs on completed conduit installations:

- WO 10-951261-001
- WO 09-954179-002
- WO 09-953025-004

The inspectors also conducted direct observation of conduits 2PM9439E and 2PM9475E, located in the cable spreading room underneath the control room, and conduits 2MN03075E and 2MN03365E, located in the reactor building by the steam generator. In addition, the inspectors conducted direct observation of conduit supports for the spliced cables 2PM1913 and 2PM1920.

The inspectors compared the as-built supports to the drawings in the WOs to verify that the supports did not exceed their maximum distance allowance. Documents reviewed are listed in the attachment.

##### b. Observations and Findings

No findings of significance were identified.

##### c. Conclusions

The inspectors determined that the completed work activities were implemented according to their respective design drawings and approved instructions. The inspectors concluded that the applicant's requirements and NRC regulations were met.

#### **C.1.14 Instrumentation Components and Systems – Record Review (IP 52055)**

##### a. Inspection Scope

The adequacy of records was assessed to verify that the safety-related Foxboro SPEC 200 analog process control equipment was produced and procured under an approved QA program that complies with 10CFR50 App. B.

The inspectors reviewed and evaluated the applicant's recent audit records associated with the Foxboro SPEC 200 equipment. The inspectors reviewed audit records to verify that a QA program was implemented at the vendor's manufacturing and engineering facilities and to verify timely follow-up actions addressing the audit findings associated with the SPEC 200 line. The inspectors reviewed TVA's records to verify their review and acceptance of the vendor's corrective actions.

The inspectors conducted a review to verify that records existed demonstrating that the required seismic and electromagnetic and radio frequency interference (EMI/RFI) qualification testing of the Foxboro SPEC 200 equipment had been satisfactorily identified, completed and accepted by the applicant. The inspectors reviewed

procurement requests to verify that the requirements for seismic, electrical isolation and EMI/RFI were identified. The inspectors reviewed a sample of the Foxboro SPEC 200 certificate of conformance and qualification reports to verify compliance with the procurement documents. The inspectors reviewed records analyzing the effects of EMI/RFI on the Foxboro SPEC 200 equipment to verify compliance to TVA Standard Specification SS-E18.14.01. The inspectors reviewed the TVA technical evaluation for panel 2-L-381A to verify the requirement for a radio exclusion zone was included. The inspector reviewed records to verify that a seismic analysis for cabinets 2-R-129 and 2-R-132 was performed and documented. The inspectors reviewed the most recent 2-R-129 rack loading drawing 08F8266630RL-210 Rev. 02 to verify it was reflected in the seismic analysis.

The inspectors interviewed responsible field engineers and conducted direct observations of installed configurations to assess the adequacy of TVA and Bechtel controls for the installation of safety related components associated with the Foxboro SPEC 200 equipment. Inspection of the as-built installation was performed to verify components were of the type specified on drawings and installed and located in accordance with drawings. The installation of a separation barrier located in 2-R-129 was inspected to verify it was installed in accordance with rack loading drawing 08F8266630RL-2101 Rev. 02 and WB-DC-30-4. The inspectors reviewed the rack loading drawing to verify the nest power supply model matched the model number of the certificate of conformance. An inspection of the as-built cabinet frame was performed to verify welds identified in the seismic report existed in the field.

The following samples were inspected:

- IP 52055 Section 2.02.a – 1 sample
- IP 52055 Section 2.02.c – 1 sample
- IP 52055 Section 2.06 – 1 sample

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The samples of instrument components records met applicable requirements.

### **C.1.15 Pipe Support and Restraint Systems (IPs 50090 and TI 2512/023)**

a. Inspection Scope

The inspectors reviewed a sample of design documents and interviewed personnel associated with the design, construction and inspection of pipe and pipe supports. Specifications, drawings, calculations, implementing procedures, and design inputs were among the documents reviewed. The inspectors reviewed design activities to verify that any significant design and field changes from approved drawings were adequately controlled and processed commensurate with the original design.

The inspectors selected a number of completed design pipe support structural drawings to determine whether they were in conformance with the final as-built installation. The inspectors visually examined and measured pipe supports and concrete anchors to determine whether their location, function, and condition meet applicable requirements.

The following samples were inspected:

- IP 50090 Section 02.03.b – 6 samples of witnessed portions of concrete anchor bolt installations
- IP 50090 Section 02.03.c – 2 samples of installed dynamic supports
- IP 50090 Section 02.03.d – 58 samples of installed pipe supports, including 2 variable spring hangers and 17 small-bore pipe lines
- IP 50090 Section 02.03.e – 4 samples
- IP 50090 Section 02.03.f – 60 samples of as-built/final design pipe supports, and 102 as-built/final pipe anchor location for pipe diameters greater than 2.5 inches

Supports inspected and documents reviewed are included attachment.

b. Observations and Findings

The inspectors identified the following URI:

Introduction: The inspectors identified a URI related to an apparent failure to protect safety-related material and equipment and prevent damage from nearby construction activities.

Description: On March 31, 2011, during an inspection of safety-related pipe supports, the inspectors identified two examples where nearby construction activities affected work that had been previously completed.

In the first example, the inspectors identified a 3 inch tube steel approximately 30 inches in length that had lack of fusion approximately 18" long. According to the applicant, this defect may have occurred during the initial fabrication process (during initial construction of Watts Bar Units 1 and 2) while performing electric resistance welding and may not have been visible or apparent at the time; however, after some recent welds were added to the ends of the tube steel in 2010 and subsequent to the QC inspection of the welds, the lack of fusion became apparent.

In the second example, the inspectors identified a strut (support # 47A450-31-27) that was locked up. WO 10-951388-006 had been initiated to free the strut, and subsequent work was performed; however, further investigation by the applicant revealed that an adjacent valve was installed following the strut adjustment which may have potentially locked up the strut after it had been freed.

The applicant initiated PERs 351360 and 351362 to address the issues identified by the NRC inspectors as discussed in the two examples above.

The inspectors concluded that in order to properly evaluate the applicant's disposition of these issues, additional inspection would be required to determine (1) whether future quality inspections would have identified these issues; and (2) what measures and controls are in place to ensure that installed components are protected from nearby construction activities. This issue was identified as URI 05000391/2011603-06, Apparent



Failure to Identify and Prevent Damage to Safety-Related Material and Equipment From Nearby Construction Activities.

c. Conclusions

The inspectors concluded that additional inspection would be required to resolve questions associated with the work performed on pipe supports and discrepancies identified during the inspection.

**P.1 Pre-Operational Activities**

**P.1.1 Pre-Operational Testing Quality Assurance (IP 35301)**

a. Inspection Scope

The objectives of this inspection were to confirm appropriate QA requirements were applied to the preoperational test program in accordance with commitments and regulatory requirements and that these requirements were being implemented. Requirements for the preoperational test program are contained in the Final Safety Analysis Report (FSAR) Chapter 14; TVA Nuclear Quality Assurance (NQA) Plan, TVA-NQA-PLN89-A; Regulatory Guide 1.68, "Initial Test Programs for Water Cooled Nuclear Power Plants," Rev. 2; ANSI 18.7-1976, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants;" ANSI N45.2.4-1972, "Quality Assurance Requirements for the Installation, Inspection and Testing of Instrumentation and Electrical Equipment;" and ANSI N45.2.8-1975, "Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants." The inspectors reviewed the QA organization, QA audit and assessment plans, an assessment report, and an audit report, and confirmed QA personnel were trained and qualified. Two of the responsible QA personnel were interviewed. In addition, selected QA aspects of the preoperational testing program were included in the inspection documented in Section P.1.2.

The following samples were inspected:

- IP 35301 Section 02.01.a.1 – 1 sample
- IP 35301 Section 02.01.a.2 – 2 samples
- IP 35301 Section 02.02.a.1 – 1 sample
- IP 35301 Section 02.02.a.2 – 1 sample
- IP 35301 Section 02.02.a.3 – 1 sample
- IP 35301 Section 02.02.b – 1 sample
- IP 35301 Section 02.03.a – 1 sample
- IP 35301 Section 02.03.b.1 – 1 sample
- IP 35301 Section 02.03.2 – 1 sample
- IP 35301 Section 02.03.3 – 1 sample
- IP 35301 Section 02.04 – 5 samples

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified. The requirements were being met in the areas of QA authorities and responsibilities, surveillance responsibilities, corrective

actions, audits, and training and qualification. TVA had chosen to apply applicable aspects of 10CFR50, Appendix B in accordance with the QA plan previously reviewed and approved by NRC. In addition, the previously reviewed corrective action program was being applied. Corrective actions for test deficiencies are covered within the test program and were reviewed and documented in Section P.1.2. The QA personnel responsible for oversight met training and qualification requirements. The audit and surveillance were thorough with appropriate corrective actions initiated.

c. Conclusions

QA requirements for preoperational testing were established and were being met for this stage of the test program.

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

a. Inspection Scope

The purpose of this inspection was to verify that the applicant had established adequate administrative controls over preoperational testing in accordance with commitments and regulatory requirements. Requirements for the preoperational test program are contained in the FSAR Chapter 14; The TVA NQA Plan TVA-NQA-PLN89-A; Regulatory Guide 1.68, "Initial Test Programs for Water Cooled Nuclear Power Plants," Rev. 2; ANSI 18.7-1976, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants;" ANSI N45.2.4-1972, "Quality Assurance Requirements for the Installation, Inspection and Testing of Instrumentation and Electrical Equipment;" and ANSI N45.2.8-1975, "Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants." The inspectors reviewed qualification documentation for two test personnel and reviewed the JTG membership assignments. Areas which are covered by Unit 1 programs, such as maintenance after turnover to operations and chemistry controls, were previously reviewed and not re-inspected. In addition, controls for drawings and manuals and the design control process previously inspected were not re-inspected. The inspectors reviewed the applicant's procedures for the preoperational test program to verify that controls were in place for the areas below.

- Test program including flushing and cleaning, instrument calibration, system turnover, functional demonstration of equipment, and component testing
- Format and content of test procedures
- Test organization including responsibilities and qualification requirements for key personnel
- Test program administration including jurisdictional controls, conduct of testing, and evaluation of test results
- Document control including test procedures, drawings, and manuals
- Design changes and modifications including change control, temporary modifications, jumpers, and bypasses
- Controls for maintenance
- Equipment protection and cleanliness during the testing phase
- Test and measurement equipment and
- Training

The following samples were inspected:

- IP 70301 Section 02.01.a – 1 sample
- IP 70301 Section 02.01.c – 1 sample
- IP 70301 Section 02.02 – 1 sample
- IP 70301 Section 02.03.a – 1 sample
- IP 70301 Section 02.03.b – 1 sample
- IP 70301 Section 02.03.c – 1 sample
- IP 70301 Section 02.03.e – 1 sample
- IP 70301 Section 02.04 – 1 sample
- IP 70301 Section 02.05 – 1 sample
- IP 70301 Section 02.06 – 1 sample
- IP 70301 Section 02.07 – 1 sample
- IP 70301 Section 02.08 – 1 sample
- IP 70301 Section 02.09 – 1 sample

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The requirements were met for establishment of programmatic controls over preoperational testing.

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

**T.1.1 Craft Training (IP 46071)**

a. Inspection Scope

The inspectors observed a classroom training session on concrete anchor installation for craft personnel and reviewed applicable procedures. The training session included discussions and hands-on examination on concrete anchor installation and procedure requirements for concrete expansion anchors, undercut anchors, and wedge anchors. The inspectors observed craft personnel being evaluated by the instructor on drilling, installing, and torquing of concrete anchors. The training session covered installation steps, acceptance criteria, and personal safety measures along with other requirements.

The following sample was inspected:

- IP 46071 Section 02.01 – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The applicant's program for concrete anchor installation training of craft personnel was adequate.

### III. OPERATIONAL READINESS ACTIVITIES

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

a. Inspection Scope

The inspectors reviewed procedures for the control of transient combustibles, ignition sources, and impairments and also held discussions with fire operations personnel about controls to verify that the program was being implemented in accordance with applicable procedures. The inspectors conducted a walk-down of the applicant'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.

The following samples were inspected:

- IP 64051 Section 02.01 – 1 sample
- IP 64051 Section 02.07 – 10 samples
- IP 64051 Section 02.08 – 1 sample

Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

### IV. OTHER ACTIVITIES

#### OA.1.1 (Discussed) Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break (MELB) Special Program (SP) (TI 2512/040)

a. Inspection Scope

The objectives of this inspection were to evaluate implementation of the MELB SP. This program was established due to the fact that TVA determined that there was inadequate documentation and assurance that design requirements were met to assure MELB criteria were met. The process consists of an iterative process of walk-downs to confirm field conditions relative to flood related commodities (curbs, drains, doors, etc.), susceptible piping, and safe shutdown equipment locations coupled with calculation

being updated as required. The applicant also planned to review previous plant modifications for effects on MELB or the need to modify Unit 2 equipment similar to Unit 1. Appropriate modifications were to be initiated as necessary to provide protection of safe shutdown equipment.

Previous inspections were conducted and documented in NRC Inspection Reports 05000391/2009604, 2010602, and 2011602. The applicant's plans were previously shown to be equivalent or exceed those performed for Unit 1. Remaining actions included completion of conduit walk-downs and implementation of modifications. During this inspection the inspectors observed three walk-downs of conduit and observed additional conduits for sealant in the auxiliary building.

b. Observations and Findings

No findings of significance were identified. The conduit walk-down person was knowledgeable and conducted a thorough inspection of the conduits.

c. Conclusions

Based on this limited review and outstanding actions by the applicant, no additional conclusion is warranted for this inspection.

**OA.1.2 (Discussed) Inspection of Watts Bar Nuclear Plant Microbiologically Induced Corrosion (MIC) SP (TI 2512/039)**

a. Inspection Scope

The objectives of this inspection were to evaluate the implementation of the MIC SP. This program was established due to the fact that TVA had discovered MIC in Unit 1 piping and initiated special controls and monitoring. The applicant determined that similar actions were appropriate for Unit 2 piping not yet incorporated into the program. The applicants planned actions included establishing minimum wall thickness requirements for those systems identified as potentially affected by MIC, determining MIC-susceptible locations, establishing grids for inspection locations, completing modifications to allow flushing similar to Unit 1, and updating program documents. A previous inspection documented in NRC Inspection Report 05000391/2010602 concluded that the applicant's planned actions were equivalent to Unit 1 except no inspections were planned for Unit 2 systems based on raw water system studies. An additional inspection reviewed a QA surveillance; reviewed samples of the specific grid location guidance for corrosion monitoring; and confirmed that the required modifications for MIC were scheduled. That inspection was documented in Report 05000391/2011602. During this inspection the inspectors conducted field inspection to verify that flushing modifications had been implemented in accordance with EDCR 54903-A.

b. Observations and Findings

No findings of significance were identified. The applicant had implemented the appropriate modifications for flushing operations required to control MIC as planned.

c. Conclusions

Based on this limited review and outstanding actions by the applicant, no additional conclusion is warranted for this program.

**OA.1.3 (Discussed) GL 83-28, Required Actions Based on Generic Implementation of Salem ATWS; and TI-2500/020, Inspection to Determine Compliance with ATWS Rule 10 CFR 50.62 (IP 35007)**

a. Inspection Scope

Background: On February 1983 Salem experienced an anticipated transient without scram (ATWS). In response the NRC issued GL 83-28, 10 CFR 50.62 (ATWS rule), and GL 85-06. An ATWS is defined as an anticipated operational occurrence (such as loss of feedwater, loss of condenser vacuum, or loss of offsite power) that is accompanied by a failure of the Reactor Trip System (RTS) to shut down the reactor. At Watts Bar, the system designed to compensate for ATWS events is called the ATWS mitigating system actuation circuitry (AMSAC).

Inspection Activities: The inspectors reviewed the EDCR and logic diagrams and associated design criteria related to the AMSAC system. However, additional design changes were still in process and the design criteria had not yet been updated for Unit 2. The inspectors interviewed responsible personnel to discuss the future schedule related to the AMSAC system.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that applicant actions to address the ATWS generic letter and the ATWS rule have not progressed sufficiently to verify completion. More inspection will be required to close the items.

**OA.1.4 (Discussed) Inspection of Licensee Activities in Reference to NRC Bulletin (BL) 88-04 – Potential Safety-Related Pump Loss (TI 2515/105)**

a. Inspection Scope

The purpose of this inspection was to assure that the applicant was implementing appropriate design changes similar to those previously accepted for Unit 1. Two potential design problems were identified in the BL. The concerns involved the potential for dead-heading of one or more pumps that have common mini-flow lines or other susceptible configurations and the potential for pump damage due to an inadequate mini-flow capacity. The applicant's review resulted in the need for modification of the RHR system by adding full flow check valves downstream from the heat exchanger and the take-off for the charging pump/RHR spray connection in each train. The inspectors reviewed previous documentation from the applicant and NRC for this issue. This included the Unit 1 NRC closure report (Report 50-390, 391/94-10), the NRC framework letter (Watts Bar Nuclear Plant Unit 2 – Status of Regulatory Framework for the Completion of Construction and Licensing for Unit 2 – Rev. 4, and Status of Generic Communications for Unit 2 – Rev. 4 dated October 28, 2010), and portions of the applicable modification package (EDCR 52637, Rev. B).

b. Observations and Findings

No findings of significance were identified. The NRC previously agreed with the applicants approach to this issue which was similar to Unit 1. The applicant’s documentation of this issue was thorough and appropriate modifications were planned. However, since the modifications were not yet performed, this item remains open.

c. Conclusions

The applicant’s planned actions were acceptable.

**OA.1.5 (Discussed) Construction Deficiency Report (CDR) 391/80-111: Faulty Fillet Welds (IP 55050)**

a. Inspection Scope

In February 1980, the applicant notified the NRC that fillet welds on socket fittings, located on safety-related systems, did not meet ASME code (ASME Boiler and Pressure Vessel Code, 1971 Edition with addenda through summer 1973, Section III, Division 1, Rules for Construction of Nuclear Facility Components) and/or TVA Construction Specification G29M requirements due to insufficient weld metal buildup. This deficiency was originally identified in historical non-conformance reports (NCRs) 2806R, 2091R, 2101R, 2111R, 2120R, 2128R, and 2137R. CDR 391/80-111 documents the undersized welds for Unit 2. To restore compliance, the applicant reinspected 100 percent of the socket welds within the scope of the CDR and did repairs as necessary to meet ASME code of record.

The inspectors reviewed the applicant’s NCR 2111, to determine if the documentation addressed all of the faulty fillet welds on Unit 2. Also, the inspectors did independent measurements on the following 14 welds to verify that the size met the code requirements:

<b>System</b>	<b>Weld Number</b>
Main Steam	2-001A-D001-05P-R1
Containment Spray	2-072A-T027-3; 2-072A-T027-10; 2-072A-T027-11A; 2-072A-T027-11B; 2-072A-T027-12
Feed Water	2-003C-T014-1; 2-003C-T014-1A; 2-003C-T014-2; 2-003C-T014-3; 2-003C-T014-13; 2-003C-T014-14; 2-003C-T014-15; 2-003C-T014-16

The following samples were inspected:

- IP 55050 Section 02.06.a – 14 samples

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The documents reviewed and fillet welds inspected for CDR 391/80-111 met the requirements of 10 CFR Part 50, Appendix B; Bechtel's QA and Special Processes Manuals; TVA's QA Program; and the code of record. This item remains open pending more independent weld inspections.

**OA.1.6 (Discussed) Welding Corrective Action Program (CAP) Sub-issue 4: Wall-Mounted Instrument Panels (IP 55100, and TI 2512/032)**

a. Inspection Scope

Background: The Welding CAP was initiated in the mid-1980s to address several welding related issues. Sub-Issue 4, "Wall-Mounted Instrument Panels," was initiated when wall-mounted instrument panels made on site were found not to have the required full penetration welds.

The corrective actions on Unit 1 included re-inspection and assessment of wall-mounted panel welds. Based on the assessment of the welds in question, the two panels which exhibited the least amount of effective weld were destructively tested to prove them capable of performing their safety function.

Inspection Activities: The applicant's corrective actions on Unit 2 also included re-inspection and assessment of wall-mounted panels in the same manner as the Unit 1 panels. The applicant determined that Unit 2 wall mounted panels were bounded by the destructive testing done on Unit 1.

The inspectors reviewed calculation WCGACQ0011, Rev. 1, which had the applicant's assessment method and inspection results for the existing Unit 2 wall panels. The inspectors also walked down a sample of Unit 2 wall-mounted panels. The inspectors examined the welds (eight welds per panel) and evaluated them using the applicant's assessment criteria in TVA procedure LSWD 1388, Appendix B, Rev. 1. The sample of wall-mounted panels inspected included:

- WBN-2PNL-276-L047
- WBN-2PNL-276-L270
- WBN-2PNL-276-L289
- WBN-2PNL-276-L575
- WBN-2PNL-276-L175A

The following samples were inspected:

- IP 55100 Section 02.06.a – 40 samples

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.



c. Conclusions

The observed corrective actions on Unit 2 were equivalent to those done on Unit 1. The documents reviewed and wall-mounted panels inspected met the requirements of 10 CFR Part 50, Appendix B; Bechtel's QA and Special Processes Manuals; TVA's QA Program; and the code of record. This sub-issue needs no further inspection and will be closed with the Welding CAP.

**OA.1.7 (Discussed) Welding CAP Sub-issue 5: HVAC Ductwork Welding (IP 55050, and TI 2512/032)**

a. Inspection Scope

Background: The Welding CAP was initiated in the mid 1980s to address several welding related issues. Sub-Issue 5, "HVAC Ductwork Welding," addressed safety-related ductwork (including the hydrogen collection system) that was made and installed without a QA program or specific welding requirements from engineering. The QA program for these systems was established in 1980. The engineering drawings were then changed to require full penetration welds. Welds made before this requirement were not inspected for complete penetration.

The corrective action on Unit 1 was to qualify the existing partial penetration welds as acceptable as is. This qualification included weld surveys, seismic analysis, and destructive testing. This item was closed for Unit 1 in a safety evaluation report entitled "HVAC Duct Weld Deficiencies".

The applicant determined that no further work was needed to close this item for Unit 2 because the issues associated with Unit 1 were properly evaluated and the corrective actions that were implemented resolve these issues for Unit 2.

Inspection Activities: The inspectors met with the applicant's engineering staff to discuss their conclusion of no work needed to close the item for Unit 2. Also, the inspectors reviewed WCG-1-324, "Safety Significance Evaluation for Seismic Category I HVAC Duct Welding Concern" (Rev. 1) and APTECH Evaluation Report AES 90051243-1Q-1, Rev. 1 to verify the applicability of the evaluations and conclusions to Unit 2. Lastly the inspectors walked down samples of spiral welded HVAC ductwork in the annulus. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that the evaluations done for Unit 1 justified the acceptability of the existing ductwork on Unit 2. This sub-issue requires no more inspection and will be closed with the Welding CAP.

**OA.1.8 (Discussed) Welding CAP Sub-issue 7: Temporary Attachments – Piping (IPs 55050, 57070, and TI 2512/032)**

a. Inspection Scope

Background: The Welding CAP was initiated in the mid 1980s to address several welding related issues. Sub-Issue 7, “Temporary Attachments - Piping,” was created to address an employee concern indicating that the documentation of required NDE of thermocouple removal areas could not be located.

The corrective actions on Unit 1 consisted of MT of the removal areas. No rejectable indications were found; however, four welds were found to have exceeded minimum wall thickness requirements due to grinding.

Ongoing corrective actions on Unit 2 consisted of MT examinations of the welds in question. Because the exact thermocouple locations could no longer be found, the applicant was doing examinations out to four inches from the edge of the weld, on both sides, all the way around the pipe circumference to ensure coverage.

Inspection Activities: The inspectors reviewed the scope of the applicant’s corrective actions (documented in WO 111858952) to verify the planned activities addressed all welds within the scope of the issue. The applicant’s MT procedure, (MT-ASME, “Bechtel Nondestructive Examination Standard, Magnetic Particle Examination,” Rev. 5) had already been reviewed by the NRC (see Inspection Report 05000391/2010-603, Section C.1.19). Therefore, the inspectors reviewed the MT inspection reports that had been created at the time of the inspection. The following MT reports were reviewed:

- MT-137
- MT-146
- MT-144
- MT-145
- MT-142
- MT-138
- MT-143
- MT-154
- MT-140
- MT-141
- MT-147
- MT-155
- MT-150

Also, the inspectors directly observed two MT examinations performed on weld ID numbers 2-001A-D003-06 and 2-001A-D001-07 as documented in Section C.1.3 of this report.

The following samples were inspected:

- IP 57070 Section 02.03 c – 13 samples

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed activities and records reviewed for this welding CAP sub-issue met the requirements of 10 CFR Part 50, Appendix B; Bechtel's QA and Special Processes Manuals; TVA's QA Program; and the code of record. This sub-issue requires more inspection.

**OA.1.9 (Discussed) Welding CAP Sub-issue 12: North/South Valve Rooms (IPs 55100, 57070, 48053, and TI 2512/032,)**

a. Inspection Scope

Background: The Welding CAP was initiated in the mid-1980s to address several welding related issues. Sub-Issue 12, "North/South Valve Rooms," was created to address an employee concern about welding over cracks in structural steel welds in the Unit 1 North and South valve rooms.

The corrective actions on Unit 1 were visual and ultrasonic (UT) inspection of 236 structural steel welds. Forty six (46) of these welds required an engineering evaluation to verify acceptability. Four welded connections with higher calculated stresses were also inspected by UT and MT. The MT testing found lamellar tearing that did not meet code acceptance requirements. The lamellar tears were repaired.

Inspection Activities: To address the lamellar tearing found in Unit 1, the applicant did MT on similar Unit 2 joints and fabricated structural steel beams in the north/south valve rooms. The inspections found lamellar tearing in one of the four joints and initiated repairs.

The inspectors reviewed MT procedure MT-AWS D1.1, Rev. 1, to verify the applicable requirements of AWS (American Welding Society) D1.1 (1972 Edition through 1974 Revisions) were met. The inspectors observed MT on structural steel to determine whether applicable instructions and travelers specified the test procedure to be followed, required equipment and materials were available, location of testing was clearly defined, and the indication evaluation process was followed. The observed MT was documented in WO 111799534. The inspectors reviewed personnel qualification records to verify applicable AWS D1.1 inspector qualification requirements were met.

The following samples were inspected:

- IP 48053 Section 02.03.d – 1 sample
- IP 55100 Section 02.06.b – 1 sample
- IP 55100 Section 02.06.c – 1 sample
- IP 55100 Section 02.06.d – 1 sample
- IP 57070 Section 02.01 – 1 sample
- IP 57070 Section 02.02 – 1 sample

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed activities and reviewed documents for Unit 2 corrective actions were equivalent to those done on Unit 1. The documents reviewed and magnetic particle testing inspected for welding CAP sub-issue 12 met the requirements of 10 CFR Part 50, Appendix B; Bechtel's QA and Special Processes Manuals; TVA's QA Program; and the code of record. This item requires more inspection and review.

**OA.1.10 (Discussed) Electrical Issues CAP Sub-Issue: Contact and Coil Ratings of Electrical Devices (TI 2512/020)**

a. Inspection Scope

The inspectors reviewed Unit 2 construction design activities, corrective action and work activities associated with the Electrical Issues CAP addressing contact and coil ratings of Class 1E inductive devices, for compliance to NRC requirements and construction permit commitments. Qualification documentation, design change packages, calculations, WO packages, and procurement packages were reviewed and in-process work activities were observed to assure that work practices and qualification specification requirements were met, and that actions taken were appropriate.

The inspectors reviewed corrective actions taken by the licensee and interviewed responsible design personnel to determine if the CAP issues related to the contact and coil ratings of electrical inductive devices would be resolved. Corrective actions that have been taken on Unit 2 were also reviewed and compared to previous actions taken on Unit 1. Issued calculations including WBPEVAR9005002 and WBPEVAR 8807028, were evaluated for the proper contacts ratings and the maximum credible voltages at device terminals of switches and relays applied at WBN. The inspectors observed in-process design changes in the field that replaced Potter Brumfield relays with Allen Bradley 700-R type relays and Westinghouse (also known as Cutler-Hammer) AR/ARD type relays on Unit 2 due to historic design changes previously made on Unit 1 and unreliable Potter Brumfield relays associated with EDCR 53112 and WO 09-951816-002. The inspectors also reviewed installed component specifications, associated field drawings, and verified the proper location and mounting of installed components in the field. Receipt inspection documents including procurement packages and qualification documents received with components were reviewed to verify applicable requirements were met. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the activities committed to for the Electrical Issues CAP related to contact and coil ratings of electrical devices are still in process and will require further inspection.

**OA.1.11 (Discussed) Three Mile Island (TMI) Action Item II.F.1.2, Install a Capability for Post-Accident Sampling for Iodine and Particulates; and TMI Action Item III.D.3.3, Provide a Capability to Detect and Measure Radioiodine in Plant Areas (IP 35007)**

a. Inspection Scope

Background: The TMI Action Items (ML051400209) were established to address lessons learned from the accident on TMI Unit 2.

The following regulatory positions were established for these two TMI Action Items:

TMI Action Item II.F.1.2, Iodine and Particulate Sampling: Provide instrumentation for monitoring effluent release lines capable of measuring and identifying radioiodine and particulate radioactive effluents under accident conditions.

TMI Action Item III.D.3.3, In-Plant Radiation Monitoring: Provide instrumentation for accurately determining in-plant airborne radioiodine concentrations to minimize the need for unnecessary use of respiratory protection equipment.

Inspection Activities: The inspectors interviewed radiochemistry laboratory personnel and instrument engineers, conducted direct field observations of plant areas designated for installation of monitoring equipment, and examined EDCRs 52340 and 52341 and Chemistry Manual Chapters 9 and 13. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the Unit 2 equipment would implement a different design than the Unit 1 equipment. Actions were still pending to install Unit 2 Iodine Sampling Monitors WBN-2-RE-90-106, 112, and 119. In addition, actions were still pending to establish a capability to obtain samples from plant gaseous effluent lines, including sample stations, sample procedures, and a portable radiochemistry cart for transport of charcoal and silver zeolite cartridges to the laboratory for analyses.

c. Conclusions

The inspectors determined that applicant actions to address the TMI action items have not progressed sufficiently to verify completion. More inspection will be required to close the items.

**OA.1.12 (Closed) GL 96-06, Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions**

a. Inspection Scope

The purpose of this inspection was to ensure that the applicant was implementing appropriate design changes similar to those previously accepted for Unit 1. The NRC had previously approved the applicant's proposed actions for both Units. This issue involved the potential for water hammer, two-phase flow, or overpressurization of systems in containment. The applicant's required actions were to modify the ERCW system to replace check valves with butterfly valves at the containment penetrations. The inspectors reviewed the previous NRC documentation for Unit 1, reviewed the

applicant's responses to the GL, reviewed the modification package (EDCR 52796) and associated WOs, and observed the completed modifications in the field.

b. Observations and Findings

No findings of significance were identified. The applicant implemented design changes which were required to address this issue.

c. Conclusions

Applicant actions were considered acceptable; therefore, this item is closed.

**OA.1.13 (Closed) CDR 391/87-08: Improper Fabrication, Inspection, and Documentation of Wall-Mounted Instrument Panels (IP 55100)**

a. Inspection Scope

Background: In February 1987, the applicant informed the NRC that the seismic adequacy of the wall-mounted instrument panels made on site was not verified because the panels did not have the required full penetration welds.

Inspection Activities: The corrective actions on Unit 1 included re-inspection and assessment of wall-mounted panel welds. Based on that assessment, the two panels which exhibited the least amount of effective weld were destructively tested to prove them capable of performing their safety function.

The applicant's corrective actions on Unit 2 also included re-inspection and assessment of wall-mounted panels in the same manner as the Unit 1 panels. The applicant determined that Unit 2 wall mounted panels were bounded by the destructive testing done on Unit 1.

This CDR is identical to Welding CAP Sub-Issue 4, Wall-Mounted Instrument Panels. The inspector's actions to cover that sub-issue are therefore applicable to this CDR. (See Section O.A.1.6 of this report). Also, the inspectors reviewed the applicant's closure package Form NGDC PP-19-2 with tracking document PER 143718. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The documents reviewed and panels inspected for CDR 391/87-08 met the requirements of 10CFR50, App. B; TVA's QA Program; and was identical to Unit 1. This item is closed.

**OA.1.14 (Closed) URI 391/86-14-02: Deficiencies in Welds (IP 55050)**

a. Inspection Scope

An inspection in 1986 revealed that some safety-related ASME code (American Society of Mechanical Engineers *Boiler and Pressure Vessel Code*, 1971 Edition with addenda

through summer 1973, Section III) welds had not received post weld heat treatment (PWHT) in accordance with the qualified welding procedure. This issue was treated as a URI and considered licensee identified. (See NRC Inspection Report 05000391/86-14, Section 10). The URI was closed for Unit 1 in Inspection Report 05000390/90-04, Section 4.1.

The welds on Unit 2 were divided into three groups, each with different corrective actions.

Group 1 – This group consisted of six welds that had questionable PWHT results. The applicant reviewed the strip charts and records and concluded they were adequate. The inspector did an independent review of the strip chart for weld number 2-003B-D002-10 to verify that the PWHT was done in accordance with the requirements of the applicable welding procedure (GT-SM13-0-2 Rev. 0).

Group 2 – This group consisted of welds which had received PWHT outside the requirements of the qualified welding procedure (GT-SM11-O-2A). The applicant requalified the welding procedure with the different PWHT in 1987 and 1990 to restore compliance. The inspectors reviewed the original and new procedure qualification records to verify they met the requirements of the applicable edition of ASME Boiler and Pressure Vessel Code Section IX and that it adequately covered the welds in question. The reviewed procedure qualification records are listed in the attachment.

Group 3 – This group consisted of eight welds which received PWHT though the weld records referenced a welding procedure qualified without PWHT. The applicant determined that the weld records incorrectly referenced the wrong welding procedure. The applicant, therefore, did a record search and corrected all eight weld records (listed in the attachment). The inspectors reviewed the applicable records to verify the adequacy of the corrective actions.

The following samples were inspected:

- IP 55050 Section 02.02.e – 1 sample
- IP 55050 Section 02.05.f.3 – 3 samples

Documents reviewed are listed in the attachment.

b. Observation and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the reviewed procedures, records, and corrective actions were adequate to address the PWHT deficiencies. This URI is closed.

**OA.1.15 (Closed) TMI Action Items II.K.3.30, Revised Small Break Loss of Cooling Accident (SBLOCA) Methods to Show Compliance with 10CFR50 Appendix K and II.K.3.31, Plant-Specific Calculations to Show Compliance with 10CFR50.46**

a. Inspection Scope

Background: As a result of the accident at TMI-2, a Bulletins and Orders Task Force was formed within the Office of Nuclear Reactor Regulation. This task force was charged, in part, to review the analytical predictions of feedwater transients and SBLOCAs for the purpose of assuring the continued safe operation of all operating reactors, including a determination of acceptability of emergency guidelines for operators. As a result of the task force reviews, a number of concerns were identified regarding the adequacy of certain features of SBLOCA models, particularly the need to confirm specific model features (e.g., condensation heat transfer rates) against applicable experimental data. These concerns, as they applied to each light-water reactor vendor models, were documented in the task force reports for each light water reactor vendor. In addition to the modeling concerns identified, the task force also concluded that, in light of the TMI-2 accident, additional systems verification of the small-break loss of coolant accident (LOCA) model, as required by II.4 of Appendix K to 10CFR50, was needed.

TMI Action Items II.K.3.30 and II.K.3.31 were created to verify that: (1) analysis methods, used by nuclear steam supply system vendors and/or fuel suppliers, for SBLOCA accidents compliance with 10CFR50 Appendix K were revised, documented, and submitted for NRC approval and (2) plant-specific calculations using NRC-approved models for SBLOCA accidents, as described in Item II.K.3.30 to show compliance with 10CFR50.46, were submitted for NRC approval.

Inspection Activities: Based on the information provided in the background section, the objective of this inspection was to gather and evaluate sufficient information to make a determination as to whether TVA had adequately addressed TMI action items II.K.3.30 and II.K.3.31. The inspection focused on a review of various communications between TVA and NRC staff regarding the creation and acceptance of SBLOCA analyses designed to resolve these TMI action items. The completed actions were evaluated to verify that the intent of both II.K.3.30 and II.K.3.31 were satisfied through the use of calculations, revision of previous design basis documentation, and new analyses to support compliance. Specific documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions associated with TMI action items II.K.3.30 and II.K.3.31 to verify the adequacy of the applicant's actions. The inspectors concluded that the applicant's efforts were sufficient to satisfy the intent of the respective TMI action items. TMI Action Items II.K.3.30 and II.K.3.31 are considered closed.



**OA.1.16 (Closed) BL 90-01, Loss of Fill-Oil in Transmitters Manufactured by Rosemount (IPs 35007 and 52055)**a. Inspection Scope

Background: On April 21, 1989, the NRC issued Information Notice 89-42, Rosemount Models 1153 and 1154 Transmitters, to alert the industry to a series of reported failures of Models 1153 and 1154 pressure and differential pressure transmitters manufactured by Rosemount. The failure mode was a gradual loss of fill-oil from the sealed sensing module of the transmitter. In 1990, the NRC issued BL 90-01 which called for licensees to promptly identify and take appropriate corrective actions for Model 1153 Series B, Model 1153 Series D, and Model 1154 Rosemount transmitters.

Later, Supplement 1 to the BL was issued to clarify that operating reactors should identify Rosemount Model 1153 Series B, Model 1153 Series D, and Model 1154 transmitters manufactured before July 11, 1989 which may be used in either safety related systems or systems installed in accordance with 10 CFR 50.62 (the ATWS rule). The BL additionally requested that transmitters that have a normal operating pressure greater than 500 psi be replaced or monitored in an enhanced surveillance program. The BL defined "replaced" as being refurbished with a sensor module manufactured after July 11, 1989, or replaced by a transmitter manufactured after July 11, 1989 (a transmitter having a serial number greater than 500000). Construction permit holders were requested to complete the items before loading fuel.

The applicant was tracking this issue as Nuclear Central Office (NCO) 920017001. The applicant has stated that design engineering actions were complete; however, the NCO was not to be closed until the associated field work was complete. Actions were still pending to replace safety-related transmitters and transmitters that fall under the requirements of 10 CFR 50.62, the regulation which covers ATWS systems. The NCO record contained a list of transmitters with issued purchase request/material requests and EDCR numbers.

Inspection Activities: The inspectors reviewed a sample of drawings, EDCRs, and POs associated with transmitters in the reactor coolant system. The review was performed to verify that the list of transmitters associated with NCO920017001 was complete. The inspectors walked down and reviewed drawings and procedures associated with three transmitters listed in closed WOs that were also on the list attached to the NCO. Two of the transmitters sensed steam generator narrow range level, and the third measured reactor coolant system loop 4 hot leg pressure. The walk-downs were conducted to verify that the transmitters met the definition of "replaced" (i.e., serial numbers were greater than 500000), that the most recent drawings were used for installations, that the specified instruments were installed in the locations noted on the drawings, that required inspections were documented in accordance with procedure, and that measures had been taken to protect the instruments after installation.

The following samples were inspected:

- IP 52055 Section 02.02.c – 3 samples

The full list of documents reviewed is in the attachment.

b. Observation and Findings

There were no findings of significance.

c. Conclusions

Based on the sample inspected, the inspectors concluded that the list of transmitters associated with the NCO adequately addressed the scope of transmitters identified in the BL supplement as needing replacement or monitoring in an enhanced surveillance program. The inspectors also concluded for the sample inspected that the transmitters had been replaced as defined in the BL. The inspectors also concluded for the sample inspected that current drawings were used in installation, the items were installed in the correct location, inspections were done and documented, and the protection for the installed items was adequate. No additional inspection is recommended for this issue at this time; therefore, BL 90-01 is closed.

**OA.1.17 (Closed) CDR 391/86-46, Radiation Monitoring System (RMS) Discrepancies (IP 35007)**

a. Inspection Scope

As stated in TVA's final report for the 10 CFR 50.55(e) deficiencies described in WBRD-50-391/86-46 (ML073551045), discrepancies had been identified which impacted the adequacy, functionality, and reliability of the RMS. The deficiencies included:

- Sample line construction deficiencies which degraded their effectiveness in obtaining a representative sample.
- Design and documentation deficiencies which placed the performance of the RMS equipment in question.
- Deficiencies in establishing traceability to unambiguous primary calibration records.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the issues and committed actions described in this CDR mirror, in every aspect, items to be addressed by the RMS SP.

c. Conclusions

The inspectors determined that issues and committed actions described in CDR 86-46 are redundant to the RMS SP. Accordingly, tracking of actions to resolve CDR 86-46 is not required and the CDR will be closed by reference to the RMS SP.

**OA.1.18 (Closed) CDR 391/82-95: Decouple Piping Incorrect Analysis (IP 50090, IP 35007 and TI 2512/023)**

a. Inspection Scope

In October 1985, the applicant notified the NRC that some thick-walled instrument piping, having approximately the same stiffness as the attached, small-bore process piping, were not accounted for in the piping stress analysis. This deficiency was originally identified in historical NCR WBN CEB 8228. The issue was documented in

CDR 390/82-99 for Unit 1 and CDR 391/82-95 for Unit 2. Based on a previous review of completed Engineering Change Notice 4785 and field verification of modified supports, the inspectors determined that CDR 390/82-99 had been adequately resolved for Unit 1 as documented in Inspection Reports 05000390/84-43 and 05000391/84-35.

To address Unit 2, the inspectors performed the following:

- Reviewed the applicant's open item closure report including any actions associated with PER 172621 and 172622, which was issued to track required Unit 2 actions for historical NCR WBN CEB 8228.
- Reviewed the applicable procedures and verified recurrence control measures had been incorporated such as updates to the design criteria and analysis checklist in the WBN Rigorous Analysis Handbook to include verification of decoupling attributes.
- Reviewed a sample of EDCR packages and applicable pipe stress analysis and verified that the decoupling analysis was included in the calculations.

Additional documents reviewed are included in the attachment.

a. Observations and Findings

No findings of significance were identified.

b. Conclusions

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

**OA.1.19 (Closed) CDR 391/94-06, Centrifugal Charging Pump 1A-A Performance Deficiency (IP 35007)**

a. Inspection Scope

Due to a performance problem of the Unit 1 Centrifugal Charging Pump (CCP) 1A-A, the applicant replaced the rotating element with the Unit 2 CCP 2B-B rotating element. During that time frame the applicant also discovered that the Unit 2 2A-A CCP rotating element was unusable. The applicant's corrective actions consisted of replacing the rotating element with vendor refurbished elements meeting current design standards.

The inspectors reviewed applicant documentation of the new rotating elements including review of the applicable EDCR 52945 and the vendor shop test reports; 280-RLCU00079-01 and 02 dated February 18, 2011 and February 12, 2011 respectively.

b. Observations and Findings

No findings of significance were identified. The test reports showed that design requirements were met. In addition, on-site testing is planned as part of the component and system preoperational testing. NRC inspections are planned for the CCPs as part of the preoperational test program reviews.

c. Conclusions

Applicant actions were considered acceptable; therefore, this item is closed. Further inspections will confirm performance of the CCPs in service.

**OA.1.20 (Closed) URI 5000391/2010605-02, Implementation of Piping Refurbishment Program (IP 35007)**

This URI involved the fact that NRC had identified a heavy rust area on piping at valve 2-FCV-1-16 which the applicant had not inspected. Further review of applicant procedures and corrective actions were necessary. Although, the procedure for piping inspection was confusing, the review of procedures disclosed that inspections were not required every time an opportunity to inspect occurred. Rather, the process was based on sample inspections which would ultimately bound the system conditions. This approach had been previously reviewed and accepted. An adjacent inspection point had been established for this area of piping and had been inspected by the applicant on October 10<sup>th</sup> and resulted in identification of the same condition of heavy rust. This was more than a month before the NRC inspection. As a result of the previous NRC inspection observations, the applicant hydrolased both areas of the piping and confirmed cleanliness which the inspectors observed. However, the applicant had not taken action on the earlier inspection such as initiation of a PER and/or appropriate corrective actions to remove the rust. This was considered a second example of failure of the refurbishment group to coordinate activities to ensure systems are restored to requirements and therefore is considered another example of the URI 05000391/2011603-01 Potential Inadequate Coordination of Refurbishment Activities to Assure System Quality documented in Section C.1.6.

**V. MANAGEMENT MEETINGS**

**X.1 Exit Meeting Summary**

On April 13, 2011, the resident inspectors presented the inspection results to Mr. David Stinson and other members of his staff. Although some proprietary information may have been reviewed during the inspection, no proprietary information was included in this inspection report.

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Applicant personnel

R. Ayala, I&C Engineer, Bechtel  
T. Ballard, Preop and Startup, TVA  
R. Bankes, Radiochemistry Lab, TVA  
C. Beach, Licensing Support  
D. Cooper, Field Engineer, Bechtel  
M. Divirgillio, Procurement Engineering  
D. McNeil, EG Supervisor, Bechtel  
F. Melton, I&C Engineer, TVA  
D. Charlton, Licensing, TVA, Unit 2  
A. Bangalore, Electrical Design, Bechtel  
R. Brown, Civil, Bechtel  
J. Davenport, Supply Chain, TVA  
R. Davis, Work Supervisor, TVA  
K. Galloway, Field Engineer, Bechtel  
D. Helms, Acting Passive Refurbishment Manager  
R. James, Sr. Civil Engineer, Bechtel  
R. Kuhn, Quality Manager, Bechtel  
E. Freeman, Engineering Manager, TVA, Unit 2  
T. Moran, MELB and MIC Special Program Owner  
G. Newell, NDE Level III, Bechtel  
M. Pitre, Lead Field Welding Engineer, Bechtel  
D. Stinson, Vice President, TVA, Unit 2  
G. Scott, Licensing, TVA, Unit 2  
T. Taylor, Field Engineering, Bechtel  
D. McNeil, Control Systems EGS, Bechtel  
I. Kahn, Engineering, Washington Group  
D. Carraghan, Supplier Quality, Bechtel  
G. Morrison, Quality, Bechtel  
N. Kennedy, Engineering Design, Bechtel  
W. Goodman, Procurement, Bechtel  
B. Perkins, Civil Supervisor, Bechtel  
R. Larcher, Field Engineer, TVA

### INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction
IP 35301	Preoperational Testing - Quality Assurance
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 43004	Inspection of Commercial-Grade Dedication Programs
IP 46053	Structural Concrete - Work Observation
IP 46071	Concrete Expansion Anchors
IP 48053	Structural Steel and Supports – Work Observation
IP 49063	Safety-Related Piping - Work Observation
IP 50073	Mechanical Components – Work Observation
IP 50075	Safety-Related Components – Records Review
IP 50090	Pipe Support and Restrain Systems
IP 51053	Electrical Components and Systems Work Observation
IP 51055	Electrical Components and Systems – Record Review
IP 51063	Electric Cable – 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 57070	Nondestructive Examination Procedure Magnetic Particle Testing Examination Procedure Review/Work Observation/Record Review
IP 64051	Procedures - Fire Prevention/Protection
IP 70301	Overall Preoperational Test Program Review Requirements
IP 71111.07	Heat Sink Performance
TI 2512/020	Inspection of Watts Bar Nuclear Plant Electrical Issues Corrective Action Program Plan
TI 2512/023	Inspection of Watts Bar Nuclear Plant Hanger Update Corrective Action Program Plan
TI 2512/032	Inspection of Watts Bar Nuclear Plant Welding Corrective Action Program Plan
TI 2512/039	Inspection of Watts Bar Nuclear Plant Microbe Induced Corrosion Special Program
TI 2512/040	Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break Special Program
TI 2515/105	Inspection of Licensee Activities in Reference to NRC Bulletin 88-04 – Potential Safety-Related Pump Loss

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

#### Opened

05000391/2011603-01	URI	Potential Inadequate Coordination of Refurbishment Activities to Assure System Quality (Sections C.1.6 and OA.1.20)
05000391/2011603-02	NCV	Failure to Sufficiently Identify Critical Characteristics for Commercial Grade Dedications (Section C.1.7)
05000391/2011603-03	URI	Corrective Actions Associated With Adverse Conditions in Motor Control Center Buckets (Section C.1.8)

05000391/2011603-04	URI	Control of Revision to Procedure Used to Perform Valve Testing (Section C.1.10)
05000391/2011603-05	URI	Potential Inadequate Disposition and Verification of Relay Seismic Qualification Test Failure (Section C.1.13)
05000391/2011603-06	URI	Apparent Failure to Identify and Prevent Damage to Safety-Related Material and Equipment From Nearby Construction Activities (Section C.1.15)
<u>Discussed</u>		
2512/040	TI	Moderate Energy Line Break SP (Section OA.1.1)
2512/039	TI	Microbiologically Induced Corrosion SP (Section OA.1.2)
83-28	GL	Required Action Based on Generic Implementation of Salem ATWS (Section OA.1.3)
2500/020	TI	Determine Compliance with ATWS Rule 10CFR50.62 (Section OA.1.3)
2515/105	TI	Licensee Activities in Reference to NRC BL 88-04 – Potential Safety-Related Pump Loss (Section OA.1.4)
391/80-111	CDR	Faulty Fillet Welds (Section OA.1.5)
2512/032	TI	Welding CAP Sub-issue 4: Wall-Mounted Instrument Panels (Section OA.1.6)
		Welding CAP Sub-issue 5: HVAC Ductwork Welding (Section OA.1.7)
		Welding CAP Sub-issue 7: Temporary Attachments – Piping (Section OA.1.8)
		Welding CAP Sub-issue 12: North / South Valve Rooms (Section OA.1.9)
2512/020	TI	Electrical Issues CAP Sub-Issue: Contact and Coil ratings of electrical devices (Section OA.1.10)
II.F.1.2	TMI Action	Install a Capability for Post-Accident Sampling

for Iodine and Particulates (Section OA.1.11)

III.D.3.3	TMI Action	Provide a Capability to Detect and Measure Radioiodine in Plant Areas (Section OA.1.11)
<u>Closed</u>		
96-06	GL	Assurance of Equipment Operability and Containment Integrity During Design Basis Accident Conditions (Section OA.1.12)
391/87-08	CDR	Improper Fabrication, Inspection, and Documentation of Wall-Mounted Instrument Panels (Section OA.1.13)
391/86-14-02	URI	Deficiencies in Welds (Section OA.1.14)
II.K.3.30	TMI Action	Revised SBLOCA Methods to Show Compliance with 10CFR50 Appendix K (Section OA.1.15)
II.K.3.31	TMI Action	Plant-Specific Calculations to Show Compliance with 10CFR50.46 (Section OA.1.15)
90-01 and Supp 1	BL	Loss of Fill-Oil in Transmitters Manufactured by Rosemount (Section OA.1.16)
391/86-46	CDR	Radiation Monitoring System Discrepancies (Section OA.1.17)
391/82-95	CDR	Decouple Piping Incorrect Analysis (Section OA.1.18)
391/94-06	CDR	Centrifugal Charging Pump 1A-A Performance Deficiency (Section OA.1.19)
391/2010605-02	URI	Implementation of Piping Refurbishment Program (Section OA.1.20)



## LIST OF DOCUMENTS REVIEWED

### I. QUALITY ASSURANCE PROGRAM

#### Q.1.2 Identification and Resolution of Construction Problems

##### PERs (Problem Evaluation Reports)

PER 317283, Anonymous PER  
 PER 317273, Anonymous PER  
 PER 324539, Anonymous PER  
 PER 320145, Anonymous PER  
 PER 327495, Anonymous PER  
 PER 317321, Anonymous PER  
 PER 321201, Anonymous PER  
 PER 321209, Anonymous PER  
 PER 320700, Anonymous PER  
 PER 323467, Trend PER; increasing number of anonymous PERs

### II. MANAGEMENT OVERSIGHT AND CONTROLS

#### C.1.2 Structural Concrete – Work Observation

##### Unit 2 Procedures

TVA Procedure MAI-5.4, “Concrete Removal, Repair, Grouting, and Dry Packing,” Revision (Rev.) 12

##### Field Change Request (FCR)

FCR 57092

##### Work Order Package (WO)

WO 111750428

#### C.1.3 Magnetic Particle Examination of Safety-Related Welds

##### Procedure

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

##### MT Examination Reports

MT-137, Weld No. 2-001A-D003-06, 03/01/2011

MT-149; Weld No. 2-070B-D089-12, 2-070B-D089-13, 2-070B-D089-14, 2-070B-D089-15; 03/08/2011

MT-150, Weld No. 2-003B-D003-12, 03/08/2011

MT-160, Weld No. 2-001A-D001-07, 03/15/2011

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

WO 110798681, ERCW Flush of 2-PIPE-067-C  
 Cleaning Plan 2-CP-067-01

### **C.1.5 Concrete Expansion Anchors**

#### Unit 2 Procedures

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

#### Work Order Package (WO)

WO 110800545  
 WO 111099108  
 WO 110835773  
 WO 111071159

#### Unit 2 Specifications

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

#### HVAC Supports

112-1675  
 112-1676

#### Pipe Supports

63-2SISR-021  
 2-ISLS-998-3854  
 2-ISLS-997-4918

### **C.1.7 Construction Refurbishment Process – Commercial Grade Dedication of Replacement and Refurbishment Items**

#### Miscellaneous Documents

MRA-JF00-00007, R2, Material Receiving Instruction; Item 2: Switch, Electrical Supply Alliance, dated 7/14/2010  
 Test Report for Acceptance for TVA Central Lab, EQ10-0193, Cat. IDs CCA090X and CEF784K, Differential Pressure Switch  
 G5930-2-120, Engineering Evaluation for Stock Code CEF784K, Differential Pressure Switch  
 G6685-2-111, Engineering Evaluation for Stock Code CDP309G, Pressure Regulator

### **C.1.8 Construction Refurbishment Process – Safety Related MCC Bucket Replacement**

#### QA Audits and Surveillances

25402-011-YQA-ECM1-10016  
 25402-011-YQA-ECM1-10017  
 25402-011-YQA-ECM1-10018

#### Miscellaneous Documents

78698-MRR-18444, Receipt package for safety related MCC Buckets

78698-MRR-19616, Receipt package for safety related MCC Buckets  
 L9001-S1 Rev4, Seismic Equivalency Analysis for vendor replacement MCC buckets  
Problem Evaluation Reports (PERs) and Service Requests (SRs)

PER 296266, "NRC-Identified Hardware Nonconformance"  
 PER 323458, Wiring mismatch under compression plate/clamp connections  
 PER 323366, MCC Bucket vendor supplied 2 buckets without lugs for motor cables  
 PER 311441, MCC bucket door interference  
 PER 338420, Vendor wire broken from lug  
 PER 321192, NRC identified terminal block in MCC bucket  
 PER 307059, Wire broke off base of lug  
 PER 338337, MCC bucket wiring problem  
 PER 243820, Trend for ice condenser vendor issues

### **C.1.9 Safety-Related Components – Records Review Ice Condenser System**

#### Miscellaneous Documents

NPG-SPP-01.14, "Service Request Information"  
 EDCR 53778, Ice Condenser Floor  
 PER 143780, Ice Condenser Floor Drain  
 PER 226652, U2 Ice Condenser Baskets  
 PER 224433, Historical: U2 Ice Condenser  
 PER 221605, Ice Condenser Items  
 PER 220057, U2 Ice Condenser Baskets  
 PER 239307, Historical: Incorrect Existing Flat Washers

### **C.1.13 Electrical Components and Systems – Work Observation**

#### Procedures

CEB-SS-5.10, Seismic Qualification of Electrical, Mechanical, and I&C Devices, 2/01/08  
 WB-DC-40-31.2 Rev. 8, Seismic Qualification of Category I Fluid System Components and  
 Electrical or Mechanical Equipment, 11/20/00

#### Procurement Documents

25402-011-MRI-EMR0-00002, PO#: 70933 Rel: 00045, Relays  
 25402-011-MRI-EMR0-00001, PO#: 33782 Rel: 155, Relays  
 STS Report S749-RP-01, "Nuclear Environmental and Seismic Qualification for an Allen-  
 Bradley electromagnetic Relay Part Number 700DC-R400Z1", 11/10/93  
 QTR10T3000-06, Rev. 0, "ATC Qualification Report for Cutler-Hammer Relay P/N: AR880AR",  
 12/13/10

### **C.1.14 Instrumentation Components and Systems – Record Review**

#### Design Control Documents

DCN 52641A, Replace Controls for EGTS Loops 2-P 65-80 and 2-P-65-82

Miscellaneous Documents

IPS Certificate of Conformance Customer PO No. 71252 Foxboro S.O. No. 826663 Models, N-2AI-I2V, Dated 9/25/2009

Foxboro Qualification Report QOAAB35 Rev.3, dated 9/17/84

IPS Certificate of Conformance Customer PO No. 71252 Foxboro S.O. No. 826663 Models, N-2AO-VAI, Dated 9/25/2009

Foxboro Qualification Report QOAAA06 Rev. H and QOAAB17 REV. A

IPS Certificate of Conformance Customer PO No. 71252 Foxboro S.O. No. 826663 Model N-2AARPSO5-A6-0, Dated 8/20/2009

Foxboro Qualification Report QOAAA37 Part 2 Rev. B, May 1984

TVA Nuclear Specification SS E18.14.01, Electromagnetic Interference (EMI) Testing

Requirements for Electronic Devices R3, 6 29-96

EMI/RFI Test Review Work Sheet, January 8, 2009 by Richard Brehm, TVA Corporate EMC Engineer

PEG Package No. WB2-07-017, Spec 200 Instrument Loops

PR 52376, Rev 4, WB Unit 2 Safety Related BOP Instrument Loops in Auxiliary Instrument room and Auxiliary Control Room

08F8266630RL-2101 Rev. 02, Rack Loading Auxiliary Instrument Room Rack 2-R-129 Train "A"

QA Audits and Surveillances

NUPIC Audit/Survey number 19778

NUPIC Audit/Survey number 22581

TVA Audit Evaluation 2010ON-56 Closure of Audit Findings

**C.1.15 Pipe Support and Restraint Systems (IPs 50090 and TI 2512/023)**Unit 2 Procedures

Bechtel Procedure 25402-000-GPP-0000-N3503, "Piping Installation," Rev. 3

TVA WDP-PD-2, "Walkdown Procedure for Piping and Pipe Supports," Rev. 9

The following non-modified pipe supports were examined:

Pipe Support Identification Number	Design Revision Authorization (DRA)	Support Type
47A060-59-6	52553-002, Rev. 0	Rigid Support
03B-2AFW-R157	52435-219, Rev. 1, 52435-221, Rev. 0	Rigid Support
63-2SIS-R271	52502-267, Rev. 0, 52502-268, Rev. 0,	Rigid Support
63-2SIS-V158	52502-167, Rev. 0, 52502-168, Rev. 0	Rigid Support
74-2RHR-R214	52538-275, Rev. 0	Rigid Support
47A427-8-41	52432-078, Rev. 0, 52432-078, Rev. 0	Variable Support
2-62A-127	52470-096, Rev. 1	Rigid Support

2-70-301	SK-2-70-301-1	Rigid Support
2-63-296	SK-2-63-296-1	Rigid Support
2-62A-136	52470-156, Rev. 0	Rigid Support
2-62A-171	52470-034, Rev. 0, 52470-033, Rev. 0	Dynamic Support
2-62A-221	52487-158, Rev. 0	Rigid Support
47A435-14-13	52492-131, Rev. 1	Rigid Support
H-450-25-28-71	52506-070, Rev. 0, 56241-660, Rev. 0	Rigid Support
47A450-25-316	52508-015, Rev. 0	Rigid Support
2-70-913	52526-031, Rev. 0	Rigid Support
2-70-806	52529-075, Rev. 0, 52529-076, Rev. 0, 52529-077, Rev. 0	Rigid Support
47A437-4-84	52532-013, Rev. 0	Rigid Support
47A435-15-61	52563-042, Rev. 0, 52563-043, Rev. 0	Rigid Support
47A450-26-169	52571-016, Rev. 0	Rigid Support
2-70-190	SK-2-70-190-1, Rev. 901	Rigid Support
47A437-5-41	SK-47A437-5-41, Rev. 3	Rigid Support
47A437-5-38	SK-47A437-5-38, Rev. 3	Rigid Support
03B-2AFW-R45	52433-012, Rev. 0, 52433-013, Rev. 0	Rigid Support
2-62A-017	52479-095, Rev. 0, 52479-096, Rev. 0, 52479-097, Rev. 0	Rigid Support
2-63-466	52491-206, Rev. 0, 52491-207, Rev. 0	Rigid Support
47A060-62-64	52476-111, Rev. 0, 52476-115, Rev. 0	Rigid Support
47A437-4-49	52536-065, Rev. 0, 52536-066, Rev. 0, 52536-067, Rev. 0	Rigid Support
74-2RHR-V162	52537-026, Rev. 0, 52537-027, Rev. 0, 52537-028, Rev. 0	Rigid Support
2-63-088	52492-211, Rev. 0, 52492-212, Rev. 0	Rigid Support
63-2SISR177	52502-112, Rev. 0, 52502-113, Rev. 0	Dynamic Support
47A437-1-25	52502-318, Rev. 0, 52502-319, Rev. 0	Variable Support
03B2AFWR066	52432-032, Rev. 0, 52432-033, Rev. 0	Rigid Support
74-2RHRR213	52538-211, Rev. 0, 52538-212, Rev. 0, 52538-213, Rev. 0	Rigid Support
H-406-16-27A-7	52587-091, Rev. 0, 52587-092, Rev. 0	Rigid Support

47A450-25-177	56241-355, Rev. 1, 56241-356, Rev. 1	Rigid Support
47A437-5-40	SK-47A437-5-40, Rev. 3	Rigid Support

The following recently modified pipe supports were examined:

Pipe Support Identification Number	Design Revision Authorization (DRA)	Support Type
H-450-2-35-493	52568-026, Rev. 0, 52568-027, Rev. 0, 52568-028, Rev. 0	Rigid Support
H-450-5-7-71	52568-077, Rev. 0, 52568-078, Rev. 0	Rigid Support
47A450-16-1	52566-004, Rev. 0, 52566-003, Rev. 0	Rigid Support
47A450-25-138	52506-025, Rev. 0, 52506-026, Rev. 0	Rigid Support
47A450-25-233	52505-009, Rev. 0	Rigid Support
67-2ERCWR013-1	52508-036, Rev. 1	Rigid Support
67-2ERCWR167-1	52508-026, Rev. 0, 52508-027, Rev. 0	Rigid Support
47A450-25-336	52508-012, Rev. 1	Rigid Support
47A450-25-300	52508-019, Rev. 0	Rigid Support
47A450-25-340	52508-005, Rev. 1	Rigid Support
47A450-26-210	52508-062, Rev. 0, 52508-063, Rev. 0, 52508-064, Rev. 0	Rigid Support
47A450-25-347	52509-017, Rev.0, 52508-022, Rev. 0, 52508-023, Rev. 0, 52508-024, Rev. 0	Rigid Support
47A450-25-154	52506-015, Rev.0, 52506-016, Rev.0, 52506-017, Rev.0, 52506-018, Rev.0, 52506-019, Rev.0	Rigid Support

47A060-67-98	52505-029, Rev. 0, 52505-030, Rev. 0	Rigid Support
47A450-26-8	52573-016, Rev. 2, 52573-017, Rev. 1	Component Support
47A450-26-197	52569-046, Rev. 1, 52569-047, Rev. 1, 52569-029, Rev. 0, 52569-028, Rev. 0	Rigid Support
47A450-26-52	52574-005, Rev. 2, 52574-006, Rev. 1, 52574-008, Rev. 1	Rigid Support
47A450-26-140	52575-011, Rev. 0, 52575-012, Rev. 0, 52575-013, Rev. 0, 52575-014, Rev. 0	Rigid Support
47A450-67-139	52574-048, Rev. 0, 52574-049, Rev. 0	Rigid Support
47A450-25-152	52506-010, Rev. 1, 52506-009, Rev. 1	Rigid Support
47A450-25-332	52508-013, Rev. 2	Rigid Support
47A450-25-312	52508-032, Rev. 2	Rigid Support
47A450-25-304	52508-030, Rev. 1	Rigid Support
47A450-31-27	52503-097, Rev. 1	Rigid Support

### **P.1.1 Preoperational Testing Quality Assurance**

Quality Assurance Organization chart dated 01/20/2011

2011 Preop Audit/Assessment Plan Guide

QA Observation Schedule – FUY2011

Preoperational Test Program Oversight Plan for Nuclear Quality Assurance Plan

Preoperational Test Program Oversight Plan for FSAR Chapter 14

Preoperational Test Program Oversight Plan for RG 1.68, Rev. 2

Construction Completion Oversight Plan dated 02/22/2011

NGDC PP-14, Audits and Assessments, Rev. 14

NGDC PP-21, Training and Qualification of Quality Assurance Personnel, Rev. 3

Quality Assurance Audit Report NGDC 1001, Preoperational Start-Up Activities and associated response dated 09/10/2010

Quality Assurance Assessment Report NGDC-WBN-10-008, System 32 Turnover to Startup Activities

## Quality Assurance PTI Review Checklist

### P.1.2 Overall Preoperational Test Program Review

SMP-1.0, Watts Bar Nuclear Plant Unit 2 Startup Manual Introduction, Rev. 2  
 SMP-2.0, Watts Bar Nuclear Plant Unit 2 Preoperational Startup Engineering Organization, Rev. 1  
 SMP-3.0, Watts Bar Nuclear Plant Unit 2 Joint Test Group Charter, Rev. 1  
 SMP-4.0, Watts Bar Nuclear Plant Unit 2 System Turnover, Rev. 2  
 SMP-5.0; Watts Bar Nuclear Plant Unit 2 Indoctrination, Training and Qualification of Preoperational Startup Engineers, Rev. 4  
 SMP-6.0; Watts Bar Nuclear Plant Unit 2 Administration, Conduct and Test Results Processing of Generic Test Instructions, Rev. 2  
 SMP-7.0; Watts Bar Nuclear Plant Unit 2 Control of Cleanliness, Layup and Flushing, Rev. 2  
 SMP-8.0, Watts Bar Nuclear Plant Unit 2 Administration of Preoperational Test Instructions, Rev. 7  
 SMP-9.0, Watts Bar Nuclear Plant Unit 2 Conduct of Test, Rev. 1  
 SMP-10.0, Watts Bar Nuclear Plant Unit 2 Packaging and Processing Test Results, Rev. 0  
 SMP-11.0, Watts Bar Nuclear Plant Unit 2 Component Test Program, Rev. 0  
 SMP-12.0, Watts Bar Nuclear Plant Unit 2 Preoperational Test Matrix, Rev. 2  
 SMP-13.0, Watts Bar Nuclear Plant Unit 2 Boundary Drawings, Rev. 5  
 SMP-14.0, Watts Bar Nuclear Plant Unit 2 Test Deficiency Notices, Rev. 2  
 SMP-15.0, Watts Bar Nuclear Plant Unit 2 Status and Control of Isolation Devices, Rev. 1  
 25402-000-GPP-0000-N1206, Work Order Processing, Rev. 12  
 25402-000-GPP-0000-N1601, Systems Completion and Turnover, Rev. 4  
 TI-437, Operational Readiness Turnover Process for Unit 2 Systems, Rev. 3

### III. OPERATIONAL READINESS ACTIVITIES

#### F.1 Fire Protection

##### Procedures and Standards

NPG-SPP-18.4.7, Control of Transient Combustibles, Rev. 0  
 NPG-SPP-18.4.8, Control of Ignition Sources (Hot Work), Rev. 0  
 NPG-SPP-18.4.6, Control of Fire Protection Impairments, Rev. 0  
 TI-210, Fire Protection Engineer Periodic Inspection, Rev. 0

##### Problem Evaluation Reports (PERs)

PER 332103, No location or identification on or above Fire Extinguishers

##### Work Orders (WOs)

WO 111260923, Install Pipe Support 2-70-270

##### Others

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



#### **IV. OTHER ACTIVITIES**

##### **OA.1.5 CDR 391/80-111: Faulty Fillet Welds**

###### Drawings

SK-WBN-E-2881-1C-1 Rev. 7  
 SK-437-5 Sheet #8 Rev. 4  
 SK-427-2 Sheet #17 Rev. 6

###### Miscellaneous

NCR 2111, Faulty Fillet Welds Nonconforming Report

##### **OA.1.6 Welding CAP Sub-issue 4: Wall-Mounted Instrument Panels**

###### Drawings

47W600-32 Rev. 0  
 47W600-82 Rev. 0  
 47W600-132 Rev. 10  
 47W600-135 Rev. 12  
 47W600-174 Rev. 14

###### Procedures

TVA Procedure LSWD 1388, "Limited Scope Walkdown Package," Rev. 1

###### Corrective Action Documents (PERs and SRs)

SR 336407  
 PER 143718

##### **OA.1.7 Welding CAP Sub-issue 5: HVAC Ductwork Welding**

###### Corrective Action Documents (PERs and SRs)

PER 143773  
 PER 143727

###### Miscellaneous

WCG-1-324, "Safety Significance Evaluation for Seismic Category I HVAC Duct Welding Concern" (Rev. 1)  
 APTECH Evaluation Report AES 90051243-1Q-1 Rev. 1

##### **OA.1.8 Welding CAP Sub-issue 7: Temporary Attachments – Piping**

###### Work Orders

111858952

Corrective Action Documents (PERs and SRs)

PER 114961  
PER 143831

NDE Reports

MT-137  
MT-146  
MT-144  
MT-145  
MT-142  
MT-138  
MT-143  
MT-154  
MT-140  
MT-141  
MT-147  
MT-155  
MT-150

**OA.1.9 Welding CAP Sub-issue 12: North / South Valve Rooms**

Work Orders

111799534, Unit 2 South Valve Room Structural Steel Repair

Drawings

48W1707-04  
48W1707-10  
48W1707-13  
48W1707-14  
48W1707-16

Procedures

MT-AWS D1.1 Rev. 1, Bechtel Magnetic Particle Examination Procedure

Corrective Action Documents (PERs and SRs)

PER 172793

Miscellaneous

NGDC PP-19-2, TVA North/South Valve Rooms Commitment Completion

**OA.1.10 Issues CAP Sub-Issue: Contact and Coil ratings of electrical devices**Calculations

WBPEVAR9005002, Rev. 2, "Evaluation of Safety-related switches & relay contact loads for 125VDC circuits", 1/14/11.

WBPEVAR8807028, "Adequacy of contact-to-contact and coil-to-coil isolation between Class 1E and non-2E circuits and Class 1E and Special circuits", 1/24/11.

EDQ00223620080011, "125V DC Vital Power Control Voltage Analysis-Unit 2", 8/27/10

Design Control Documents

EDCR 53112, Rev. A, Replace P&B slave relays with Westinghouse and Allen Bradley relays

DCN M-21892-A, Replace P&B MDR relays used for 10 primary safety functions

DCN W-38605-B, Slave relay replacement

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

PER: PIRWBNEEB8610PER, Rev. 0, Missing manufacture ratings for contact switching 125VDC safety-related inductive loads, 2/25/91

Procurement Documents

25403-011-MRA-EMR0-0002, Rev. 0, EDCR 53112-A Relays

Work Control Documents

WO: 09-951816-002, Replace/Install new relays & rework internal wiring to terminal block

**OA.1.11 TMI Action Item II.F.1.2, Install a Capability for Post-Accident Sampling for Iodine and Particulates; and TMI Action Item III.D.3.3, Provide a Capability to Detect and Measure Radioiodine in Plant Areas**Miscellaneous Documents

WB-DC-40-57, "Anticipated Transients without Scram Mitigation system actuation circuitry (AMSAC)", Rev. 4

WCAP-1085P-A, Rev. 1, AMSAC Generic Design Package

NGDC 10180700, GL 83-28 (2.1 Part 1) Equipment Classification (Reactor Trip System Components)

Drawings

DRA 52408-015, Rev. 0

DRA 52408-025, Rev. 0

**OA.1.13 CDR 391/87-08: Improper Fabrication, Inspection, and Documentation of Wall-Mounted Instrument Panels**Miscellaneous

Closure package: Form NGDC PP-19-2 with Tracking Number: PER 143718.

**OA.1.14 URI 391/86-14-02: Deficiencies in Weld**Procedures

Welding Procedure GT-SM13-0-2 Rev. 0

Corrective Action Documents (PERs and SRs)

PER 144961

Miscellaneous

PWHT Strip Chart for Weld No. 2-003B-D002-10

PQR GT-SM13-0-2 (1978)

PQR GT-SM11-0-2A (R 1) (1987)

PQR GT-SM11-0-2A (Mod 1) (1990)

Field Weld Operation Sheet for weld numbers:

- 2-001A-D001-16
- 2-001A-D003-14
- 2-110A-D006-15
- 2-001A-D009-17
- 2-003B-D002-02
- 2-003B-D002-03
- 2-003B-D002-04
- 2-003B-D002-05

**OA.1.15 TMI Action Item II.K.3.30, “Revised SBLOCA Methods to Show Compliance with 10CFR50 Appendix K” and II.K.3.31, “Plant-Specific Calculations to Show Compliance with 10CFR50.46”**

Letter from TVA to NRC dated October 17, 1986

SSER 5 dated November 1990

NRC IIR 50-390/85-08 and 50-391/85-08 dated March 29, 1985

NRC IIR 50-390/85-59 and 50-391/85-48 dated November 15, 1985

Letter from TVA to NRC dated February 16, 1995

Letter from NRC to TVA dated April 18, 1995

SSER 15 dated June 1995

Letter from Westinghouse to TVA (WBT-D-1460) dated January 22, 2010 highlighting the results from WBN2 SBLOCA analysis (LTR-LIS-09-436)

Letter from Westinghouse to TVA (WBT-D-1399) dated December 21, 2009 highlighting the recommended changes to WBN2 FSAR regarding SBLOCA analysis

WBN2 FSAR Amendment 97 dated January 11, 2010

**OA.1.16 BL 90-01, Loss of Fill-Oil in Transmitters Manufactured by Rosemount**Design Control Documents

EDCR 53391

EDCR 55385

EDCR 53613

EDCR 52449

Work Control Documents

WO 09-953656-008, "EDCR 53391 Inspect Panel 2-PNL-276-L577, RC, Steam and Feedwater Panel (Inside CNTMT)", 09/13/10

WO 09-953656-009, "EDCR 53391 – Inspect Panel 2-PNL-276-L359. Replace Instrument 2-PT-068-0068. Install and/Inspect", 08/05/10

Drawings

DRA 53391-009, Rev. 0

DRA 53391-011, Rev. 0

2-47W610-68-1 "Electrical Control Diagram Reactor Coolant System" Rev. 1

2-47W610-68-2 "Electrical Control Diagram Reactor Coolant System" Rev. 1

2-47W610-68-3 "Electrical Control Diagram Reactor Coolant System" Rev. 2

2-47W610-68-4 "Electrical Control Diagram Reactor Coolant System" Rev. 17

2-47W610-68-5 "Electrical Control Diagram Reactor Coolant System" Rev. 1

2-47W610-68-6 "Electrical Control Diagram Reactor Coolant System" Rev. 11

2-47W610-68-7 "Electrical Control Diagram Reactor Coolant System" Rev. 2

Procedures

MAI 4.4.B "Instrument and Instrument Panel Installation", Rev. 6

Miscellaneous Documents

NCO920017001, Loss of Fill-Oil in transmitters Manufactured by Rosemount PO 13729, Rosemount Transmitters

**OA.1.18 CDR 391/82-95: Decouple Piping Incorrect Analysis**Open Items/Commitment Completion Report

Tracking Number: PER 172621

Tracking Number: PER 172622

Problem Evaluation Reports

PER 172621

PER 172622

TVA Design Criteria Document

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

Analysis Check list included in WBN-RAH-510 of the WBN Rigorous Analysis Handbook

Drawings

Drawing Number 2-47W600-1701 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration

Drawing Number 2-47W600-1761 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration

Drawing Number 2-47W600-1767 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration

Drawing Number 2-47W600-1776 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration

Drawing Number 2-47W600-1780 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-1784 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-1781 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-1786 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-1787 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-1790 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-2048 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-2049 Rev 0, Change Reference EDCR 53390, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-1899-1 Rev 0, Change Reference EDCR 53392, Electrical Instrument Sensing Line Slope Configuration  
Drawing Number 2-47W600-2039-2 Rev 0, Change Reference EDCR 53392, Electrical Instrument Sensing Line Slope Configuration

#### Calculations

Calculation Summary of Instrument Sensing Line problem 70203, EDCR 53392  
EDMS/RIMS No. T93091116017, REV 0 - 9/28/09  
Calculation Summary of Instrument Sensing Line problem 03293, EDCR 53390  
EDMS/RIMS No. T93091013002, REV 0 - 8/31/09  
Calculation Summary of Instrument Sensing Line problem 0600250-04-11, EDCR 53392  
EDMS/RIMS No. T93101201516, REV 4 - 11/23/10

## LIST OF ACRONYMS

AOV	air-operated valve
AMSAC	ATWS mitigating system actuation circuitry
ASME	American Society of Mechanical Engineers
ATWS	anticipated transient without scram
AWS	American Welding Society
BL	Bulletin
CAP	Corrective Action Program
CAQ	condition adverse to quality
CDR	Construction Deficiency Report
CFR	<i>Code of Federal Regulations</i>
CVCS	Chemical and Volume Control System
DAS	data acquisition system
DCN	Design Change Notice
ECP	Employee Concerns Program
EDCR	Engineering Document Construction Release
EMI/RFI	electromagnetic and radio frequency interference
ERCW	Essential Raw Cooling Water
GL	Generic Letter
HVAC	Heating, Ventilation, and Air Conditioning
IC	Ice Condenser
IDD	intermediate deck door
IMC	Inspection Manual Chapter (NRC)
IP	Inspection Procedure (NRC)
IR	Inspection Report (NRC)
LCO	limiting condition for operation
LOCA	loss of coolant accident
MAI	Modification Addition Instruction
MELB	moderate energy line break
MI	Maintenance Instruction
MIC	microbiologically induced corrosion
MCC	motor control center
MRR	Material Receiving Report
MT	magnetic particle testing
NCO	Nuclear Central Office
NCR	nonconformance report
NCV	non-cited violation
NOA	Notice of Anomaly
NRC	Nuclear Regulatory Commission
PDS	Procurement Data Sheet
PER	Problem Evaluation Report
PO	Purchase Order
PWHT	post weld heat treatment
QA	quality assurance
QC	quality control
Rev.	revision
RMS	Radiation Monitoring System
SAR	safety analysis report
SDDR	Supplier Disposition Deviation Request
SI	Safety Injection

SL	severity level
SP	Special Program
SSC	structures, systems, and components
TI	Temporary Instruction (NRC)
TVA	Tennessee Valley Authority
URI	unresolved item
UT	ultrasonic test
WBN	WBN Nuclear Plant
WO	work order