



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

November 13, 2012

Mr. Michael D. Skaggs
Senior Vice President
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Tennessee Valley Authority
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Chattanooga, TN 37402-2801

**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2012608**

Dear Mr. Skaggs:

On September 30, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on October 16, 2012, with Mr. Hruby, General Manager, and other members of your staff.

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

Based on the results of this inspection, the enclosed report documents two NRC-identified findings which were determined to involve violations of NRC requirements. However, because the findings were Severity Level IV violations and were entered into your corrective action program, the NRC is treating these as non-cited violations (NCVs) consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest any NCV 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).

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

Sincerely,

/RA/

Joel E. Rivera-Ortiz, Acting Chief
Construction Projects Branch 3
Division of Construction Projects

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

Enclosure: Inspection Report 05000391/2012608 w/Attachment

cc w/encl: (See next page)

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cc w/encl: (See next page)

* Previous Concurrence

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Letter to Michael D. Skaggs from Joel Rivera-Ortiz dated November 13, 2012.

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INSPECTION REPORT 05000391/2012608

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2012608

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: 1260 Nuclear Plant Rd
Spring City, TN 37381

Dates: August 19 – September 30, 2012

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Approved by: Joel E. Rivera-Ortiz, Acting Chief
Construction Projects Branch 3
Division of Construction Projects

Enclosure

EXECUTIVE SUMMARY

Watts Bar Nuclear Plant, Unit 2

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

Inspection Results

- The NRC identified a Severity Level (SL) IV Non-Cited Violation (NCV) of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the failure to perform work on a safety-related system with an approved work instruction. (Section OA.1.2)
- The NRC identified a Severity Level SL IV NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," for the failure to promptly correct a condition adverse to quality associated with actions related to NCV 05000391/2011604-02 and NRC Bulletin (BL) 89-02. (Section OA.1.4)
- The inspectors concluded that concerns pertaining to several open items, including Unresolved Items (URIs), Three Mile Island (TMI) Action Items, Notices of Violations (NOVs), NRC Bulletins, NRC Inspection Procedures (IPs), and Construction Deficiency Reports (CDRs) have been appropriately addressed for WBN Unit 2. These items are closed.
- Other areas inspected were adequate with no findings of significance identified. These areas included various electrical systems and components; mechanical systems and components; nuclear welding; Corrective Action Programs (CAPs) and Special Programs (SPs); Temporary Instructions (TIs); NRC IPs; CDRs; and refurbishment.

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REPORT DETAILS

Summary of Plant Status

During the inspection period covered by this report, TVA performed construction completion activities on safety-related systems and continued engineering design activities of the Watts Bar Nuclear (WBN) Plant, Unit 2.

I. QUALITY ASSURANCE PROGRAM

Q.1 Quality Assurance Oversight Activities

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

a. Inspection Scope

The inspectors continued to review problem evaluation reports (PERs), as part of the applicant's corrective action program (CAP), to verify that issues being identified under the CAP were being properly identified, addressed, and resolved by the applicant.

The inspectors also reviewed the applicant's actions for evaluation of Unit 1 licensee event reports (LERs) for application to Unit 2. Results of the applicant's review were documented in PER 494917 and subsequent PER 558180.

During this inspection period, the inspectors observed a training session on safety conscious work environment (SCWE) and 10 *Code of Federal Regulations* (CFR) 50.9 to determine whether the training met regulatory requirements of Confirmatory Order NRC-2012-0171, issued for enforcement action EA-12-021 (ML12173A020) which addresses a violation of 10 CFR 50.9 for completeness and accuracy of information. The training consisted of multiple sessions provided to supervisors and non-supervisory personnel at the site. The observed training was part of the corrective action plan for PER 533342 which addresses the confirmatory order.

The inspectors performed a focused sample of the following three PERs during the hanger analysis and update program (HAAUP) CAP team inspection further discussed in Section OA.1.2 of this report:

- PER 424908: This PER was a result of a non-conservative error in the spread sheet used for combining load at an anchor when the piping on both sides of the anchor were safety related and seismically analyzed using TPIPE. The non-conservative summation occurred for faulted loads. The resolution involved recalculating the anchor loads for all pipe stress problems that utilized the non-conservative load summation. The new loads were then used to evaluate and modify (if required) affected anchor supports. The implementation of the PER was verified by reviewing several pipe stress problems and anchor calculations.
- PER 424354: This PER discussed piping stress analysis problems that contained both American Society of Mechanical Engineers (ASME) Class 1 NB and ASME Class 2 NC piping. When the combination existed, the requirements of ASME Section III, Subsection NC 3672.1(b) was not completed in the piping analysis. The

resolution involved identifying all piping calculations that have both Class 1 and Class 2 piping in the same analysis problem and recalculating the Class 2 portion to include the requirements of NC 3671.1(b). The implementation of the PER was verified by reviewing several pipe stress problems and verifying that the requirements of NC 3671.1(b) were properly included in the revised stress calculation.

- PER 428897: This PER discussed the modeling of the steam generator as “rigid members” in the pipe stress analysis problems for the main feedwater loops 1 thru 4. The actual stiffness utilized for the steam generators was not rigid. The stiffness used for the “rigid” member was approximately the same as the stiffness of the 16” main feedwater line and therefore was not rigid. In addition, the thermal rotational movements of the steam generators were not considered in the piping analysis. These issues were resolved by performing a reanalysis of pipe stress problems including a proper “rigid” member for the steam generator and including the rotational movements in the piping model. All associated pipe supports were evaluated for changes to the pipe stress analysis. Pipe stress analysis and pipe support design calculations were reviewed to verify analysis changes were implemented.

Several other PERs were reviewed during the HAAUP CAP inspection (Section OA.1.2 of this report) and are listed in the attachment.

b. Observations and Findings

No findings were identified. The applicant’s review of Unit 1 LERs was thorough and appropriate corrective actions were confirmed completed or new actions initiated.

c. Conclusions

Generally, the issues identified in the PERs were properly identified, addressed, and resolved. This included corrective actions for PERs 424908, 424354, and 428897 which were reviewed as a focus sample and appeared to be adequate.

The observed training was conducted in accordance with Construction Permit No. CPPR-92 as modified by Confirmatory Order NRC-2012-0171, issued for enforcement action EA-12-021 and corrective actions to PER 533342.

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1 Construction Activities

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

a. Inspection Scope

The inspectors independently assessed applicant controls, associated with Unit 2 construction work activities, to prevent adverse impact on Unit 1 operational safety. The inspectors attended routine Unit 1/Unit 2 interface meetings to assess the exchange and sharing of information between the two site organizations. Periodic construction and planning meetings were observed to assess the adequacy of the applicant’s efforts to

identify those construction activities that could potentially impact the operating unit. This included the review of selected work activities which the applicant had screened as not affecting Unit 1 to verify the adequacy of that screening effort. Additionally, the inspectors independently assessed selected construction activities to verify that potential impacts on the operating unit had been identified and adequately characterized with appropriate management strategies planned for implementation. Furthermore, the inspectors performed independent walkdowns of select construction work locations to verify that controls to protect the operating unit provided an adequate level of protection and had been properly implemented.

Specific work activities observed included:

- Work order (WO) 113821957, seismic improvements to 120 VAC vital instrument board.
- WO 08-953324-000, disassemble valve, conduct internal maintenance, and replace valve (System 72, containment spray)
- WO 113761709, Appendix R, diesel generator 2B start-up test
- WOs 113691053 and 113640797, installation of 1-inch nitrogen line

b. Observations and Findings

No findings were identified.

c. Conclusions

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

C.1.2 Structural Steel and Supports Work Observation and Construction Refurbishment Process (Inspection Procedures 50090, 48053, 37002 and 46071)

a. Inspection Scope

The inspectors observed pull testing of expansion shell anchors to determine whether the anchors were tested and examined in accordance with procedures and specifications. Specifically, the inspectors observed pull testing of expansion shell anchors associated with hanger 2-ISLS-998-3257 and WO 111749016. The inspectors reviewed calibration records for the anchor pull testing equipment to determine whether the equipment calibration was current. The inspectors reviewed procedure Modification and Addition Instruction (MAI)-5.1A, Expansion Shell Anchors (SSD) Installation, Rev. 7, and specification G-32, Bolt Anchors Set in Hardened Concrete, Rev. 23, to determine whether the pull testing requirements were adequate.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The observed SSD pull testing was conducted in accordance with current procedural requirements. The calibration records reviewed for the pull testing equipment were current. The SSD pull testing requirements in the reviewed procedures were adequate.

C.1.3 Mechanical Components – Work Observation and Construction Refurbishment Process (Inspection Procedures 50073 and 37002)

a. Inspection Scope

The inspectors observed clad repairs to steam generator 1 bowl, hot leg side, and steam generator 4 bowl, hot leg side, to determine whether the clad repair areas were welded in accordance with procedures and ASME Boiler and Pressure Vessel (B&PV) Code 2007 edition. The inspectors reviewed welding procedure specifications and supporting procedure qualification records to determine whether the qualified procedures met the requirements of ASME B&PV Code 2007 edition.

The inspectors reviewed Westinghouse design specification 425A55, Rev.2, to determine whether the specification met regulatory commitments. The inspectors reviewed pre-heat and post-weld soak procedures to determine whether the requirements of ASME B&PV Code 2007 edition were met.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The observed refurbishment activities on steam generator numbers 1 and 4 were conducted in accordance with procedures and ASME B&PV Code 2007 edition. The reviewed documents were in compliance with the requirements of ASME B&PV Code 2007 edition.

C.1.4 Construction Refurbishment Process – Watts Bar Unit 2 (Inspection Procedure 37002)

a. Inspection Scope

The inspectors reviewed a sample of applicant's corrective actions documented in PERs associated with refurbishment activities to confirm timely and appropriate corrective actions were initiated. The inspectors also confirmed completion of a sample of the corrective actions. Five of these PERs involved corrective actions as a result of quality assurance (QA) assessment findings. These findings included incorrect WOs referenced on evaluation forms, incomplete engineering justifications, lack of specificity for required testing, lack of documentation for external inspections, and differences in attributes for wear and loose parts evaluation. One additional PER associated with refurbishment activities was also reviewed. Documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 37002 Section 02.02.f – six samples

b. Observations

No findings were identified. The applicant initiated appropriate corrective actions for the problems identified. The actions associated with the QA findings were thorough and conservative and resulted in improvements to the refurbishment program.

c. Conclusions

Based on this limited review, no additional conclusion is warranted for this inspection.

C.1.5 Electrical Components and Systems – Work Observation (Inspection Procedures 51053 and 51063)

a. Inspection Scope

The inspectors observed Tan-Delta very low frequency (VLF) and insulation resistance testing of cable 2PP800A feeding the pressurizer backup heater group transformer (2-OXF-68-341A) 6.9 kV service conductors to determine adequacy of the testing methods. The inspectors reviewed the calibration dates for the VLF test equipment for appropriate periodicity. The inspectors reviewed the adequacy of test equipment set-up at the medium voltage switchgear 2-BD-211-A/20A. The inspectors observed the methods used to record test results for consistency with the applicant's approved procedures and practices. The inspectors reviewed testing procedures, instruction manuals, and test results for adequacy as they were developed.

The inspectors observed cable testing to determine if the methods used to test these cables were adequate for the type of cable (Anaconda TVA type WNB-1B, 2/0 AWG, 270' long per design documents). Insulation resistance testing was evaluated to determine if the testing provided acceptable results when tested to 2,500 volts. The testing for the Tan-Delta VLF testing was reviewed for verification that the results demonstrated all three phases were in good condition showing an adequate almost flat line through the increasing voltage application. The inspectors evaluated the procedures used in conducting this test to ensure they were proper and followed the written instructions provided with the test equipment. The inspectors reviewed the calibration for the test equipment to verify current calibration and reviewed training records for the personnel using it to ensure they were adequately trained in its use. The inspectors verified the results from this testing were recorded electronically on a laptop computer provided for this purpose.

The following sample was inspected:

- IP 51063 Sections 02.02.f - one sample

b. Observations and Findings

No findings were identified. The inspectors determined the applicant's methods used to test these cables were adequate for the type of cable (Anaconda TVA type WNB-1B, 2/0

AWG, 270' long per design documents). Insulation resistance testing was determined to provide acceptable results when tested to 2,500 volts. The testing method for the Tan-Delta VLF testing proved that all three phases were in good condition showing an adequate almost flat line through the increasing voltage application.

c. Conclusions

The inspectors concluded that the applicant's testing practices were conducted appropriately, and the results provided evidence of adequate condition for this feeder.

C.1.6 Reactor Vessel and Internals – Work Observation (Inspection Procedure 50053)

a. Inspection Scope

During the inspection period the opportunity to enter the Reactor Pressure Vessel or the internals did not occur due to limited access into these areas; however, for those accessible areas, inspectors continued to conduct inspections of the reactor pressure vessel (RPV) and upper internals storage, preservation, housekeeping, and protection activities to determine whether requirements, work procedures, and Quality Control (QC) inspection procedures were being met. These activities are controlled by applicant procedure 25402-000-GPP-0000-N2102, "Housekeeping," Rev. 8. The inspectors verified that protective devices were installed around the top of the open vessel to prevent entry of foreign objects. The inspectors ensured that the core barrel and lower internals were in their storage locations in the refueling cavity and were protected with a temporary protective material.

The following samples were inspected:

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

b. Observations and Findings

No findings were identified.

c. Conclusions

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

F.1 Fire Protection

F.1.1 Fire Protection (Inspection Procedure 64051)

a. Inspection Scope

The inspectors accompanied fire protection personnel during a periodic inspection of construction areas to determine whether construction activities and areas met procedure requirements. The inspectors took a limited set of field-verifiable attributes from preventative maintenance guidance into the field and evaluated 11 fire suppression devices. The inspectors reviewed labeling, accessibility, and material condition of fire

hoses and fire extinguishers to determine whether any evidence of deterioration was present. The inspectors reviewed preventative maintenance instructions to determine whether records of these 11 fire suppression devices met procedure inspection requirements.

The inspectors observed three construction activities using ignition sources to determine whether fire watch procedure requirements were met. Specifically, the inspectors observed hot work activities related to WOs 113295239, 113691053, 113640797, and 111168080, Rev. 2.

Additional documents reviewed are listed in the attachment.

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

- U2-FW-7
- U2-FW-42
- U2-FW-54
- U2-FW-162
- U2-27-A
- 1053/U2
- CB-9
- AB-75
- AB-76
- 2-ISV-26-665
- 2-ISV-26-666

The following samples were inspected:

- IP 64051 Section 02.07 – 11 samples
- IP 64051 Section 02.08 – 3 samples

b. Observations and Findings

No findings were identified.

c. Conclusions

The periodic inspections performed by fire protection personnel of construction activities and construction areas met procedure requirements. The applicant's firefighting staff was adequately maintaining fire prevention equipment for the purposes of suppressing fires within the auxiliary building, reactor building, and control building. The applicant implemented adequate fire protection measures and controls to support Unit 2 construction activities and minimize impact on Unit 1 operation activities.

IV. OTHER ACTIVITIES

OA.1.1 (Discussed) Non-Cited Violation 05000391/2012612-02, Failure to Correct Longstanding CAP Deficiencies (Inspection Procedure 92702)

a. Inspection Scope

This NCV was associated with CAP deficiencies for the timely completion of corrective actions to address issues with procedures, processes, and personnel. The inspectors reviewed the current backlog status, reviewed the current outstanding actions, and reviewed a QA assessment of corrective actions to determine the timeliness of issues within the CAP.

b. Observations and Findings

No findings were identified.

c. Conclusions

The applicant had made significant improvement in management of the corrective actions backlog, reducing the number of outstanding actions, and ensuring no significant outstanding actions remain affecting procedures, processes, or personnel. Further inspection is warranted of programmatic changes initiated to address this NCV.

OA.1.2 (Discussed) Hanger Analysis and Update Program Corrective Action Program (Temporary Instruction 2512/023 and Inspection Procedure 50090)

a. Inspection Scope

Background: The HAAUP CAP was established to evaluate a number of identified issues for Category I and I(L) piping and pipe supports and to implement a comprehensive completion plan to adequately resolve these issues. The issues identified in the HAAUP CAP originated from employee concerns, lessons learned, and other applicant source documents such as condition adverse to quality reports (CAQRs), corrective action tracking documents (CATDs), vertical slice review (VSR), discrepancy reports (DRs), PERs, and NRC open items.

The issues identified, and root causes, were grouped into the following three categories:

- Interface control of design input and output
- Design and analysis methodology, and
- Level of design documentation

The objectives of this CAP were to assure that pipe and pipe supports were structurally adequate, complied with design criteria, and the design criteria complied with licensing requirements. In addition, the HAAUP CAP included NRC BL 79-02 and BL 79-14 for anchor bolts and pipe supports, respectively.

The Watts Bar Unit 1 HAAUP CAP was completed and documented in a final report issued on October 27, 1995 (ML 072890425). Because of the similarities between Units 1 and 2, most of the design commitments for both Units 1 and 2 were addressed in the Unit 1 final report. The HAAUP CAP for Unit 2 was established in December 2007.

TVA's regulatory framework letter to NRC dated January 29, 2008, outlined TVA's plans for the implementation of the Unit 2 HAAUP CAP which stated that the Unit 1 approach would be used. NRC had previously approved the Unit 1 approach in NUREG-1232, Supplemental Safety Evaluation Report (SSER) 6 dated April 1991 and SSER 8 dated January 1992.

Since 2008, NRC had inspected, reviewed, and documented several aspects of the HAAUP CAP through open items inspections and inspection of IP 50090, "Pipe Support and Restrain Systems," for pipe supports and IP 46071, "Concrete Expansion Anchors," for anchor bolts. The results of these inspections have been documented in several inspection reports, including IR 05000391/2011609 (ML11350A229) which provided a status for IP 50090 and closed IP 46071. In addition, Temporary Instruction (TI) 2512/023 provided guidance to the inspectors to make a determination as to whether TVA's HAAUP CAP plan had been satisfactorily implemented to ensure that issues were adequately resolved. Some of the objectives included in the TI were also included in IPs 50090 and 46071; therefore, inspection efforts and activities covered under these two IPs and documented in Unit 2 inspection reports were credited towards TI 2512/023.

Inspection Activities: The purpose of this inspection was to gather sufficient information to make a determination as to whether TVA's HAAUP CAP plan was satisfactorily implemented to ensure that the problems addressed in this CAP were adequately resolved. The inspectors performed the following inspection activities of different areas associated with the HAAUP CAP:

ASME Large Bore and Small Bore Piping

- Reviewed a sample of small bore and large bore piping analysis calculations listed in the attachment. Also, as part of the inspections performed for IP 50090 and documented in previous inspection reports (IRs) including IRs 05000391/2011606 (ML111370681) and 05000391/2011609, the inspectors observed walkdowns, conducted as-built verification of supports that had not been modified, conducted field observations, and reviewed design change packages.
- Reviewed a sample of calculations listed in the attachment and verified that the analysis considered loadings for pressure, deadweight, thermal, operating modes, seismic events, seismic anchor motions, fluid transients, and enveloping response spectra similar to the Unit 1 approach.

Instrument Lines

- Reviewed pipe stress analysis calculations of piping systems that contained instrument lines that could not be decoupled. The review included determining that the methods of incorporating the instrument line met the project design requirements.

Category I(L) (also known as important to safety or II over I) Piping and Supports

- Reviewed calculations WCG-2-615, WBN2 Seismic Category I(L) Piping Walkthrough Screening Evaluation Guidelines, Rev.0, and WCG-2-921, Category

I(L) piping and support program summary calculation, Rev. 0, to verify that applicable HAAUP CAP commitments were incorporated and met.

- Inspected the as-built configuration for the following limited scope walkdown (LSWD) packages and verified that the screening criteria was met, including those that contained outliers.
 - LSWD-3247, System 63, Rev. 1
 - LSWD-3258, System 01, Rev. 2
 - LSWD-3273, System 68, Rev. 1
 - LSWD-3236, System 70, Rev. 0
- Reviewed the following LSWD packages and verified that outliers and the engineer disposition of either use-as-is, rework, or further evaluation met applicable screening and design criteria.
 - LSWD-3291, System 61, Rev. 1
 - LSWD-3293, System 26, Rev.0
 - LSWD-3273, System 68, Rev. 1
 - LSWD-3247, System 63, Rev. 1
 - LSWD-3235, System 70, Rev. 0
 - LSWD-3258, System 001, Rev. 2
- Reviewed training records for 13 engineers and verified that educational background, seismic and engineering work experiences, and completed training forms met applicable procedural requirements.

Pipe Support Component Substitution

- Reviewed closure package information associated with CATD 11102-WBN-02 regarding site-manufactured standard components for replacement of Bergen-Patterson components manufactured prior to August 30, 1984. This included the sampling plan and associated results. The inspectors confirmed that the actions performed under the Unit 1 effort encompassed most of the Unit 2 components as well, and that exceptions were properly evaluated and corrective actions were adequate.

Pipe Rupture

- Reviewed piping calculations containing high energy piping to ensure that the requirements of TVA design criteria document, WB-DC-40-50, were included in the calculations.

Recurrence Control: Design criteria and commitments/actions governing piping system analysis and design

- Reviewed design criteria utilized in the qualification and analysis of category I and I(L) piping systems.
- Reviewed design criteria utilized in the qualification of pipe supporting elements for category I and I(L) piping systems.
- Reviewed a sample of design and field change procedures applicable to pipe support and restraint systems.

- Reviewed several completed pipe stress calculations for category I and I(L) piping systems.
- Reviewed completed pipe support calculations for category I and I(L) piping systems.
- These reviews included verification that the calculations incorporated the requirements provided in the design criteria.
- These reviews included verification that the methods utilized to meet the requirements of the procedures were adequate.

Recurrence Control: Review and verify appropriate use of seismic response spectra and considerations for including the effects of zero power physics testing

- Reviewed several pipe stress calculations to verify that the appropriate response spectrum was utilized and that the response spectra was combined in a manner consistent with the design requirements and procedures.

Review design/analysis methodology including unverified assumptions (UVAs)

- All reviewed calculations were documented if any UVAs were used in the analysis. The intent in identifying UVAs was to track these items for closure when the correct information has been identified and incorporated into the calculations. During the review of calculations (and the calculation revision history), it could be determined that later revisions of the calculations included the verified information and removed the UVA tag. At the time of the inspection, two calculations existed that had UVAs associated with the scope of the inspection. According to TVA, these calculations will be updated and revised as required when the verified information is available. Procedural controls for UVAs were also reviewed.

Other areas reviewed

- The inspectors reviewed several PERs as discussed in Section OA.1.1 of this inspection report and a number of QA oversight documents including nine QA surveillances, two QA assessments, and seven QA oversight reports. The PERs and QA documents were reviewed to ensure that issues identified were properly identified, documented, addressed, and corrected.
- Other items including NRC BLs 79-02, BL 79-14, CDR 91-18, CDR 81-67, CDR 84-17, and CDR 86-33 are further discussed in this report.
- Additionally, the following HAAUP CAP-related open items have been discussed and documented in previously issued inspection reports:
 - CDR 87-01, Inadequate support shown on typical valve support drawings closed in IR 05000391/2012607 (ML12276A028)
 - TI 2512/030, Seismic Analysis CAP closed in IR 05000391/2010602 (ML101230144)
 - IP 46071, Concrete Expansion Anchors closed in IR 05000391/2011609
 - BL 75-05, Operability of Category I hydraulic and sway suppressors closed in IR 05000391/2012602 (ML12087A324)
 - URI 87-13-02, Supports installed on non-load bearing wall closed in IR

- 05000391/2011609
- URI 87-13-04, Use of leveling nuts on baseplates closed in IR 05000391/2011605 (ML112201418)
- Inspection Follow-up Item (IFI) 90-27-13, Piping subsystems qualification closed in IR 05000391/2012602 (ML12087A324)
- IFI 93-20-02, Anchor bolt installation practices closed in IR 05000391/2012605 (ML12220A536)
- CDR 79-18-01, Defective Phillips self-drilling anchors closed in IR 05000391/2011605
- CDR 80-21-06, Incorrect valve weights is AFW piping analysis closed in IR 05000391/2010605 (ML110410680)
- CDR 82-07, Shock arrestor strut assembly interference closed in IR 05000391/2012602
- CDR 82-55, Concrete anchorage free edge violation closed in IR 05000391/2010605
- CDR 82-95, Qualification of process piping with instrument lines attached closed in IR 05000391/2011603 (ML111370702)
- CDR 83-58, Defective Pacific Scientific Company (PSCo) shock arrestor captan spring tang closed in IR 05000391/2012603 (ML12123A156)
- CDR 84-19, Overstressed pad plates for hydrogen pipe supports closed in IR 05000391/2011605
- CDR 85-07, Relief valve thrust forces negligible closed in IR 05000391/2010605
- CDR 85-12, H2 collector piping overstressed closed in IR 05000391/2011602 (ML110800483)
- CDR 85-38, CS pipe deficiencies closed in IR 05000391/2011605
- CDR 86-38, Failure to implement disposition of previous non-conformances closed in IR 05000391/2011605
- IFI 93-20-02, Anchor Bolt Installation Practices closed in IR 05000391/2012605

Documents reviewed are listed in the attachment.

b. Observations and Findings

During the inspection of seismic category I(L) piping and support LSWD packages to determine whether the support screening criteria was correctly implemented, the inspectors identified the following Severity Level (SL) IV non-cited violation (NCV):

Introduction: The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the failure to perform work on a safety-related system with an approved work instruction.

Description: In September 2012, the inspectors performed independent walkdowns of I(L) supports LSWD packages and observed that pipe support hanger H-435-13-204-2 (system 63, safety injection piping) was disassembled and replaced with metal wire attached to a temporary support. Additionally, two other support hangers were broken in the connecting rod. These three pipe support hangers were previously identified as being installed during a I(L) limited scope walkdown. The results of the walkdown were documented in LSWD-3247 package, Rev. 1.

The applicant initiated Service Request (SR) 608512 in response to the inspectors' observations. During screening of SR 608512, the Project Review Committee (PRC) initially determined that the broken and disassembled pipe support hangers were a historical issue and would be fixed by future work. The PRC did not recognize the potential of work being performed without a WO or beyond a WO scope. Upon further questioning by NRC inspectors, the applicant recognized that the potential cause of the broken and disassembled pipe support hangers was due to unauthorized work. The initial screening of the supports was determined to be valid at the time of the I(L) LSWDs in 2010 because the unauthorized work took place after these walkdowns were conducted, and the supports were installed at the time.

Applicant procedure 25402-000-GPP-0000-N1206, "Work Order Processing," section 8.9.2 stated that "when work order activities require temporary removal of permanent plant components, then removal activities are performed and documented in accordance with CCPP 25402-000-GPP-0000-N6204, Field Material Control and Traceability." However, the applicant could not provide any documentation to show that these supports had been worked on using an approved WO or any other type of work control process document. The applicant issued PERs 611071 and 620506 to address the lack of documentation and the issue with performing safety-related work without adequate work instructions in the CAP.

The inspectors determined that the failure to perform work in safety-related equipment without adequate work instructions and not documenting the disassembly of the pipe support in accordance with procedure 25402-000-GPP-0000-N1206 was a performance deficiency. The performance deficiency is considered more than minor in accordance with IMC 2517 because it represented an uncontrolled work practice that impacted quality involving a safety-related structure, system, or component (SSC). The inspectors determined this finding to be of very low safety significance, i.e. SL-IV, in accordance with Section 6.5 of the Enforcement Policy because the licensee failed to establish, maintain, or implement adequate controls over construction processes that are important to safety. However, this finding did not represent a breakdown in a licensee's QA program for construction related to a single work activity.

The finding has a cross-cutting aspect in the work practices component of the human error prevention cross-cutting area, as defined in Inspection Manual Chapter (IMC) 0310, "Components Within The Cross-Cutting Areas," because the applicant failed to properly document work activities affecting safety-related components, H.4(a).

Enforcement: 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires in part that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings.

Contrary to the above, in September 2012, the licensee failed to accomplish work activities affecting the quality of a safety-related piping support in accordance with documented instructions or procedures of a type appropriate to the circumstances. Specifically, the applicant failed to disassemble and modify a seismic category 1 pipe support for the safety injection system in accordance with approved procedures or work instructions. Additionally, the applicant was unable to identify and provide documented evidence to confirm that the disassembly of the affected pipe support was conducted in

accordance with appropriate work instructions. Because this was a SL IV violation and the issue 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. This violation is identified as NCV 05000391/2012608-01, "Failure to Perform Work with Approved Work Instructions."

c. Conclusions

The HAAUP CAP (TI 2512/023) will remain open pending inspection of the following associated items:

- Portions of IP 50090, Pipe Supports, as discussed in IR 05000391/2011609. Specifically inspection of dynamic supports, inspection of a sample population of final as-builts for remaining modified supports, and QA assessments as applicable to future remaining pipe support activities.
- Violation 86-14-03, Failure to establish measures to ensure deviations from specification are controlled.
- CDR 84-07, Support designs do not meet requirements.
- CDR 86-24, Inadequate flexibility of instrument tubing attached to steel containment vessel.
- Violation 87-19-01, Failure to follow procedures for installing equipment in north/south valve rooms.
- Violation 87-19-02, Failure to preserve equipment installed in north/south valve rooms.

In addition, the inspectors identified NCV 05000391/2012608-01 where the applicant performed work in the field without approved work instructions for safety-related pipe support work activities. As noted in the violation write-up above, this NCV does not directly impact the HAAUP CAP because the applicant was able to demonstrate that the I(L) Limited Scope Walk Downs performed at the time were in accordance with procedures; however, it does relate to ongoing construction and refurbishment activities.

OA.1.3 (Discussed) Supplemental Safety Evaluation Report Appendix HH Item 50, Anchor Bolt Documentation and Pull Tests (Inspection Procedures 35007 and 46071 and Temporary Instruction 2515/028)

a. Inspection Scope

Background: A letter from the NRC to the applicant dated July 2, 2010, stated that inspectors would follow up on pull tests for anchor bolts where historical records could not be retrieved. In addition, the applicant had previously stated that approximately five percent of the anchor bolts did not have QC documentation; however, at the time of the NRC Office of Nuclear Reactor Regulation's (NRR's) review none of the pull tests had been performed nor had all the QC documentation been retrieved. To resolve the NRC staff's comments, the applicant stated that if the pull test did not show that the anchor had adequate capacity, the anchor would be replaced.

Subsequent to the letter, the applicant retrieved most of the QC documentation for anchor bolts which resulted in a population significantly less than the five percent as noted above.

Inspection Activities: The inspectors performed the following:

- Reviewed the documentation of inspector observations documented in IRs including 05000391/2011605, 05000391/2011607 (ML112730197), 05000391/2011608 (ML11311A082), and 05000391/2011609 which documented the replacement of SSD anchor bolt with wedge bolts to determine the extent of previous inspection efforts.
- Reviewed the following drawings which contained anchor bolts previously inspected and documented in IRs 05000391/2011607 and 05000391/2011608 to verify that the SSDs had been replaced with a wedge bolt as stated in TVA's response:
 - Engineering Design Change Request (EDCR) 52502, Rev. 1, Drawing # 47A437-1-24, Rev. 2
 - EDCR 52503, Rev. A, Drawing # 47A450-25-66, Rev. 2
 - EDCR 52512, Rev. 1, Drawing # 47A060-26-27, Rev. 0
- Reviewed historical QC documentation (anchor bolt inspection pull test data) to verify appropriate incorporation into the design calculation. The following calculations were selected for review:
 - EDCR 57506, Calculation 47A45025140, Rev. A
 - EDCR 52574, Calculation 47A45026078, Rev. B
 - EDCR 52508, Calculation 47A45026202, Rev. A

b. Observations and Findings

No findings were identified. The inspectors noted that the applicant's scope and plans for actions involving anchor bolt pull tests and records were updated since the NRC letter dated July 2, 2010.

c. Conclusions

The applicant's actions to address this item have been updated and, based on discussions with the TVA licensing; issuance of a revised letter has been planned in order for the NRC to conduct a proper review of the revised actions to address this issue. This item remains open pending review of the updated response and implementation of approved actions.

OA.1.4 (Discussed) Non-Cited Violation (NCV) 05000391/2011604-02: Failure to Maintain Adequate Design Specifications (Inspection Procedure 92702)

a. Inspection Scope

The inspectors reviewed corrective actions associated with NCV 05000391/2011604-02, "Failure to Maintain Adequate Design Specifications," captured in PER 356559, in order to verify that issues being identified under the CAP were being properly identified, addressed and resolved by TVA. The PER was related to corrective actions associated with TVA commitments made to resolve historical NRC BL 89-02, "Stress Corrosion Cracking (SCC) of High-Hardness Type 410 Stainless Steel (SS) Internal Preloaded bolting of Anchor Darling Model S350W Swing Check Valves."

Documents reviewed are listed in the attachment.

b. Observations and Findings

The inspectors identified the following violation of regulatory requirements:

Introduction: The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," for failure to promptly correct a condition adverse to quality associated with actions related to NCV 05000391/2011604-02 and NRC BL 89-02.

Description: In July 2011, the applicant initiated PER 356559 to address NCV 05000391/2011604-02 associated with NRC BL 89-02. This PER included corrective actions to revise procedure NEDP-8, "Technical Evaluation for Procurement of Materials and Services," and procurement Design Standard DS-M18.2.18, "Standardized Procurement Notes," to prevent the use of 410 SS and other similar materials susceptible to SCC as described in NRC BL 89-02. At the time of the inspection, procurement procedure NEDP-8 and Design Standard DS-M18.2.18 were revised and the corrective actions were closed in the applicant's CAP.

Procedure NEDP-8, Section 3.5.7 was revised to state that "AISI type 410 SS shall not be used in safety related valves and valve components (including stems, fasteners, hinges, pins, etc) for water service applications. Future procurements should use Type 17-4 precipitation hardness (PH) steel, purchase specification (PF) 2031, for safety and non-safety related valves and valve components." The procurement procedure further explained that "when type 410 SS material is used for valves and valve components, PF 2029 and a 30 HRC maximum hardness should be used to define technical requirements." The inspectors identified that this hardness value, which was based on Rockwell's hardness scale, was not consistent with BL 89-02 in that the maximum hardness value for SCC discussed in the NRC Bulletin was HRC 26. Additionally, the procedure did not include restrictions of other materials that are similar to the Type 410 SS and equally susceptible to SCC. Furthermore, purchase specification PF 2029, a purchase specification for SA-479 Type 410 SS that included restrictions for the use of Type 410 SS material in safety-related valves and components in liquid service applications, did not provide information on the hardness limitations in BL 89-02 and did not restrict other susceptible materials similar to the Type 410 SS.

Additionally, Design Standard DS-M18.2.18, Section 4.3 stated that "T3071-Fasteners made from AISI Type 410 SS shall not be used in internal raw water applications." There was also additional clarification that stated, "[Type] 410 stainless steel should be avoided if possible in safety-related valves (including stems, fasteners, hinges, pins, etc), raw service water applications, and ASME Class 1/TVA Class A applications; however it may be used (but not preferred) in other plant applications calling for SA-479 or A479 Type 410 material." This statement was restricting the use of Type 410 SS in safety-related valves; however, it did not restrict the use of other materials similar to Type 410 SS that are susceptible to SCC and did not specify the maximum HRC hardness requirements discussed in BL 89-02. Procedure DS-M18.2.18 also referenced a TVAN Engineering Bulletin which addressed the requirements of BL 89-02 and detailed the recommended replacement material as 17-4 PH martensitic SS. However, this Engineering Bulletin did not address the need to avoid the use of other materials similar to Type 410 SS that are susceptible to SCC.

The inspectors determined that the lack of procedural guidance to avoid the use of materials similar to Type 410 SS that were susceptible to SCC, as well as inadequate HRC requirements within the design standard DS-18.2.18, procurement procedure NEDP-8, TVAN Engineering Bulletin L29040429, and purchase specification PF 2029 did not meet the planned corrective actions in PER 356559. The inspectors determined that adequate measures were not in place to fully address the corrective actions for NCV 05000391/2011604-02 and BL 89-02 in that the applicant's procurement process could result in the purchase of swing check valves containing components made of materials similar to the Type 410 stainless steel of incorrect hardness, and susceptible to SCC.

The inspectors determined that the failure to implement adequate corrective actions to address the condition adverse to quality in NCV 05000391/2011604-02 and BL 89-02 was a performance deficiency. This performance deficiency was determined to be more than minor in accordance with IMC-2517, Appendix C, because the failure to promptly correct the condition adverse to quality represented an inadequate process or procedure that, if left uncorrected, could adversely affect the quality of the fabrication and construction of several safety-related SSCs. Specifically, the inadequate procurement procedures and specifications could adversely affect the quality and construction of safety-related SSCs in that swing check valves with components made of material susceptible to SCC could be procured for safety-related applications. The inspectors determined this finding to be of very low safety significance, i.e. SL-IV, in accordance with Section 6.5 of the Enforcement Policy because the applicant failed to establish, maintain, or implement adequate controls over procurement, construction, examination, or testing processes that are important to safety. However, the inadequate corrective actions did not entail multiple examples of deficient construction or construction of unknown quality as the result of inadequate program implementation.

The applicant initiated PER 605368 to address this finding. Planned actions in PER 605368 included: a) revision of NEDP-8 and DS-M-18.2.1 to apply correct hardness requirements to 400 series martensitic SS family and other SS grades to prevent recurrence; b) Service Requests to each TVA site in order to review responses to BL 89-02 and purchases made of products with 400 series martensitic steel with high hardness; and c) Issue a new PF specification for 400 series martensitic SS family.

This finding has a cross-cutting aspect in the Work Practices component of the Human Performance cross-cutting area, as defined in IMC 0310, because the applicant failed to ensure supervisory and management oversight of the completion of corrective actions associated with the issues noted above, such that nuclear safety was supported (H.4(c)).

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," requires, in part, that "measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected."

Contrary to the above, the applicant failed to establish adequate measures to assure the condition adverse to quality described in NCV 05000391/2011604-02 and BL 89-02 was promptly identified and corrected. Specifically, the inspectors identified that the applicant did not implement adequate corrective actions to ensure design specifications and procedures included adequate measures to prevent the use of swing check valves with components made of 410 SS and other similar materials susceptible to SCC in safety-related applications as discussed in BL 89-02. Because this was a SL IV violation

and the issue was entered into the applicant's CAP, this violation is treated as a non-cited violation (NCV), consistent with Section 2.3.2 of the NRC Enforcement Policy. This violation is identified as NCV 05000391/2012608-02, "Failure to Take Adequate Corrective Action Associated with NCV 391/2011604-02 and NRC Bulletin 89-02."

c. Conclusions

The inspected activities associated with the CAP and closure of NCV 05000391/2011604-02 and NRC BL 89-02 were not performed in accordance with applicant procedures and NRC regulations as discussed above in NCV 05000391/2012608-02. The applicant had addressed these issues by including them into the CAP in PER 605368. Therefore, until further inspection of planned corrective actions, BL 89-02 and NCV 0500391/2011604-02 will remain open until further inspection activities have taken place.

OA.1.5 (Discussed) Construction Deficiency Report 391/83-08, Valve Indication Problems with EMD Gate Valves (Inspection Procedures 50073 and 50075)

a. Inspection Scope:

Background: A deficiency concerning valve position indication was identified and reported to the NRC in accordance with 10 CFR 50.55(e) as Nonconformance Report (NCR) WBN NEB 8302. A geared limit switch rotor is used to provide an electrical bypass of the "open" torque switch at the beginning of the opening stroke. As a result, it is likely that monitor and/or indicator lights also operated by that rotor will indicate valve closure slightly before the flow path is completely shut off. If the valve were to stop between this set point and the full shut-off position, a flow path through the valve could exist even though a "closed" indication had been achieved. This deficiency occurred through a design error in which Westinghouse engineers changed the normal wiring to accommodate certain customer preferences. These changes were not reviewed with respect to overall system requirements. An erroneous valve position indication on a valve of this type located in a safety-related system could lead to operator error and/or a degradation of the safety of operation of the plant.

Inspection Activities: The inspectors reviewed the applicant's actions to resolve the deficiency by reviewing the engineering complete closure package, which included Engineering Change Notice (ECN) 3978. The inspectors reviewed the revised drawings to verify that the deficiency no longer exists and that the logic of operation is consistent with the description in the associated design documents. The inspectors also reviewed Unit 1 drawings associated with the same design change to verify that the same design that was used on Unit 1 was made to Unit 2.

Documents reviewed are listed in the attachment.

b. Observations and Findings:

No findings were identified.

c. Conclusions:

Additional inspection activities are still required prior to closure of CDR 391/83-08; specifically, the inspectors will review the applicant's field implementation.

OA.1.6 (Discussed) Construction Deficiency Report 391/86-14, Failure to Follow Procedures (Inspection Procedures 50073 and 50075)

a. Inspection Scope:

Background: A deficiency concerning improper installation of ASCO model 8316 solenoid valves was identified and reported to the NRC in accordance with 10 CFR 50.55(e). All thread bolts were used in place of the solenoid valves original bonnet screws and mounting brackets. Additionally, field modifications to the mounting brackets were not performed in accordance with approved procedures. The modifications negated the seismic and environmental qualification of the solenoid valves.

Inspection Activities: The inspectors reviewed the applicant's actions to resolve the deficiency by reviewing the engineering complete package, which included PER 143711 and NCR 6566. The inspectors reviewed the list of ASCO 8316 solenoid valves to verify that all were scheduled to be replaced as part of the refurbishment program, and that all of the valves were associated with an EDCR or WO.

Documents reviewed are listed in the attachment.

b. Observations and Findings:

No findings were identified.

c. Conclusions:

Additional inspection activities are still required prior to closure of CDR 391/86-14; specifically, the inspectors will review portions of TVA's field implementation to verify that the new valves are installed in accordance to the approved procedures.

OA.1.7 (Discussed) Construction Deficiency Report 391/87-27, Potential Failure of Operator-to-Valve Engagement on XOMOX Supplied Valves (IP 50073 and 50075)

a. Inspection Scope:

Background: On October 15, 1987, XOMOX Corporation notified Watts Bar Nuclear Plant in accordance with 10 CFR Part 21 that the potential exists for improper drive train engagement between their valves and associated operator. The potential may exist on Xomox (Tuflin) plug or butterfly valves with Limitorque 90 degree electric motor operators with H-BC gears for certain components in the drive train within the operator or between the operator and the valve stem to move out of correct engagement. This may result in loss of operability of the valve and incorrect position feedback. Twelve valves of this type per unit were delivered to WBN and installed. These valves are used as containment isolation valves in the portion of the essential raw cooling water (ERCW) system serving the upper containment ventilation coolers.

Inspection Activities: The inspectors reviewed the applicant's actions to resolve the deficiency by reviewing the engineering complete package. The inspectors reviewed the revised drawing, interviewed engineering personnel, reviewed the completed installation WOs, and walked down the valves that had the adapter replaced in the field to verify that the commitments in the CDR have been addressed.

Documents reviewed are listed in the attachment.

b. Observations and Findings:

No findings were identified.

c. Conclusions:

Additional inspection activities are still required prior to closure of CDR 391/87-27; specifically, the inspectors will review the results of the post maintenance testing of the valves.

OA.1.8 (Discussed) Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (TI 2512/037)

a. Inspection Scope

Background: In 1989, the Watts Bar Nuclear Performance Plan identified a special program to establish a controlled master fuse list. The special program provided corrective actions to address three primary issues; specifically, (1) Class 1E safety-related fuses had not been adequately identified and controlled; (2) Bussmann KAZ actuators had been improperly used to provide circuit protection; and (3) requirements for redundant overcurrent protection of electrical penetration assemblies had not been adequately addressed by design. NRC inspectors subsequently documented in inspection report 50-390/93-31 (ML072680484) that the Master Fuse List Special Program had been acceptably implemented for Unit 1.

The initial inspection of activities to implement the special program on Unit 2 was documented in IR 05000391/2010603 (ML102170465). That report determined that technical and quality requirements for fuses had been defined in an engineering-controlled information system; however, further inspection was needed to confirm actions to finalize MAXIMO fuse tabulations (i.e., master fuse list), and to observe as-installed fuse configurations, including replacements for Bussmann KAZ actuators.

Inspection Activities: The inspectors interviewed responsible engineering personnel to determine the status of special program activities and to evaluate the awareness of controls established for control of fuses. The procedure for entering, changing, and verifying fuse information in the MAXIMO fuse tabulations, EDPI 25402-3DP-G04G-00503, was reviewed to evaluate the adequacy of administrative controls. Field verification records for a sample of 10 safety-related fuse installations, as documented in Startup Manual Procedure (SMP)-6.0, Fuse Verification Forms, were reviewed to evaluate activities to assure reliable data was established in the information system. The inspectors conducted direct field observations of a sample of fuses installed in reactor motor-operated valve (MOV) board WBN-2-MCC-213-B002 Compartment 5C

and 8D to confirm field verified fuses conformed to the descriptions in the MAXIMO fuse tabulations.

b. Observations and Findings

No findings were identified.

The inspectors determined that, for the sample inspected, the documentation of as-installed fuse configurations on the SMP-6.0 Fuse Verification Forms provided a record of actual installations. The recorded information was used by engineering to compare the field data to engineering-specified information contained in the MAXIMO fuse tabulations, and reconciliations were implemented when differences were found between the information sources.

Procedure EDPI 25402-3DP-G04G-00503 was found to provide administrative controls for the MAXIMO information system. Measures included a second party verification process to assure that as-installed fuse data was accurately transcribed into the MAXIMO fuse tabulations. The inspectors' reviews of a sample of data contained in the MAXIMO second party verified fuse list determined that engineering requirements were accurately reflected in the plant installations for the sample inspected.

All of the fuse installations in the inspection sample were associated with plant System 213 (reactor MOV power system). The applicant had not yet installed, or verified data for fuses in an additional 49 plant systems. Also, none of the installations in the inspection sample involved replacements for KAZ actuators.

Documents reviewed are listed in the attachment.

c. Conclusion

The inspectors determined that implementation of the Special Program for establishing a master fuse list was still in progress and will require further inspection to obtain a representative inspection sample.

OA.1.9 (Discussed) Unresolved Item 391/86-24-06, Review of Cable Splicing as Required by FSAR

a. Inspection Scope

Background: As documented in IR 05000391/86-24 (ML082280247), information was received by an inspector that electrical cables were pulled through an enclosed wireway vertical riser, where six of the fourteen cables were spliced on their way to Control Room Panel M-4-A. The spliced cables were identified as 2PM2241A, 2V1071A, 2PM3989A, 2PM3994A, 2PM4463A, and 2PM4483A. Four of the six cables identified were part of the Unit 1 Splice Program; (2PM2241A, 2V1071A, 2PM3989A, and 2PM3994A) installed after February 15, 1989, and considered acceptable to revised splice requirements.

Inspection Activities: The inspectors reviewed OPEN ITEMS/COMMITMENT COMPLETION FORM, NGDC PP-19-2, with tracking number PER 178012 Rev. 1 to evaluate the status of the engineering complete package. The inspectors reviewed TVA

General Engineering Specification, G-38, for "Installation, Modifications, and Maintenance Insulated Cables Rated up to 15,000 Volts," to compare with design changes in integrated cable and raceway design system (ICRDS) and calculation EDQ00299920090007, "Evaluation of Unit 2 Class 1E Splices in Mild and Harsh Environments," in response to criteria requirements set forth by the specifications.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

The evaluation performed by the applicant in the engineering complete package to address this historical URI, identified in ICRDS, indicates new cable runs had been installed to replace cable segments associated with the incorrectly located splices. The ICRDS cable standard reports developed for cables 2PM4463A and 2PM4483A are indicated as having part replacements to eliminate the splices in question and providing a continuous run from junction box 0-JB-290-3434-A to 2-PNL-278-M4/A. Existing spliced cable segment within the enclosed wireway are scheduled to be cut, abandoned, and tagged as 2ABN1042A and 2ABN1043A respectively.

c. Conclusion

The inspectors determined that the engineering evaluation developed to address this URI 391/86-24-06 was adequate. This item will remain open until full implementation of the design scope is completed by applicant.

OA 1.10 (Closed) Bulletin 79-02, Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts (Inspection Procedure 46071 and Temporary Instruction 2515/028)

a. Inspection Scope

Background: NRC BL 79-02 was issued on March 8, 1979, because pipe support base plate designs using concrete expansion anchor bolts were deficient and could potentially impair the operability of piping systems. Bulletin 79-02, Rev. 1, was issued on June 21, 1979, as a means to clarify and identify acceptable ways of satisfying the bulletin requirements. Bulletin 79-02, Rev. 2, was issued November 8, 1979, as the final clarification of the bulletin's intent as well as establishing the NRC positions on minimum factors of safety, anchor bolt preload, and expected date for completion of actions. The BL's actions were:

- The effects of base plate flexibility are accounted for in the calculation of anchor bolt loads
- The minimum factors of safety for wedge type and shell type anchor bolts are 4 and 5 respectively
- The applicability of cyclic loading on the design requirements of anchor bolts
- Verification that existing anchor bolts have been installed correctly
- Anchor bolts installed in concrete block walls are acceptable
- Anchor bolts used with structural steel shapes instead of base plates

The inspectors reviewed the Unit 1 HAAUP CAP closure report to determine how TVA addressed action 4 for Unit 1 through reviewing documentation for all the pipe supports. Pipe supports were tracked using a computer system that was in place during construction that ensured all inspections had been performed in accordance with TVA's general construction specification G-32, "Bolt Anchors set in Hardened Concrete." TVA addressed action 4 for Unit 2 by conducting a complete review of all affected pipe support calculations and by performing the necessary revisions to design documents and field modifications to achieve compliance. This action required a review of all existing historical anchor bolt inspection test card data to include in the reanalysis of the pipe support design calculation. TVA addressed missing or incomplete anchor bolt inspection test card data by replacing the anchor bolts or performing a pull test to ensure compliance as discussed in Section OA 1.3 of this report.

Inspection Activities: The inspectors reviewed the HAAUP CAP closure report which described in detail the scope, implementation, and reconciliation of BL 79-02, Rev. 2, to determine the applicant's actions related to BL 79-02. TVA's letter to NRC dated July 26, 1991, detailed that actions had been completed for complying with the requirement of BL 79-02. The inspectors reviewed this report to determine the applicability to Unit 2 in addressing anchor bolts that were acquired from common lots during the time construction was ongoing for both units.

The inspectors reviewed NUREG-0847, Supplement 8, dated January 1992, to confirm that NRC staff had approved the methodology discussed above and that the same methodology used on Unit 1 to address BL 79-02 was being followed for Unit 2 except for action 4 above.

TI 2515/028 was issued on July 1, 1979, to verify that TVA had taken actions on the issues required by BL 79-02, Rev. 1. Inspection Procedure 46071, "Concrete Expansion Anchors," was issued on December 17, 1986, with the objective to confirm concrete expansion anchors were properly installed and that the applicant's response was consistent with commitments made in response to BL 79-02. Inspection Procedure 46071 was closed in IR 05000391/2011609, Section C.1.8. This report documented the inspection of field work and review of procedures and records associated with concrete expansion anchors for Unit 2.

To address BL 79-02 for Unit 2, the inspectors performed the following:

- Reviewed the WBN Unit 1 closure report for BL 79-02 to verify that the applicable design considerations were adequately captured in the design standard DS-C.1.7.1, "General Anchorage to Concrete."
- Reviewed NUREG-0847, Supplement 8, dated January 1992, to confirm that NRC staff had approved the methodology discussed above and that the same methodology used on Unit 1 to address BL 79-02 was being followed for Unit 2.
- Reviewed a sample of calculations to verify that minimum factors of safety for anchor bolts were accounted for in the pipe support design (these are discussed further in Sections OA.1.3, Supplemental Safety Evaluation Report Appendix HH Item 50, Anchor Bolt Documentation and Pull Tests, and OA.1.2, Hanger Analysis and Update Program Corrective Action Program, of this report).

- Reviewed TVA's interim response to the NRC dated December 6, 1979, that seismic category 1 piping supports had not been nor would be installed on concrete block walls. The inspectors performed this review to verify that the changes had been carried over into design standard, DS-C1.7.1.
- Reviewed TVA's interim response to the NRC dated December 6, 1979, to evaluate that all expansion anchor installations, regardless of their use in base plates or other structural attachments, were included in TVA's review.
- Reviewed previous IR 05000391/2011609, Section C.1.8 to confirm closure of IP 46071 and that documents reviewed and work observations performed under IP 46071 could be credited towards actions associated with BL 79-02.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on these actions, the inspectors determined that the applicant resolved BL 79-02 for Unit 2. This item is closed for Unit 2.

OA 1.11 (Closed) Bulletin 79-14, Seismic Analysis for As-Built Safety-Related Piping Systems (Temporary Instruction 2515/029 and 2512/023 and Inspection Procedure 50090)

a. Inspection Scope

Background: The applicant received construction permits for the WBN plant, Units 1 and 2, in 1973 under 10 CFR Part 50. Construction activities for WBN Unit 1 and 2 had started when BL 79-14 was issued by the NRC on July 2, 1979. This BL required the applicant to assure that seismic analyses of safety-related piping systems accurately reflected the as-built configuration of the plant. The BL was subsequently revised to Rev.1 and Supplements 1 and 2. NRC Bulletin 79-14 was issued because NRC and non-NRC inspection activities identified that the piping system's as-built conditions were different from design drawings and design input at several nuclear facilities. The NRC determined that this condition could render systems inoperable, because applied loads could exceed the allowable loads in some cases. The BL required licensees or applicants to review their design input based on the completed QC record or perform walkdown inspections to check as-built configurations against the design input. If non-conformances were found, the non-conformances were to be evaluated and the design input revised or the hardware modified. The bulletin also required the applicant to correct administrative problems which could allow this problem to recur. A response was to be submitted, including a schedule for required modifications.

TVA submitted their preliminary response in 1979. Construction of WBN Units 1 and 2 proceeded until 1985. However, as a consequence of the identification of a large number of deficiencies shortly before the WBN Unit 1 operating license was expected to be issued, the NRC sent a letter to TVA on September 17, 1985, requesting information under 10 CFR 50.54(f), on TVA's plans to address the deficiencies for its operating and construction activities at WBN and TVA's other nuclear facilities. In response to this

letter, TVA developed a nuclear performance plan to address corporate and site-specific issues, establishing programs to address a wide variety of material, design, and programmatic deficiencies. WBN Unit 2 construction was suspended in 1985, with major structures in place and equipment such as reactor coolant system piping installed. The HAAUP CAP was developed to address NRC generic communications, including BLs, on the subject of piping analysis and pipe support design as well as to correct and prevent recurrence of other issues identified by the applicant through several avenues including employee concerns, CAQRs, NCRs, PERs, significant condition reports (SCRs), and internal and external reviews. These issues were found to be mainly associated with interface control of design input and output, design and analysis methodology, and design documentation completeness.

On June 29, 1989, TVA issued Rev.1 to the HAAUP CAP committing to the re-analysis of all safety-related piping systems in accordance with the requirements of BL 79-14 and submitted it to NRC for review. In January 1990, the NRC documented their review of the HAAUP CAP in the "Safety Evaluation Report on the Watts Bar Nuclear Performance Plan - NUREG-1232," Volume 4, and accepted the plan. The NRC review concluded that the WBN Unit 1 HAAUP CAP was an acceptable plan to ensure that the structural design of piping systems was in compliance with the design criteria and licensing commitments. The corrective actions identified in the CAP were to:

- Revise design criteria, Final Safety Analysis Report (FSAR), and procedures
- Walk down the piping systems to obtain the as-built configuration and condition
- Re-analyze the piping systems
- Review the pipe support calculations
- Re-work or modify the pipes and supports

NRR reviewed the revised design criteria, FSAR, procedures, design methodology, and scope of safety-related piping systems. NRC inspection efforts on BL 79-14, for WBN Unit 1, were documented in IRs 50-390/83-01 (ML082190162), 50-390/1989-200, 50-390/1990-018, 50-390/1990-028, 50-390/1992-201, 50-390/1993-007, and 50-390/1993-045. These IRs documented review and inspection of non-modified and modified piping systems and pipe supports as well as pipe support calculations, piping stress analysis, design criteria, FSAR, procedures, design methodology along with other program documentation. NRC inspection reports 50-390/95-53 (ML072680911) closed BL 79-14 for WBN Unit 1 based on these inspection efforts, the review of the BL 79-14 Final Closure Report, and the completion of WBN Unit 1 HAAUP CAP.

On August 3, 2007, TVA informed the NRC of its intent to complete construction and licensing of WBN Unit 2. In a letter dated September 7, 2007, TVA provided an updated summary of the status of generic letters and BLs, issued prior to 1995, needing to be addressed for WBN Unit 2. Bulletin 79-14 was identified as needing closure for WBN Unit 2.

On January 29, 2008, TVA submitted to the NRC a regulatory framework letter for the completion and licensing of WBN Unit 2 and made the commitment of implementing HAAUP CAP for Unit 2 using the Unit 1 approach. TVA subsequently provided updates to this regulatory framework letter based on discussions with NRC staff. On August 15, 2012 (ML 12234A688), TVA provided an updated status of the regulatory framework for

the completion and licensing activities for WBN Unit 2 as well as an updated status of generic communications, including BL 79-14. The actions for Unit 2 included:

- Initiate a Unit 2 hanger walkdown and hanger analysis program
- Complete re-analysis of piping and associated supports as necessary
- Perform modifications as required by re-analysis

On February 28, 2012, TVA issued the final closure report for WBN Unit 2 HAAUP CAP (a subsequent revision was issued on September 18, 2012) and notified the NRC about its completion of the HAAUP CAP. Section 9 of this closure report stated how BL 79-14 requirements were addressed in the CAP.

In addition, TI 2515/029 was issued on September 14, 1979. The objective of this TI was to provide guidance for inspection and review of licensees' actions and written responses to BL 79-14.

Inspection Activities: The BL 79-14 requirements, for WBN Unit 2, were reviewed during recent inspection efforts conducted by the NRC. These inspection efforts were performed to verify the implementation of HAAUP CAP requirements. During these inspection activities, NRC inspectors sampled QC-accepted modified and non-modified piping and supports to verify adequate as-built configuration as well as to review design input and output documentation. The following inspection reports documented the review and inspection of non-modified and modified piping systems and pipe supports as well as pipe support calculations, walkdown packages, piping stress analysis, design criteria, design drawings, procedures, training, and design methodology along with other program documentation:

- Inspection Reports 05000391/2008006, 2008007, 2008009, 2008010, 2009602, 2009603, 2009604, 2009605, 2010602, 2010603, 2010604, 2010605, 2011602, 2011603, 2011604, 2011605, 2011607, 2011608, and 2011609

These inspections were conducted in following the guidance contained in IPs 50090 and 46071 for pipe support and anchor bolts, respectively. IP 50090 specifically references BL 79-14 and provides inspection requirements that include review of implementing procedures and records; and direct observation of installation activities.

During this inspection period, the inspectors reviewed the final HAAUP CAP closure report including the design criteria, to determine the commitments and actions governing piping system analysis and design. The appropriate use of seismic response spectra and considerations along with the design analysis and methodology were also reviewed by the inspectors. The inspectors reviewed documents to verify if adequate procedural requirements existed to control and resolve UVAs of the design calculations. The as-built physical configuration, drawings, and calculations of the piping associated with Pipe Stress Calculations N3-67-72A and N3-26-11A were inspected during field observations. The inspectors interviewed several of the applicant individuals cognizant of the HAAUP CAP and BL 79-14. These interviews served to determine the qualifications of the individuals involved in the development of the inspection elements and acceptance criteria, the rationale of the acceptance criteria, the walkdown procedure requirements, the inspection of accessible and inaccessible piping, and the process to improve QA procedures related to design changes.

Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on the review of the Unit 2 HAAUP CAP closure report and the NRC inspections performed at Watts Bar Unit 2, inspectors determined that the applicant resolved BL 79-14, including its supplements and Temporary Instruction 2515/029. This item is closed for Unit 2. The HAAUP CAP and IP 50090 will continue to remain open and will include inspection of safety-related dynamic supports that were seismically analyzed, but not yet installed as discussed in Section OA.1.2 of this report.

OA 1.12 (Closed) Construction Deficiency Report 391/91-18: Deficiency in RVHVS Piping Stress Analysis (Inspection Procedure 35007 and 50090 and Temporary Instruction 2512/023)

a. Inspection Scope

Background: In July 1991, the applicant notified the NRC that the reactor coolant system (RCS) operating modes calculation for the reactor vessel head vent system (RVHVS) did not accurately address the temperature to which the piping downstream of the control valve will be subjected. This deficiency was originally identified in Watts Bar Significant Corrective Action Report WBSA910239 for Unit 2 and was completed by PER144229. The issue was also documented as CDR 390/91-18 for Unit 1 and CDR 391/91-18 for Unit 2. Based on a previous review of the revised RCS operating modes calculation, the updated piping stress analysis and the completion of any resulting piping and/or pipe support modification, the inspectors determined that CDR 390/91-18 was adequately resolved for Unit 1. The closure of CDR 390/91-18 was documented in IR 50-390/94-61.

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

- Reviewed that the calculation EPM-MJD-100388, "RCS Operating Modes," Rev. 10 to determine if the calculation was applicable for both Unit 1 and Unit 2. Revision 8 made the calculation applicable for both Unit 1 and 2 in September 2008. Unverified assumptions were removed in the 10th revision on May 2011.
- Reviewed the pipe stress analysis calculation N3-68-10R, Rev. 6 for Unit 2 to verify if the calculation was adequate and followed the design methodology.
- Reviewed Engineering Design Construction Release (EDCR) 52524 to verify that required modifications, identified in Pipe Support Analysis Calculation N3-60-10R, Rev. 3 were adequately addressed.
- Reviewed detailed administrative controls, in accordance with DCN 34674A, to verify that they were incorporated in drawing notes from drawings 2-47W813-1 and 2-45W600-68-2.

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on these actions and review of the applicant's engineering complete closure package, the inspectors determined that the applicant resolved the original construction deficiency for Unit 2. This item is closed for Unit 2.

OA.1.13 (Closed) Construction Deficiency Report 391/81-67: Qualification of Epoxy Grout for Safety-Related Applications (Inspection Procedures 35007, 50090 and 46071 and Temporary Instruction 2512/023)

a. Inspection Scope

Background: In August 1981, the applicant discovered a condition where unqualified epoxy grout had been used on anchor bolts for supports and hangers inside containment. Specifically, the epoxy grout had not been qualified for radiation bombardment or for use in environments exceeding 120 degrees Fahrenheit. This condition was originally identified in historical NCR 3567R on August 19, 1981. The NRC tracked this issue as CDR 390/81-71 for Unit 1 and CDR391/81-67 for Unit 2.

Between May 22 and July 2, 2011, inspection activities were performed to determine the adequacy of the applicant's corrective actions to address CDR 391/81-67. The inspectors identified two pipe supports with epoxy grouted anchors which had not been evaluated in accordance with the committed corrective action for CDR 391/81-67. This condition was documented in IR 05000391/2011605 (ML112201418) as NCV 05000391/2011605-01, Failure to Take Adequate Corrective Action Associated with CDRs and Issues Identified in an NRC Bulletin. The applicant initiated PER 357284 to capture this issue.

Inspection Activities: The inspectors performed the following inspection activities:

- Reviewed the revised Engineering Complete PP-19 Closure package for CDR 391/81-67, to verify corrective actions associated with PER 357284 were incorporated.
- Reviewed PER 357284, to determine if it addressed the two unevaluated pipe supports, 2-90-100 and 2-90-103, referenced in NCV 05000391/2011605-01.
- Reviewed revised pipe support calculations for supports 2-90-100 and 2-90-103 to verify compliance with General Engineering Specification G-32, Bolt Anchors Set in Hardened Concrete; TVA Design Standard DS-C1.7.1, General Anchorage to Concrete; and CEB 86-18-C, Evaluation of Epoxy Grouted Anchors at Elevated Temperatures.

- Reviewed FCR 58356-A to verify the adequacy of proposed modifications to support 2-90-100.

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors reviewed the applicant's revised engineering complete closure package and determined that the applicant either implemented or initiated appropriate actions to resolve the original construction deficiency. Based on these proposed actions, and inspection activities documented in NRC IR 05000391/2011605, the item can be closed; however, future inspection of completed work is possible at the NRC's discretion.

OA.1.14 (Closed) Construction Deficiency Report 391/84-17: Deficient Welds for Hanger Lugs on ASME Code Piping (Inspection Procedures 35007, 50090 and 46071 and Temporary Instruction 2512/023)

a. Inspection Scope

Background: In March 1984, the applicant identified a welding issue concerning the lack of full penetration on shear lug welds. Specifically, some ASME piping shear lug welds were not full penetration welds in accordance with the design drawings. In addition, some welds did not extend the full length of the shear lug. To address this issue, the applicant initiated NCR WBN 5559 and reported these issues to the NRC as CDR 50-390/84-17 and CDR 50-391/84-17 for Units 1 and 2, respectively. These issues were downgraded to non-reportable in a report dated May 1984, but were reopened when similarly deficient welds were discovered in January 1987. The applicant issued SCR W-518-P to document these deficiencies for Unit 1; SCR WBN 7192 was initiated to document the potential for this condition in Unit 2. The root cause of these deficiencies was determined to be poor craftsmanship, inadequate supervision, and inadequate inspection by the QC welding inspector.

Between May 22 and July 2, 2011, inspection activities were performed to determine the adequacy of the applicant's corrective actions to address CDR 391/84-17. The inspectors identified a pipe support calculation which was performed assuming the presence of a full penetration weld rather than using as-built measurements, as prescribed by commitments associated with the closure of CDR 391/84-17. This condition was documented in NCV 05000391/2011605-01, Failure to Take Adequate Corrective Action Associated with CDRs and Issues Identified in an NRC BL. The applicant initiated PER 382103 to capture this issue.

The applicant performed an extent of condition evaluation and determined that there were 66 existing supports designated to have full penetration welds on the shear lugs. The applicant performed ultrasonic testing (UT) or visual inspections (VIs) of the shear lug welds on all 66 supports. When the use of UT was not possible, VI was performed, and welds were measured and treated as fillet welds. The applicant determined from UT that shear lug welds on two pipe supports, 2-63-353 and 63-2SIS-R076, had indications

and could not be considered full penetration welds. The applicant revised pipe support drawings and calculation, and issued field change requests (FCRs) to add weld caps to the existing lug welds in order to attain the required strength.

Inspection Activities: The inspectors performed the following:

- Reviewed the applicant's revised Engineering Complete PP-19 Closure Package, to verify corrective actions associated with PER 382103 were incorporated.
- Reviewed PER 382103, and attachments, to determine if it addressed the incorrectly evaluated shear lug welds referenced in NCV 05000391/2011605-01.
- Reviewed UT and VI result to verify that inspection or testing was performed on all 66 supports.
- Reviewed a sample of pipe support calculations to verify that inspection and testing results were incorporated.
- Reviewed FCRs to evaluate modifications to pipe supports 2-63-353 and 63-2SIS-R076.
- Reviewed drawing revision authorizations (DRAs) to verify incorporation of modifications to pipe supports 2-63-353 and 63-2SIS-R076.
- Reviewed pipe support calculations 2-63-353 and 63-2SIS-R076 to verify incorporation of testing data and proposed modifications.

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors reviewed the applicant's revised engineering complete closure package and determined that the applicant either implemented or initiated appropriate actions to resolve the original construction deficiency. Based on these proposed actions, and inspection activities documented in NRC IR 05000391/2011605, the item can be closed; however, future inspection of completed work is possible at the NRC's discretion.

OA.1.15 (Closed) Construction Deficiency Report 391/86-33: Support Spans on 1/2-inch Schedule 40 Stainless Steel Piping with Concentrated weights Less than 25 Pounds (Inspection Procedure 35007, 50090 and 46071 and Temporary Instruction 2512/023)

a. Inspection Scope

Background: In April 1986, the applicant notified the NRC that they had installed ½-inch Schedule 40 SS piping without considering reduced span lengths for concentrated loads. Specifically, piping was installed without consideration of concentrated loads, when the loads were less than 25 pounds. The intent of the design drawings was to reduce span requirements for all concentrated loads, including those less than 25 pounds. The applicant determined that misinterpretation of the design drawings and miscommunication between design and construction organizations, led to the installation

of the piping without consideration for the reduced spans. The applicant initiated SCR WBN 6560 to track this issue.

Although the design drawings affected both Units 1 and 2, the applicant determined that 1/2-inch Schedule 40 SS piping had not been incorrectly installed in Unit 1 as a result of this condition. To prevent recurrence of this issue, the applicant revised the design drawings to clarify the requirements for reduced span lengths for concentrated loads below 25 pounds. The applicant also committed to identifying all effected piping and evaluating it to the correct design requirements.

Inspection Activities: The inspectors performed the following inspection activities for Unit 2:

- Reviewed the applicant's Engineering Complete PP-19 Closure package and any actions associated with PER 143715, to verify they addressed methods to track actions for historical SCR WBN 6560.
- Reviewed design drawings to verify adequate incorporation of requirements for span lengths of one-half inch Schedule 40 SS piping with concentrated loads.
- Reviewed TVA Calculation Number WCG-1-1419, to verify it described the seismic validation methodology for piping and supports.
- Reviewed multiple calculations to determine established guidelines for walkthrough screening evaluation of piping, to verify inclusion of appropriate measures to identify improperly installed one-half inch Schedule 40 SS piping.
- Reviewed WBN Design Criteria Document WB-DC-20-32, Integrated Interaction Program Screening and Acceptance Criteria, to evaluate the acceptance criteria to be utilized during limited scope walkdowns (LSWDs) which were intended to verify the adequacy of instrument and control piping.
- Reviewed a sample of LSWD package results, which documented the evaluation of systems containing one-half inch Schedule 40 SS piping, to identify deficiencies associated with one-half inch Schedule 40 SS piping.
- Reviewed calculations WCG-2-904 and WCG-2-905 which documented the resolution of outliers identified in the LSWD packages, to verify proper disposition of deficiencies with one-half inch Schedule 40 SS piping.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors reviewed the applicant's engineering complete closure package and determined that the applicant either implemented or initiated appropriate actions to

resolve the original construction deficiency. Based on these proposed actions, the item can be closed; however, future inspection of completed work is possible at the NRC's discretion.

OA.1.16 (Closed) Heat Sink Performance (Inspection Procedure 71111.07 Sections 02.02.b.2 and 02.02.c)

a. Inspection Scope

Background: The subject IP required inspection of various activities associated with ensuring adequate heat sink for components. These items were identified as requiring inspection at Watts Bar Unit 2 during the construction/refurbishment phase. Section 02.02.b.2 of the IP covers inspection of 2-3 heat exchangers not being tested. Section 02.02.c of the IP covers confirmation of non-destructive examination of a heat exchanger cooled by a closed loop system indirectly cooled by the ERCW system. Both of these sections were previously inspected and documented in inspection reports 05000391/2011603, Section C.1.6; and 05000391/2012607 (ML112730197), Section C.1.11; respectively.

Inspection Activities: The inspectors reviewed the above IR associated with heat sink performance to determine if sufficient inspection activities had been performed to consider these items were adequately addressed.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on the activities reviewed, the inspectors concluded that these two inspection items can be closed.

OA.1.17 (Closed) Notice of Violation 05000391/2012612-01: Failure to Correct a Condition Adverse to Quality Associated with Containment Spray Pump Layup and Preventive Maintenance (Inspection Procedures 92702, 50075 and 52055)

a. Inspection Scope

Background: This issue involved the fact that the applicant had failed to adequately address an NRC-identified deficiency. NRC inspection reports 05000391/2011609 (ML11350A229) documented NCV 05000391/2011609-01, Failure to Perform Layup and Preventative Maintenance on Safety-Related Components, which identified that layup and preventive maintenance recommendations had not been fully implemented for the installed containment spray pumps. Specifically, the applicant failed to address all of the recommendations and further failed to recognize programmatic deficiencies. The applicant responded to this NOV in a letter dated June 7, 2012. The corrective actions included addressing the containment spray recommendations, development of an improved layup and preventive maintenance (LUPM) program, and development and implementation of LUPM requirements for installed equipment. In addition, the applicant implemented additional controls in the licensing group to ensure NRC-identified issues did not go unaddressed.

Inspection Activities: The inspectors reviewed the applicant's corrective actions documented in PERs 523722 and 556040 to determine if the applicant had established sufficient corrective actions to address the concern. The inspectors reviewed the new LUPM procedure (25402-000-GPP-0000-N1304, System/Component Layup, Rev. 3) and reviewed the new LUPM data base for safety-related equipment to confirm the actions for containment spray pumps were addressed. Additionally, the inspectors reviewed vendor information associated with the Westinghouse-supplied large motors, auxiliary feedwater (AFW) pump motors, safety injection (SI) pumps, centrifugal charging pumps, and Limatorque valve motors; reviewed LUPM implementation activities for the SI and charging pumps, the AFW motors, and Limatorque valve motors; conducted simulated implementation of quarterly LUPMs, with responsible applicant personnel, on the SI pumps and the AFW motors; and observed implementation of quarterly LUPMs on the control rod drive motor generators to verify the applicant was appropriately implementing the new program. The inspectors also reviewed the revised licensing procedure (NRC Inspection Preparation and Support, Rev. 1). The following samples were inspected:

- IP 50075 Section 02.03.c.2 – two samples
- IP 52055 Section 02.02.b.1 – two samples

b. Observations and Findings

No findings were identified. The applicant had established a viable procedure for development and implementation of LUPM activities with documentation requirements for any exceptions to vendor recommendations.

c. Conclusions

Based on the activities reviewed, the inspectors concluded that the applicant had taken appropriate corrective actions to address the NOV; therefore, this item is closed.

OA.1.18 (Closed) Three Mile Island (TMI) II.E.1.1: Auxiliary Feedwater System Evaluation, Modifications (Inspection Procedures 50073 and 50075)

a. Inspection Scope:

Background: After the accident at TMI, the NRR required all pressurized water reactors operating licensees and operating license applications to reevaluate the auxiliary feedwater (AFW) systems. The reevaluation required licensees to:

- Perform a simplified AFW system reliability analysis that uses event-tree and fault-tree logic techniques to determine the potential for AFW system failure under various loss-of-main-feedwater transient conditions. Particular emphasis should be given to determine potential failures that could result from human errors, common causes, single-point vulnerabilities, and test and maintenance outages;
- Perform a deterministic review of the AFW system using the acceptance criteria of Standard Review Plan 10.4.9 and associated Branch Technical Position ASB 10-1 as principal guidance; and

- Reevaluate the AFW system flow rate design bases and criteria.

Inspection Activities: The inspectors reviewed the applicant's corrective actions that were required to be implemented to verify that requirements of the TMI action item were met. The inspectors reviewed design documents and interviewed responsible engineers on the Unit 2 AFW system to verify that it was similar to the Unit 1 AFW system. The NRC component design basis (CDB) team inspection reviewed several Unit 1 AFW system components in 2010 which is documented in IR 05000390/2010006 (ML101620543). During the CDB inspection the inspectors reviewed design calculations involving minimum flow, run out protection, NPSH, overpressure prevention, and trip and throttle valve, and site procedures to verify design assumptions had been appropriately translated into these documents. Additionally, the inspectors reviewed operating procedures for aligning AFW pumps during a station blackout, small break loss of coolant accident, and other event scenarios that cause a loss of main feedwater were reviewed to verify that operation of the AFW system was consistent with design basis requirements and analyzed conditions. Alternate flow paths and water sources, as well as possible diversion paths, were reviewed to verify that the process medium would be available and unimpeded during an accident. NRR reviewed and approved TVA's Failure Modes and Affects Analysis in a 1982 Safety Evaluation Report (SER) (ML073450539).

Documents reviewed are listed in the attachment.

b. Observations and Findings:

No findings were identified.

c. Conclusions:

Based on the review of the applicant's final closure report, the CDB inspection review, the NRR review and approval, and there being no major revisions to the calculations, this item is closed.

OA.1.19 (Closed) Construction Deficiency Report 390/91-12: Undersized Component Cooling System Instrumentation for Reactor Coolant Pump Thermal Barriers (Inspection Procedure 35007)

a. Inspection Scope

Background: An internal audit by the applicant to assess the design of the component cooling water system, System 70, identified certain pressure and flow instruments that were purchased with a specified maximum pressure rating of 300 psig. In contrast, they were installed in a segment of component cooling water system piping that required a capacity to withstand a pressure of 2,485 psig from a postulated thermal barrier heat exchanger tube rupture event. The instruments were used to provide indication and to annunciate inadequate flow to the thermal barrier heat exchangers on the reactor coolant pumps. The function of the instruments was non-safety related; however, the instruments were required to maintain the integrity of the reactor coolant system boundary.

Corrective actions for Unit 1, including actions to prevent recurrence, were documented in a 10 CFR 50.55(e) report, CDR 390/91-12. NRC inspectors verified acceptable completion of actions for Unit 1 in IR 50-390/91-26 (ML072880173).

Inspection Activities: The inspectors reviewed the applicant's final closure documentation package for Unit 2 corrective actions to verify specific actions were included in the documentation to address the issue. The associated Engineering Construction Document Release packages were reviewed to verify all eight of the affected instruments were identified, and that specified technical requirements provided assurance that the instruments would remain intact under analyzed pressures following a postulated thermal barrier heat exchanger tube rupture event. Material requisitions were reviewed to verify technical requirements had been correctly translated into the procurement control documents. The inspectors reviewed records of completed WOs to verify replacement instruments were installed in accordance with technical and quality requirements. The inspectors interviewed responsible engineering and construction personnel and conducted direct field observations for a sample of four of the eight instrument installations to verify as-installed configurations were complete and installations were performed in accordance with approved procedures and practices.

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

Eight instruments in the component cooling water system were identified as requiring upgrades to assure the components will maintain the integrity of the reactor coolant pressure boundary during postulated accident conditions. The inspectors verified that replacement instruments certified to be capable of withstanding analyzed accident pressures had been specified, purchased, mounted, and connected to their sensing lines. Installations were fully complete for five of the instruments; however, electrical signal circuits had not yet been connected for three instruments. The inspectors identified that WO 110884130 had been issued to complete the remaining circuit connections.

c. Conclusion

The inspectors reviewed the applicant's engineering complete package and determined that actions implemented by the applicant provided replacement instruments that would be sufficient to maintain pressure boundary integrity under the analyzed accident conditions. Actions to prevent recurrence had been previously verified in IR 50-390/91-26. Electrical signal circuits had not been completed for three of the instruments; however, based upon inspection of a sample of completed installations and verification that WO 110884130 had been issued to complete the remaining electrical connections, CDR 390/91-12 is closed.

OA.1.20 (Closed) TMI Action NUREG 0737 Item II.G.1: Power Supplies for Pressurizer Relief Valves, Block Valves, and Level Indicators (Inspection Procedure 35007)

a. Inspection Scope

Background: In response to the TMI accident, NUREG-737, Section II.G.1, was issued establishing the requirements that motive and control power for the pressurizer block valves and pressurizer level indicators, must be supplied from an emergency power bus different from the source supplying the power operated relief valves (PORVs). The affected components were associated with System 68 (reactor coolant system), and included: A-Train Block Valve 2-FCV-68-333A, PORV 2-PCV-68-340, B-Train Block Valve 2-FCV-68-332B, PORV 2-PCV-68-334, Level Indicators LI-2-68-320, LI-2-68-335A, and LI-2-68-339A.

Inspection Activities: The inspectors reviewed applicable wiring diagrams, single line diagrams, and interviewed responsible design personnel related to this inspection to verify that power sources to the PORV valve, and its associated block valve, were fed from emergency power sources derived from the same train, but different busses, as required by the NUREG 0737. The inspectors conducted direct observations of installations in the plant to verify that power sources called for on the design documents were actually the sources used. The inspectors reviewed the Watts Bar 2 Post Accident Design Criteria for separation and isolation for instrumentation. The inspectors reviewed Form NGDC PP-19-2 with tracking numbers NCO850045002 and NCO820253051 Final Closure Package documentation.

b. Observations and Findings

No findings were identified.

The inspectors independently verified the Train A valves were fed from the Reactor MOV Board 2A1-A for the 480 volt feed to 2-FCV-68-333A cubicle 6D. The equipment nameplate had not been installed for this particular motor control center starter bucket; however, a green temporary identification tag was installed pending installation of the permanent nameplate. In addition, the inspectors identified that flexible conduit 2VC2013A for the feed to Block Valve 2-FCV-68-333A had been disconnected from its source junction box; however, a document review established that the condition was due to actions being implemented under a special corrective action program task; developed to resolve deficiencies in flexible conduit installations. The inspectors verified that correction of the condition with this conduit was being implemented by the Flexible Conduit Installations (CP 5.1) Closure Report, Revision 000, and TVA General Engineering Specification G-40, Installation, Modification and Maintenance of Electrical Conduit, Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting and Miscellaneous Systems, associated with the resolution of this CAP.

The inspectors identified the use of a single terminal strip with adjacent connection terminals used for two of the three level indicators signal connectors. This condition was verified to be acceptable based on the design criteria WB-DC-30-4, Separation/Isolation, Section 4.4.5, Post Accident Monitoring.

c. Conclusion

The inspectors determined that modifications were implemented by the applicant such that PORVS, associated block valves, and level indicators are powered from the same Train, but different busses. Actions required to complete the installation were covered by programs properly documented and verified by inspectors in previous inspections. Based on these actions and review of the applicant's final closure package, the TMI action, NUREG-737 Section II.G.1, is closed.

OA.1.21 (Closed) Construction Deficiency Report 89-07: Damaged Electrical Cable in Conduit due to Pullbys

a. Inspection Scope

Background: In June 1989, damage to Class 1E cables, ranging from jacket abrasions to exposure of the copper conductors, was identified while pulling back cables from a Unit 2 conduit. In particular, conduit 2PM6474D contained reactor protection system cables that provide inputs from the main steam pipes, feed-water, turbine controls, safety injection, and reactor coolant systems. During pullback of cables from conduit 2PM6474D, damage was identified on several cables.

Inspection Activities: The inspectors reviewed OPEN ITEMS/COMMITMENT COMPLETION FORM NGDC PP-19-2 with tracking number PER 144111 to evaluate the status of corrective actions implemented to resolve the pullby deficiencies identified. The inspectors reviewed PER 144111 and ICRDS report on conduit 2PM6474D, along with all cables routed through this conduit, to assess design documents related to this item. The inspectors reviewed calculations WBN-EEB-EDQ00299920080021 Rev. 0, Appendix 9.1 that identified the cables that failed the pullby criteria and established the level of risk of pullby associated with the particular cables. Cables included in the review were: 2PM516D, 2PM518D, 2PM606D, 2PM696D, 2PM791D, 2PM881D, 2PM1314D, 2PM1454D, 2PM1573D, 2PM1694D, 2PS282D, 2PS283D, 2PS284D, and 2PS285D. These were all new cables to be routed through 2PM6474D, and had not yet been installed.

b. Observations and Findings

No findings were identified.

There were no cables installed in the affected conduits based on a walkdown conducted by the applicant as part of calculation EDQ00299920080021 activities. Also, the cables listed above were previously scheduled to be replaced under the special CAP for the pullby sub-issue. The pullby CAP had been implemented to ensure there would be no undetected pullby damage in other conduits. The CAP sub-issue associated with cable damage, due to pullbys, was previously closed in IR 05000391/2011607 (ML112730134).

c. Conclusion

The inspectors determined that programs implemented by the applicant to address cable damage, due to pullbys, were properly addressed. As written programs were properly addressed and the issues identified in this CDR 89-07 were adequately captured in the

program developed for addressing pullby CAP sub-issues. Based on the actions and review of the applicant's engineering complete package, the damaged electrical cable in conduit due to pullbys in CDR 89-07 is closed.

OA.1.22 (Closed) Unresolved Item 05000391/2011603-03, Corrective Actions associated with Adverse Conditions in Motor Control Center Buckets

a. Inspection Scope

Background: Unresolved Item 05000391/2011603-03, Corrective Actions Associated with Adverse Conditions in Motor Control Center Buckets, identified additional inspection needed to determine if quality problems associated with new replacement motor control center (MCC) buckets had been properly resolved. The URI documented non-conformances associated with MCC buckets which included improper terminations, improper crimping of terminal connections, loose wiring, deviations from vendor proposals to seismically qualify MCC buckets by testing instead of the analysis provided, and deviation from the welding standards prescribed in the procurement documents. The inspectors previously reviewed this URI as documented in IR 05000391/2011603 (ML111370702), Section C.1.8.

Inspection Activities: The inspectors interviewed responsible engineers and examined examples of old and new MCC buckets in the warehouse to evaluate their similarity. The inspectors discussed, with applicant representatives, the technical justification for the seismic qualification of the existing MCCs using new replacement buckets, and the seismic qualification of bucket components by seismic testing. The inspectors reviewed the vendor's Trentec seismic test report for 18-inch MCC buckets that tested each of the components in the bucket assembly to determine adequate seismic qualifications. The inspectors reviewed reports of components that had contact chatter during the bucket seismic testing to determine adequacy of resolution. The inspectors reviewed work procedures to confirm their adequacy in addressing changes in replacement bucket weights and the methods used by the applicant to determine the impact on the seismic qualification of the entire MCC. The inspectors evaluated the impact of the replacement activities associated with the new buckets on the MCC seismic analysis. Specifically, the inspectors reviewed:

- PERs associated with MCC bucket replacements listed in the attachment of this report
- Seismic Equivalency Analysis for Trentec Replacement Buckets, L9001.S1
- Contract documents for replacement MCC buckets
- Seismic Test Report for an 18" Trentec Motor Control Center Compartment assembly, S9028.1
- Miller Handbook for Resistance Spot Welding, 003 335C, Dated 2010-04

In response to this URI, the licensee initiated PER 501739 and provided a supplier deviation disposition request to approve use of the new buckets under seismic equivalency analysis rather than seismic testing. The inspectors reviewed examples of checklists containing the acceptance criteria used for receipt inspection of purchased material for adequacy. The inspectors reviewed the vendor's 10 CFR 21 evaluation letter subject: "Review of PER 243820 for 10 CFR 21 Reporting Requirements, dated November 11, 2010," for the reportability under 10 CFR Part 21 for the first two groups of non safety related buckets received on site. Additionally, the inspectors reviewed

procedure NC PP-13, "Watts Bar Nuclear Plant Unit 2 – NRC Reporting Requirements," Rev. 3, to determine if the content of that procedure was adequate for evaluating reportability. Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings were identified.

Through the evaluation of the associated corrective actions on PERs regarding quality problems associated with safety-related MCC bucket replacements, the inspectors determined that the applicant's actions were adequate. Regarding spot welding on the buckets, the inspectors determined that the welding instructions provided by the vendor were adequate to produce acceptable welds. Through visual observation of the MCC buckets and review of the equivalency analysis, the inspectors determined that the replacement MCC buckets were shown to be structurally equivalent to the original ones.

c. Conclusions

The inspectors concluded that the URI concerning quality problems associated with the replacement MCC buckets had been adequately resolved. The receipt inspections addressed non-conformances identified with the initial material received on-site, vendor 10 CFR Part 21 reporting was adequately performed, and all concerns identified with the seismic qualification of the replacement MCC buckets had been adequately addressed. URI 2011603-03 is closed.

OA.1.23 (Closed) Violation (VIO) 05000391/2010603-08: Failure to Adequately Evaluate and Qualify Molded Case Circuit Breakers (Inspection Procedure 92702)

a. Inspection Scope

Background: Heinemann molded case circuit breakers (MCCBs) were seismically tested for qualification by TVA in 1992. The inspectors determined that the test did not simulate the MCCBs mounting configuration. The inspectors found that the 1992 test of the MCCBs was inadequate because the mounting configuration could affect the safety related performance of the MCCBs during an earthquake. This issue was documented in IR 05000391/2010603 (ML102170465) as VIO 2010603-08.

Inspection Activities: An onsite inspection was conducted to determine whether TVA management had assigned responsibility for implementing corrective actions, including necessary changes to procedures and practices and whether corrective actions have been fully implemented. Interviews were conducted with responsible personnel in the civil engineering organization to determine the extent of modifications to the 120 VAC vital instrument power boards required to make the seismic qualification test acceptable as well as to verify the adequacy of acceptance criteria for the work performed to implement the design changes. The inspectors reviewed the corrected and updated seismic test procedures for Watts Bar and Sequoyah configurations, seismic test results for Watts Bar and Sequoyah from the 2011 and 2012 tests, design change documentation for necessary design changes discovered during testing, and calculations defining the limiting case required response spectrum for testing the MCCBs. The inspectors observed the installation of the maintenance and modification of the MCCB mounting configuration to determine the characteristic differences between the as

installed configuration and the as tested configuration. The inspectors verified that procedures were developed to maintain configuration control as MCCBs are periodically replaced. Inspector independently confirmed that the modifications to the 120 VAC vital instrument power boards adequately represent the tested configuration.

Documents reviewed are identified in the attachment.

b. Observations and findings

No findings were identified.

The inspectors determined that the applicant had implemented adequate corrective action. The applicant adequately applied the requirements of 10 CFR 50 Appendix B Criterion III for Design control as well as measures for management and work control, documents and records control. The inspectors determined that the seismic qualification test met the applicant's commitment to IEEE 344-1975 for the seismic qualification of class 1E equipment for Nuclear Power Generating Stations. The inspectors determined that the applicant successfully conducted seismic tests of the MCCBs in a similar configuration to their as found configuration. The applicant developed calculation WCG-ACQ-0587 dated September 2012 to document the most limiting seismic test response required for the evaluation of replacement MCCBs. The applicant developed seismic test procedures, S1123.0 dated September 2011 and S1209.0 dated March 2012, to ensure that seismic tests enveloped the calculated limiting response and mounting assembly for the MCCBs. The applicant documented the test results in reports S1123.0 dated October 2011 and S1209.0 dated April 2012. The test reports indicated that the MCCBs as tested configuration were suitable for their intended safety function. The applicant modified site drawings to match the as tested configuration of the MCCBs. The applicant developed design change notice (DCN) 59132 Rev. A to configure the 120 VAC vital instrument power boards that house the MCCBs to match what was seismically tested and reflected in the site drawings. The applicant work instructions contained procedures to replace the rear angle supports and standoff spacers with new uniform angle supports, foam material, and precision-made standoff spacers, thus, ensuring the uniform spacing and clamping requirements of the as tested configuration.

c. Conclusion

The inspectors determined that the conditions identified in the NOV had been restored to comply with applicable requirements. This item is closed.

V. MANAGEMENT MEETINGS

V.1 Exit Meeting Summary

An exit meeting was conducted on October 16, 2012, to present inspection results to Mr. Hruby and other members of his staff. The inspectors identified that no proprietary information had been received during the inspection and none would be used in the inspection report. The areas inspected were described, inspection activities, and discussed the inspection results. The applicant acknowledged the observations provided with no dissenting comments.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Applicant personnel

A. Bangalore, Bechtel – Electrical Design
D. Beckley, Bechtel – Electrical Engineer
D. Bose, Bechtel – Civil Engineer
F. Evans, Bechtel – Construction
F. Koonz, TVA – Mechanical Engineer
G. Lee, TVA – Sr. Metallurgical Engineer
G. Scott, TVA - Licensing
J. Boykin, TVA – Quality Control
J. Kepler, Bechtel – Master Equipment List
J. O'Dell, TVA – Licensing
J. Rochelle – Civil Engineering
K. Shaffer, TVA – Unit 2 Operation
M. DiCarlo, Bechtel – QC Inspector
M. Fry, Bechtel – Construction
M. Johnson – MOV Program Manager
M. McGrath, TVA – Licensing
M. Pitre, Bechtel – Welding Lead
N. Kennedy, Bechtel – Electrical Engineer
R. Enis, TVA – Civil Oversight
R. Waehner, Bechtel – Electrical Engineer
S. Street, Bechtel – Electrical Engineer

INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 46071	Concrete Expansion Anchors
IP 48053	Structural Steel and Supports Work Observation
IP 50053	Reactor Vessel and Internals Work Observation
IP 50073	Mechanical Components - Work Observation
IP 50075	Safety-Related Components – Records Review
IP 50090	Pipe Support and Restrain Systems
IP 51053	Reactor Vessel and Internals Work Observation
IP 51063	Electric Cable – Work Observation
IP 52055	Instrument Components and Systems – Record Review
IP 64051	Procedures - Fire Prevention/Protection
IP 71111.07	Heat Sink Performance
IP 92702	Followup on Corrective Actions for Violations and Deviations
TI 2512/023	Inspection of Watts Bar Nuclear Plant Hanger Update Corrective Action Program Plan
TI 2512/037	Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program

TI 2515/028	Inspection Requirements to Review Licensee Actions Taken in Response to IE Bulletin 79-02, Revision No. 1
TI 2515/029	Inspection Requirements for IEB 79-14

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Open and Closed

391/2012608-01	NCV	Failure to Perform Work with Approved Work Instructions (Section OA.1.2)
391/2012608-02	NCV	Failure to Take Adequate Corrective Action Associated with NCV 391/2011604-02 and NRC Bulletin 89-02 (Section OA.1.4)

Closed

79-02	BL	Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts (Section OA.1.10)
79-14	BL	Seismic Analysis for As-Built Safety-Related Piping Systems (Section OA.1.11)
391/91-18	CDR	Deficiency in RVHVS Piping Stress Analysis (Section OA.1.12)
391/81-67	CDR	Qualification of Epoxy Grout for Safety-Related Applications (Section OA.1.13)
391/84-17	CDR	Deficient Welds for Hanger Lugs on ASME Code Piping (Section OA.1.14)
391/86-33	CDR	Support Spans on one-half inch Schedule 40 Stainless Steel Piping with Concentrated weights Less than 25 Pounds (Section OA.1.15)
IP 71111.07 Section 02.02.b.2	IP	Heat Sink Performance (Section OA.1.16)
IP 71111.07 Section 02.02.c	IP	Heat Sink Performance (Section OA.1.16)
05000391/2012612-01	NOV	Failure to Correct a Condition Adverse to Quality Associated with Containment Spray Pump Layup and Preventive Maintenance (Section OA.1.17)
TMI II.E.1.1	TMI Action Item	Auxiliary Feedwater (AFW) System Evaluation, Modifications (Section OA.1.18)

390/91-12	CDR	Undersized Component Cooling System Instrumentation for Reactor Coolant Pump Thermal Barriers (Section OA.1.19)
TMI II.G.1	TMI Action Item	Power supplies for pressurizer relief valves, block valves and level indicators. (Section OA.1.20)
391/89-07	CDR	Damaged electrical cable in conduit due to pullbys. (Section OA.1.21)
05000391/2011603-03	URI	Corrective Actions associated with Adverse Conditions in Motor Control Center Buckets. (Section OA.1.22)
0500391/2010603-08	NOV	Failure to Adequately Evaluate and Qualify Molded Case Circuit Breakers (Section OA.1.23)
<u>Discussed</u>		
Item 50	SSER (App HH)	Anchor Bolt documentation and Pull Tests (Section OA.1.3)
2512/023	TI	Hanger Analysis and Update Program Corrective Action Program (Section OA.1.2)
391/2011604-02	NCV	Failure to Maintain Adequate Design Specifications (Section OA.1.4)
391/83-08	CDR	Valve Indication Problems with EMD Gate Valves (Section OA.1.5)
391/86-14	CDR	Failure to Follow Procedures (Section OA.1.6)
391/87-27		Potential Failure of Operator-to-Valve Engagement on XOMOX Supplied Valves (Section OA.1.7)
2512/037	TI	Watts Bar Master Fuse List Special Program (Section OA.1.8)
391/86-24-06	URI	Review of Cable Splicing as Required by FSAR (Section OA.1.9)
IP 51063 – Electrical Cable – Work Observation	IP	Observe Very Low Frequency High potential cable testing on 6900-volt cables (Section C.1.5)

LIST OF DOCUMENTS REVIEWED

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1.2 Structural Steel and Supports Work Observation and Construction Refurbishment Process (Inspection Procedures 50090, 48053 and 37002)

Procedures

MAI-5.1A, Expansion Shell Anchors (SSD) Installation, Rev. 7

Specifications

G-32, Bolt Anchors Set in Hardened Concrete, Rev. 23

Corrective Action Documents

PER 590740, Anchor bolt pull test procedure clarification

Miscellaneous

Report of Calibration for Asset ID E00720, Certificate No. 61094. Calibration Date 7/10/2012
Field Change Request 57280A, SSD Anchor Pull Test Criteria

C.1.3 Mechanical Components – Work Observation and Construction Refurbishment Process (Inspection Procedures 50073 and 37002)

Specifications

25402-011-V1A-MG00-04761-002, Westinghouse-MG00-WBT-D-3986, Steam Generator Weld Cladding Design Specification-425A55-R2

Procedures

QEP-SOP-MOD-3-781, Superheat FGH Standard Operating Procedure Model-3, Rev. 1

Welding Procedure Specifications

PCI 1-A8-OV-(309L/308L)-MN-GTAW, Rev. 2
PCI 1843-OV-43-MN-GTAW, Rev. 0

Procedure Qualification Records

PCI PQR 889A, Rev. 0
PCI PQR 889B, Rev. 0
PCI PQR 892A, Rev. 0
PCI PQR 892B, Rev. 1

C.1.4 Construction Refurbishment Process – Watts Bar Unit 2 (Inspection Procedure 37002)

PER 460344, QA Identified Lack of Tracking Incomplete Refurbishment
PER 491432, QA Identified Lack of Documentation of Pipe Surface Assessment
PER 548402, QA Identified Deficiencies in Documentation of Refurbishment Work Performed
PER 555958, QA Identified Incomplete Documentation of Refurbishment Activities
PER 572385, QA Identified Loose Flange Bolting
PER 565419, Correct Implementation of FCR 58311 is Indeterminate

F.1.1 Fire Protection (Inspection Procedure 64051)

Procedures

TI-211, Fire Protection, Rev.4

WBN0-FPS-510-EXT/INSP, File 02, Portable Fire Extinguishers Inspection, Rev.121

Preventive Maintenance Instruction/Fire Suppression Records

WBN0-FPS-510-0001-C, File 02, Rev. 11, page 4 of 6

WBN0-FPS-510-0001-A, File 02, Rev. 9, page 11 of 12

WBN0-FPS-510-EXT/INSP, File 01, Rev. 1, page 9 of 11

WBN0-FPS-510-EXT/INSP, File 02, Rev. 0, pages 11-17

0-FOR-26-4, Quarterly Inspection of Fire Hose Stations in Accessible Area and Hydrant Support Mobile Equipment, Date 8/8/12, Rev.7

Work Orders

113295239, Perform Cladding Repair of #1, #3, and #4 Steam Generators

113691053, Installation of 1" Nitrogen Line

113640797, Installation of 1" Nitrogen Line

111168080, Modify ASME Section III Pipe Supports in System 61, Rev. 2

IV. OTHER ACTIVITIES

OA.1.2 (Discussed) Hanger Analysis and Update Program Corrective Action Program (Temporary Instruction 2512/023 and Inspection Procedure 50090)

Procedures

TI-205, "Watts Bar Nuclear Plant Unit 1 & 2 Technical Instruction TI-205 Piping and Instrument Analysis," Rev. 02

CEB-80-10, "Watts Bar Nuclear Plant – Movement Data Used in Piping Analysis," Rev. 06

WBNP-DS-1935-2618, "Design Specification for ASME Section III Nuclear Class 3 Piping Systems," Rev. 10

WBNP-DS-1935-2618, "Design Specification for ASME Section III Nuclear Class 2 Piping Systems," Rev. 10

Design Criteria

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

WB-DC-40-31.12, "Seismic/Structural Qualification of Seismic Category I and 1(I) In-Line and Other In-Line System Components," Rev. 10

WB-DC-40-31.50, "Evaluating the Effects of A Pipe Failure Inside and Outside Containment," Rev. 12

WB-DC-40-31.9, "Criteria for Design of Piping Supports and Supplemental Steel In Category I Structures," Rev. 21

Piping Stress Analysis Calculation

N37404A, "Summary of Piping Analysis Problem Number N3-74-04A," Rev. 08

N36810R, "Summary of Piping Analysis Problem Number N3-68-10R," Rev. 03

N36805R, "Summary of Piping Analysis Problem Number N3-68-05R," Rev. 02

N36805R, "Summary of Piping Analysis Problem Number N3-68-05R," Rev. 001

N33004R, "Summary of Piping Analysis Problem Number N3-30-04R," Rev. 005

N36803R, "Summary of Piping Analysis Problem Number N3-68-03R," Rev. 004

N36805R, "Summary of Piping Analysis Problem Number N3-68-05R," Rev. 002

N32611A, "Summary of Piping Analysis Problem Number N3-26-11A," Rev. 002

N30306A, "Summary of Piping Analysis Problem Number N3-03-06A," Rev. 008

N370R32A, "Summary of Piping Analysis Problem Number N3-70-R32A," Rev. 003
 N36810R, "Summary of Piping Analysis Problem Number N3-68-10R," Rev. 003
 CL10600250811, "Class 1 Stress report CL1-0600250-08-11 for Piping Analysis Problem No N3-62-14R," Rev.001
 CL10600250804, "Class 1 Stress report CL1-0600250-08-01 for Piping Analysis Problem No 0600250-08-04," Rev. 002
 CL1N36805R, "Class 1 Stress report CL1-N3-68-05R for Piping Analysis Problem No N3-68-05R," Rev. 001
 CL1N36803R, "Class 1 Stress report CL1N36803R for Piping Analysis Problem No N3-68-03R," Rev. 002
 9165940023, "Summary of Piping Analysis Problem Number N3-74-11A," Rev. 004
 06002500901, "Summary of Piping Analysis Problem Number 0600250-09-01," Rev. 008
 06002500701, "Summary of Piping Analysis Problem Number 0600250-07-01," Rev. 004
 06002500301, "Summary of Piping Analysis Problem Number 0600250-03-01," Rev. 007
 06002500204, "Summary of Piping Analysis Problem Number 0600250-02-04," Rev. 002
 06002500202, "Summary of Piping Analysis Problem Number 0600250-02-02," Rev. 002
 06002500201, "Summary of Piping Analysis Problem Number 0600250-02-01," Rev. 002
 70019112579862, "Summary of Piping Analysis Problem Number 70019," Rev. 007

Pipe Support Calculation

47A06026067, "Calculation for Support No. 47A060-26-67," Rev. 001
 47A06030002, "Calculation for Support No. 47A060-30-2," Rev. 003
 47A06074004, "Calculation for Support No. 47A060-74-4," Rev. 002
 47A40006306, "Calculation for Support No. 47A400-6-306," Rev. 003
 47A40006307, "Calculation for Support No. 47A400-6-307," Rev. 001
 47A40006310, "Calculation for Support No. 47A400-6-310," Rev. 003
 47A46401040, "Calculation for Support No. 47A464-1-40," Rev. 001
 47A46401057, "Calculation for Support No. 47A464-1-57," Rev. 001
 47A46420018, "Calculation for Support No. 47A464-20-18," Rev. 004
 47A46430002, "Calculation for Support No. 47A464-30-2," Rev. 003
 201B014, "Calculation for Support No. 201B014," Rev. 001

PERs

264689, Secondary Pipe Support not Accounted for on Calculation
 310240, Anchor Proof Loading with no Test Criteria
 321142, Discrepancies between Design Output and As-Constructed Condition
 330135, No Documentation for Removed Support
 370537, QA Overview of New and Modified Supports
 378574, QC Observation of Pipe Support 2-01B-130
 415043, Mistakes Found in Pipe Support Calculation
 421481, QC Acceptance Signoff Performed by Uncertified Individual
 426468, Base Plate Analysis used FAPPS Reactions Instead of the Actions Felt
 448928, QA Oversight of Support 2-01B-109
 448940, QC Inspector Involvement on Support 2-01B-109
 465055, Wedge Bolts Under Torqued
 465069, QC Inspector Involvement on Wedge Bolts Under Torqued
 476404, System 063 Pipe Supports/Walk Down Package Deficiencies
 490727, Lack of QC Surveillance During Correcting Documentation Errors
 502989, QC Inspector Involvement in PER 502305
 578011, T-Pipe Modeling Errors
 580087, Stress Calculation has Incorrect Attachment F
 591551, Bypassed QC Hold Point

QA Documents

NGDC-WB-10-009, Quality Assurance - Implementation of NRC Bulletin 79-14 – Assessment Report

NGDC-WB-11-004, Quality Assurance – Effectiveness of QA Program Elements Applicable to the I&E Bulletin 79-14 Walkdowns – Assessment Report

Surveillance 25402-WBN-SR-11-1744, Modify/Install Pipe Support in Reactor Building

Surveillance 25402-WBN-SR-11-1835, Completed System 074 Safety Related Pipe Support

Surveillance 25402-WBN-SR-11-1845, System 074 Pipe Supports

Surveillance 25402-WBN-SR-11-1849, Safety Related Pipe Supports

Surveillance 25402-WBN-SR-11-1997, Unit 2 System 030 Modified HVAC Supports

Surveillance 25402-WBN-SR-11-2006, QC Certification for Pipe Supports and Anchor Bolt Inspections

Surveillance 25402-WBN-SR-11-2073, Unit 2 System 063 Pipe Supports

Surveillance 25402-WBN-SR-12-2093, PER 445533 Corrective Action Review

Surveillance 25402-WBN-SR-12-2106, HAAUP CAP Closure Report for Engineering Portion

NGDC-WB-11-010, Quality Assurance Oversight Report for May-August 2011

NC-WB-12-009, Quality Assurance Oversight Report for April-June 2012

Nuclear Assurance Oversight Results, New and Modified Supports, dated 05/12/2011

Nuclear Assurance Oversight Results, Modified Support Observation, dated 06/02/2011

Nuclear Assurance Oversight Results, Strut Locked Up and Jam Nut not Torqued, dated 09/20/2011

Nuclear Assurance Oversight Results, Support Oversight, dated 10/13/2011

Nuclear Assurance Oversight Results, Oversight of Completed Field Work, dated 02/14/2012

OA.1.4 Non-Cited Violation (NCV) 391/2011-604-02: Failure to Maintain Adequate Design Specifications (IP 92702)

Procedures

NEDP-8, Technical Evaluation for Procurement of Materials and Services, Rev. 0020

TVAN Engineering Bulletin, 04/27/2004

DS-M18.2.18, Standardized Procurement Notes, Rev. 0019

Specifications

PF-2029, G-29B-S02B – Standard Materials Specification Manual, Rev. 4, 05/30/2012

Other

PER 356559, Historical Issue: IEB 89-02, SR Swing Check, 410 Stainless Recurrence Controls

PER 400884, PER written to address NRC Non-Cited Violation

Open Items Commitment, NCO880118006, Review of Remaining Unit 2 SR Swing check valves

OA.1.5 (Discussed) CDR 391/83-08, Valve Indication Problems with EMD Gate Valves (IP 50073 and 50075)

ECN 3978, Motor Operated Valves, 07/1983

45W760-62-3, Wiring Diagrams Chemical and Volume Control Sys Schematic Diagrams, Rev. 9

45W760-63-3, Wiring Diagrams Safety Injection System Schematic Diagrams, Rev. 7

45W2766-1, Wiring Diagrams 480V Reactor MOV BD 2AI-A Connection Diagram, Rev. 9

OA.1.6 (Discussed) CDR 391/86-14, Failure to Follow Procedures (IP 50073, and 50075)

NCR 6566, ASCO Valves Modified from Approved Drawings, 07/1986

EDCR 54870, Construction Work Scope, 04/2010

EDCR 53600, Construction Work Scope, 03/2010

EDCR 53927, Construction Work Scope, 01/2010
 EDCR 53235, Construction Work Scope, 07/2009
 EDCR 53580, Construction Work Scope, 07/2010

OA.1.7 (Discussed) CDR 391/87-27, Potential Failure of Operator-to-Valve Engagement on XOMOX Supplied Valves (IP 50073, and 50075)

2-47W845-3, Mechanical Flow Diagram – ERCW, Rev. 7
 NP3491-C, Xomox valve Schematic and Bill of Material, Rev. 902
 VTM-X002-0010, Vendor Technical Manual for Xomox Corporation Tufline Sleeved Plug Valves, Rev. 17
 WO 1123900226, 2-FCV-067-0134-B Gear Operator, 11/11

OA.1.8 (Discussed) Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (TI 2512/037)

Closure Package

Open Items/Commitment Completion Item 111032509, R 1, Master Fuse List Special Program

Procedure

EDPI 25402-3DP

OA.1.9 (Discussed) Review of Cable Splicing as Required by FSAR. (URI 86024-06)

Closure Package

OPEN ITEMS/COMMITMENT COMPLETION FORM NGDC PP-19-2 with tracking number PER 178012 R1.

Calculations

Calculation WBN-EDQ002999920090007 “Evaluation of Unit 2 Class 1E Splices in Mild and Harsh Environments.”

Specifications

General Engineering Specification G-38 “Installation, Modification and Maintenance Insulated Cables Rated up to 15,000 Volts,” Rev. 20.

OA 1.11 (Closed) Inspection and Enforcement (IE) Bulletin 79-14, Seismic Analysis for As-Built Safety-Related Piping Systems

TVA Procedures

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

Bechtel Procedures

Pipe Stress Analysis Calculations

Pipe Stress Calculation N3-67-72A

Pipe Stress Calculation N3-26-11A

Drawings

Isometric Drawing 2-47W491-209

Isometric Drawing 2-47W450-242

Miscellaneous

TVA letter dated September 7, 2007, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Generic Communications Issued Prior to 1995"

TVA letter dated August 3, 2007, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Reactivation of Construction Activities"

NRC letter dated July 2, 2010, "Watts Bar Nuclear Plant, Unit 2 – Program for Construction Refurbishment (TAC NO. ME1708)"

TVA letter dated August 21, 1995, "Watts Bar Nuclear Plant (WBN) – Unit 1 – Closure Certification for Office of Inspections and Enforcements (OIE) Bulletins 79-02 and 79-14"

TVA letter dated March 20, 2008, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Generic Communications Status for Unit 2 – Restructured Tables"

NRC letter dated May 28, 2008, "Watts Bar Nuclear Plant, Unit 2 – Status of Generic Communications for Review (TAC NO. MD8314)"

TVA letter dated January 29, 2008, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2"

TVA letter dated July 29, 2008, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Generic Communications Status for Unit 2 – Revision 1 (TAC NO. MD8314)"

TVA letter dated August 15, 2012, "Watts Bar Nuclear Plant (WBN) Unit 2 – Status of Regulatory Framework for the Completion of Construction and Licensing for Unit 2 – Revision 8 (TAC No. MD6311), and Status of Generic Communications for Unit 2 – Revision 8 (TAC No. MD8314)"

SECY-07-0096, "Possible Reactivation of Construction and Licensing Activities for the Watts Bar Nuclear Plant Unit 2," June 7, 2007.

TVA letter dated March 13, 2008, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2 – Restructured Tables"

TVA letter dated September 26, 2008, "Watts Bar Nuclear Plant (WBN) – Unit 2 – Regulatory Framework for the Completion of Construction and Licensing Activities for Unit 2 – Corrective Action and Special Programs, and Unresolved Safety Issues"

TVA letter dated December 9, 2008, "Watts Bar Nuclear Plant (WBN) – Unit 2 –Licensing Basis Preservation and Construction Refurbishment Program for Structures, Systems and Components (SSCs) (TAC NO. MD6311)"Activities for Unit 2 – Corrective Action and Special Programs, and Unresolved Safety Issues"

TVA letter dated November 19, 1984, "Watts Bar Nuclear Plant Unit 1- NRC OIE Bulletin 79-14 - Seismic Analysis for As-Built Safety-Related Piping System."

Implementation Plan for the Unit- 2 Hanger Analysis and Update Program (HAAUP) CAP Hanger Analysis and Update Program (HAAUP) CAP Unit 1 Closure Report, issue on October 20, 1995

Hanger Analysis and Update Program (HAAUP) CAP Unit 2 Closure Report, issue on February 28, 2012

NUREG-1232, "Safety Evaluation Report on Tennessee Valley Authority: Watts Bar Nuclear Performance Plan," Watts Bar Unit 1, Volume 4, January 1990.

NUREG-0847 Supplement No. 6, "Safety Evaluation Report related to the operation of Watts Bar Nuclear, Watts Bar Unit 1 and 2," April 1991.

NUREG-0847 Supplement No. 8, "Safety Evaluation Report related to the operation of Watts Bar Nuclear, Watts Bar Unit 1 and 2," January 1992.

OA 1.12 (Closed) Construction Deficiency Report (CDR) 391/91-18: Deficiency in RVHVS Piping Stress Analysis (Inspection Procedure 35007, 50090, and Temporary Instruction 2512/023)

25402-3DP-G04G-00037, "Design Calculations," Rev. 12

25402-3DP-G04G-00081, "Engineering Document Construction Release," Rev. 14 TVA

NEDP-2, "Design Calculation Process Control," Rev. 17

OA.1.13 (Closed) Construction Deficiency Report 391/81-67: Qualification of Epoxy Grout for Safety-Related Applications (Inspection Procedure 35007, 50090, 46071 and Temporary Instruction 2512/023)

Specifications

General Engineering Design Specification G-32, Bolt Anchors Set in Hardened Concrete, Rev. 23, 12/14/2005

TVA Design Standard DS-C1.7.1, General Anchorage to Concrete, Rev. 11, 01/03/06

Calculations

Calculation 290100, Calculation for Pipe Support No. 2-90-100, Rev. 002, 08/20/2010

Calculation 290100, Calculation for Pipe Support No. 2-90-100, Rev. 004, 03/13/2012

Calculation 290103, Calculation for Pipe Support No. 2-90-103, Rev. 002, 08/25/2010

Calculation 290103, Calculation for Pipe Support No. 2-90-103, Rev. 003, 09/06/2011

Field Change Request

FCR 58356-A, 07/29/2011

Problem Evaluation Reports

PER 357284, NRC ID'D: Calculation did not Evaluate Epoxy Grout, status date 10/12/2011

Miscellaneous

CEB 86-18-C, Evaluation of Epoxy Grouted Anchors at Elevated Temperatures, 07/09/1986

Revised Engineering Complete PP-19 Closure Package for CDR 391/81-67, 05/30/2012

OA.1.14 (Closed) Construction Deficiency Report 391/84-17: Deficient Welds for Hanger Lugs on ASME Code Piping (Inspection Procedure 35007, 50090, 46071 and Temporary Instruction 2512/023)

Calculations

Calculation 263353, Calculation for Pipe Support No. 2-63-353, Rev. 004, 05/23/2012

Calculation 632SISR076, Calculation for Pipe Support No. 63-2SIS-R076, Rev. 003, 12/06/2011

Field Change Request

FCR 59339-A, 2-63-353, 05/29/2012

FCR 58919-A, 63-2SISR076, 11/29/2011

Drawing Change Request

DRA 52497-064, Drawing Number 2-63-353-1, 05/17/2012

DRA 52497-065, Drawing Number 2-63-353-2, 05/17/2012

DRA 52500-016, Drawing Number 63-2SISR076-1, 11/22/2011

DRA 52500-017, Drawing Number 63-2SISR076-2, 06/14/2010

DRA 52500-018, Drawing Number 63-2SISR076-3, 06/14/2010

Problem Evaluation Reports

PER 382103, NRC ID'D: Weld evaluation of lugs for pipe support calculation 742RHRR213 Rev. 1 was not conservative, status date 09/01/2011

Miscellaneous

Revised Engineering Complete PP-19 Closure Package for CDR 391/84-17, 07/17/2012

OA.1.15 (Closed) Construction Deficiency Report 391/86-33: Support Spans on 1/2” Schedule 40 Stainless Steel Piping with Concentrated weights Less than 25 Pounds (Inspection Procedure 35007, 50090, 46071 and Temporary Instruction 2512/023)

Drawings

47A051-1F, Mechanical Category I Supports Instr Sensing Lines, Rev. 2, 04/11/1988
 47A052-1D, Mechanical Category I Supports Instr Sampling Lines, Rev. 2, 05/20/1986
 47A054-1D, Mechanical Category I SPRT Control Air Lines, Rev. 4, 09/27/1985

Calculations

WCG-2-615, WBN2 Seismic Category I & I(L) Instrument and Controls (I&C) Tubing Walkthrough Scope Definitions by Flow Diagrams, Rev. 01
 WCG-2-904, WBN2 Seismic Category I and I(L) Instruments and Controls Outlier Resolution, Rev. 002, 12/06/2011
 WCG-2-905, WBN2 Seismic Category I and I(L) Instruments and Controls – Program Closure Summary Calculation, Rev. 000, 10/24/2011

Miscellaneous

Engineering Complete PP-19 Closure Package, for CDR 391/836-33, dated 03/07/2012
 WBN Design Criteria Document WB-DC-20-32, Integrated Interaction Program Screening and Acceptance Criteria, Rev. 5
 Final Report for WBRD-50-391/86-33, R.L. Gridley (Manager of Licensing) to Dr. J. Nelson Grace (Regional Administrator), 04/03/1986

OA.1.17 (Closed) Notice of Violation 05000391/2012612-01: Failure to Correct a Condition Adverse to Quality Associated with Containment Spray Pump Layup and Preventive Maintenance (Inspection Procedures 92702, 50075, and 52055)

PER 460344, QA Identified Lack of Tracking Incomplete Refurbishment
 PER 491432, QA Identified Lack of Documentation of Pipe Surface Assessment
 PER 548402, QA Identified Deficiencies in Documentation of Refurbishment Work Performed
 PER 555958, QA Identified Incomplete Documentation of Refurbishment Activities
 PER 572385, QA Identified Loose Flange Bolting
 PER 565419, Correct Implementation of FCR 58311 is Indeterminate

OA.1.18 (Closed) Three Mile Island (TMI) II.E.1.1: Auxiliary Feedwater (AFW) System Evaluation, Modifications (IP 50073 and 50075)

05000390/2010006, NRC Component Design Basis Inspection, 06/2010
 NRC Safety Evaluation Report, 06/1982
 EPMJAF112091, AFW Failure Modes and Affects Analysis, Rev. 10
 HCTGBG091981, Design Parameters for Motor and Turbine Driven AFW Pumps, Rev. 9

OA.1.19 CDR 390/91-12: Undersized Component Cooling System Instrumentation for Reactor Coolant Pump Thermal Barriers

Closure Package

Open Item/Commitment Completion Item 144226, Undersized Component Cooling System Instrumentation for Reactor Coolant Pump Thermal Barriers

EDCRs

EDCR 53392, Rev. A, Install Instrument Panels 2-L-191-A and B and Associated Instrument Lines, dated 11/10/2009

EDCR 53645, Rev. A, Inspect/Install Local Panels 2-L-351-A and B, dated 1/28/2010
 EDCR 53676, Rev. A, Install Instrument Panels 2-L-271, 263, 560, and 561 and Associated Instrument Lines, dated 1/26/2010
 EDCR 53393, Rev. A, Install Instruments on Panels 2-L-185B and C and Associated Instrument Lines, dated 9/24/2009
 EDCR 53611, Rev. A, Install Instrument Lines and Instruments for Local Panels 2-L-174, 175A, 176, and 177, dated 12/10/2009
 EDCR 54154, Rev. A, Terminate Cables on Various I&C Local Panels, dated 4/7/2010

Miscellaneous

25402-011-MRA-JP02-00008, Data Sheet 10, Differential Pressure Transmitter (Electronic)
 25402-011-MRA-JP02-00008, Data Sheet 12, Differential Pressure Transmitter (Electronic)
 WO 09-954326-028, EDCR 53392, completed 1/25/2011
 WO 09-954326-029, EDCR 53392, completed 6/2/2011
 WO 09-954583-014, EDCR 53611, completed 11/30/2010
 WO 10-951301-001, EDCR 53676, completed 11/8/2010
 WO 110882624, EDCR 54154, completed 4/11/2011
 WO 110883278, EDCR 54154, completed 6/10/2011
 WO 110884245, EDCR 54154, completed 3/31/2011

OA.1.20 TMI Action NUREG 0737 Item II.G.1 Power Supplies for Pressurizer Relief Valves, Block Valves, and Level Indicators

Closure Package

Open Item/Commitment Completion Form NGDC PP-19-2 tracking numbers NCO850045002 and NCO820253051 Final Closure Package documentation.

Specifications

General Engineering Specification G-40 "Installation, Modification and Maintenance of Electrical Conduit, Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting and Miscellaneous Systems," Rev. 16.

Drawings

2-45W751-3 R3, Unit 2 – Wiring Diagrams / 480V REAC MOV BD 2A1-A – Single Line SH-3.
 2-45W751-8 R1, Unit 2 – Wiring Diagrams / 480V REAC MOV BDS 2B1-B – Single Line SH-2.
 2-45W600-68-1 R4, Unit 2 – Wiring Diagram / Reactor Coolant System – Schematic Diagrams.
 2-45W760-68-5 R3, Unit 2 – Wiring Diagram / Reactor Coolant System – Schematic Diagrams.
 45N2643-6 R6, Unit 2 – Wiring Diagrams / Unit Control Board – Panel 2-M-4 Connection Diagrams-Sheet 6
 45N2643-7 R6, Unit 2 – Wiring Diagrams / Unit Control Board – Panel 2-M-4 Connection Diagrams-Sheet 7
 45N2661-1 R8, Unit 2 – Wiring Diagram / Reactor Protection Set I Connection Diagrams-Sheet 1
 45N2662-1 R7, Unit 2 – Wiring Diagram / Reactor Protection Set II Connection Diagrams-Sheet 1
 45N2663-1 R0, Unit 2 – Wiring Diagram / Reactor Protection Set III Connection Diagrams-Sheet 1
 45N2643-7 R0, Unit 2 – Wiring Diagram / Unit Control Board – Panel 2-M-4 Connection Diagrams – Sheet 7
 1-15E500-2, R39 dated 10/7/2009, Key Diagram – Station Aux Power System.

Miscellaneous

WB-DC-30-4 Watts Bar Design Criteria – Separation / Isolation

WB-DC-30-7 Watts Bar Design Criteria – Post Accident Monitoring Instrumentation Integrated Cable & Raceway Design System (ICRDS) Raceway Standard Report for Conduit 2VC2013A dated 9/26/2012.
ICRDS Cable Standard Report for cable 2V2456A dated 9/26/2012.

OA.1.21 Damaged Electrical Cable in Conduit due to Pullbys. (CDR 89-07)

Closure Package

OPEN ITEMS/COMMITMENT COMPLETION FORM NGDC PP-19-2 with tracking number PER 144111

Calculations

Calculation WBN-EEB-EDQ00299920080021 Rev. 0 Appendix 9.1

Miscellaneous

ICRDS Raceway Standard Report for conduit 2PM6474D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM516D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM518D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM606D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM696D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM791D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM881D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM1314D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM1454D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM1573D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PM1694D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PS282D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PS283D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PS284D dated 9/25/2012.
ICRDS Cable Standard Report for cable 2PS285D dated 9/25/2012.

OA.1.22 (Closed) URI-05000391/2011603-03, Corrective Actions associated with Adverse Conditions in Motor Control Center Buckets

Reports

25402-011-V1A-ECM1-01216-002 - Trentec MCC Buckets – ECM1/ Sqrts Reports Seismic Test Report for an 18” Trentec Motor Control Center Compartment Assembly S9028.1 R4, Dated 9/20/2010.
25402-011-V1A-ECM1-00882-010 - Trentec MCC Buckets – ECM1/ Seismic Equivalency Analysis for Trentec Replacement Buckets and TVA Watts Bar 11 ITE/Telemecanique 1E Buckets. Report No. L9001.S1, Revs. 4 & 8.
Sampling Inspection of MCC Bucket Resistance Spot Welds for Replacement Buckets from Qualtech NP, Dated 6/28/2012.

Calculations

WCG-ACQ-1131 Rev. 001 – In-Cabinet Required Response Spectra for MCC ‘Buckets’ in Safety Related 480 Volt Motor Control Center Boards, Dated 11/21/2011.
WCG-ACQ-0446 Rev. 3 – Seismic Qualification of 480V Reactor MOV Boards for Added Mass per EDCR 53288 and 53292

Procedures

NC PP-13, NRC Reporting Requirements, Rev. 3, Dated 4/12/2012
Project Procedure 25402-000-GPP-000-N6104 Materials Receiving, Rev. 008, Dated 5/7/2012.

Miscellaneous Documents

Field Change Request 57420-A Existing MCC Buckets to be replaced per EDCR-53288, Dated 2/10/2011.

Engineering Document Construction Release (EDCR-2) No. 53288, Rev. A, Replace Safety Related, Class 1E Motor Control Center (MCC) buckets.

Supplier Deviation Disposition Request (SDDR) 25402-011-YDA-ECM1-00037-001 Trentec MCC Buckets ECM1 / SDDR-L9001TE-4 &15, Dated 06/06/2012. (Technical justification for taking exception to the American Welding Society (AWS) D1.3 Structural Welding Code – Sheet Steel and using the Miller Handbook).

Supplier Deviation Disposition Request (SDDR) 25402-011-YDA-ECM1-00035-001 Trentec MCC Buckets ECM1 / SDDR-L9001TE-14, Dated 02/15/2012. (Proposed resolution for Trentec's Non-conformance Report (NCR) 10-53 for seismic testing of individual bucket components by testing and justify the structural sheet metal by similarity to original TE5600 bucket design).

Qualtech (Trentec) Effectiveness Review Summary (PER 243820-002), Dated 01/18/2011.

Miller Handbook for Resistance Spot Welding 003 335C, Dated 2010-04

Trentec IOM # L9001 TE vendor manual for replacement buckets

TR-42926-1 Seismic Simulation Test Program on Motor Control Center, Dated 5/15/1975

Problem Evaluation Reports (PERs)

PER 241599 - July 28, 2010

PER 243820 - August 11, 2010

PER 299689 - December 20, 2010

PER 321192 - February 9, 2011

PER 323458 - February 14, 2011

PER 307059 – January 10, 2011

PER 338337 – March 11, 2011

PER 338420 – March 14, 2011

PER 278291 - November 4, 2010

PER 362614 - April 28, 2011

PER 415814 – August 10, 2011

PER 442574 - October 3, 2011

PER 244483 - August 16, 2010

PER 343545 - March 23, 2011

PER 323366 - February 14, 2011

PER 321192 – February 9, 2011

PER 501176 – February 3, 2012

PER 538778 – April 19, 2012

PER 501739 – February 2, 2012

PER 501704 – February 2, 2012

OA.1.23 (Closed) Violation (VIO) 2010603-08: Failure to Adequately Evaluate and Qualify Molded Case Circuit Breakers (IP 92702)

SR 612568 dated 9/20/2012, NRC observed that work in the 120 VAC vital instrument power boards appeared to place the boards in a configuration not fully supported by seismic qualification test reports.

WO113821953 rev1, work order to replace 8 sections of 1 ¼" X 1 ¼" angle and spacers in 1-BD-253-0003-F IAW DCN 59132-A.

Change Request 60178 dated 9/20/2012, reword DCA to change backer angle bolting method.

WCG-ACQ-0588 dated 9/14/2012, calculation for STERI evaluation of replacement Heinemann CF2-Z51-1 circuit breakers and associated mounting hardware in 120 VAC Vital instrument Power Boards for DCN 59132A.

WCG-ACQ-0587 rev3 dated 7/16/2012, In-Cabinet Required Response Spectra (RRS) for Heinemann Circuit Breakers in WBN 120V AC Vital Instrument Power Boards.
 DCN 59132A dated 4/19/2012, design output which will ensure Heinemann circuit breakers on the WBN Unit 1 and Unit 2 120 VAC Vital Instrument Power Boards (Equipment IDs above) are installed and maintained in a seismically qualified configuration.
 S1123.0 rev1 procedure dated 9/2/2011, Seismic qualification test procedure for Heinemann circuit breakers with attached electrical bus bar.
 S1123.0 rev1 test report dated 10/11/2011, Seismic qualification test report for Heinemann circuit breakers with attached electrical bus bar.
 S1209.0 rev1 procedure 3/13/2012, Seismic qualification test procedure for Heinemann circuit breakers with attached electrical bus bar.
 S1209.0 rev1 test report dated 4/18/2012, Seismic qualification test report for Heinemann circuit breakers with attached electrical bus bar.

LIST OF ACRONYMS

AFW	Auxiliary Feedwater
ASME	American Society of Mechanical Engineers
B&PV	Boiler & Pressure Vessel
BL	Bulletin
CAP	Corrective Action Program
CAQR	Condition Adverse to Quality Report
CATD	Corrective Action Tracking Document
CCMRC	Construction Completion Management Review Committee
CDB	Component Design Basis
CDR	Construction Deficiency Report
CFR	Cod of Federal Regulations
DCN	Design Change Notice
DR	Discrepancy Reports
DRA	Drawing Revision Authorization
ECN	Engineering Change Notice
EDCR	Engineering Document Construction Release
ERCW	Essential Raw Cooling Water
FSAR	Final Safety Analysis Report
HAAUP	Hanger and Analysis Update Program
HRC	Rockwell Hardness
ICRDS	Integrated Cable and Raceway Design System
IFI	Inspection Follow-up Item
IMC	Inspection Manual Chapter
IP	Inspection Procedure (NRC)
IR	Inspection Report
LER	Licensee Event Report
LSWD	Limited Scope Walkdown
LUPM	Layup and Preventive Maintenance
MAI	Modification and Addition Instruction
MCC	Motor Control Center
MCCBs	Molded Case Circuit Breakers
MOV	Motor-Operated Valve
NCR	Non-Conformance Report
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
NRR	NRC Office of Nuclear Reactor Regulation

NOV	Notice of Violation
PER	Problem Evaluation Report
PF	Purchase Specification
PH	Precipitation Hardening
PORV	Power Operated Relief Valve
PRC	Project Review Committee
QA	Quality Assurance
QC	Quality Control
RCS	Reactor Coolant System
Rev.	Revision
RRS	Required Response Spectra
RVHVS	Reactor Vessel Head Vent System
SCC	Stress Corrosion Cracking
SCR	Significant Condition Report
SCWE	Safety Conscious Work Environment
SER	Safety Evaluation Report
SL	Severity Level
SP	Special Program
SR	Service Request
SS	Stainless Steel
SSC	structure, system, or component
SSD	Expansion Shell Anchors
SSER	Supplemental Safety Evaluation Report
TI	Temporary Instruction
TMI	Three Mile Island
TVA	Tennessee Valley Authority
URI	Unresolved Item
UT	Ultrasonic Testing
UVA	Unverified Assumptions
VI	Visual Inspections
VLF	Very Low Frequency
VSR	Vertical Slice Review
WBN	Watts Bar Nuclear Plant
WO	Work Order