



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
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March 27, 2012

Mr. Michael D. Skaggs  
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SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2012602

Dear Mr. Skaggs:

On February 18, 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 March 2, 2012, with Mr. Hruby 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 one NRC-identified finding which was determined to involve a violation of NRC requirements. However, because this finding was a Severity Level IV violation and was entered into your corrective action program, the NRC is treating it as a non-cited violation (NCV) consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest the 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/**

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

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

Enclosure: Inspection Report 05000391/2012602 w/Attachment

cc w/encl: (See next page)

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Letter to Michael D. Skaggs from Robert C. Haag dated March 27, 2012.

SUBJECT: WBN NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED  
INSPECTION REPORT 05000391/2012602

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2012602

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: 1260 Nuclear Plant Rd  
Spring City TN 37381

Dates: January 1 – February 18, 2012

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

Enclosure

## **EXECUTIVE SUMMARY**

### **Watts Bar Nuclear Plant, Unit 2**

This integrated inspection included aspects of engineering and construction activities performed by TVA associated with the Watts Bar Nuclear (WBN) Plant Unit 2 construction project. This report covered a seven-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. 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**

- A Severity Level (SL) IV non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the inspectors for failure to implement measures to assure that conditions adverse to quality were promptly identified and corrected. Specifically, the applicant failed to ensure that issues, identified by NRC inspectors and provided to the applicant more than nine months prior, had been evaluated for conditions adverse to quality and, if necessary, that they were promptly identified and corrected. (Section OA.1.7)
- The inspectors concluded that concerns pertaining to several open items, including Unit 2 Corrective Action Programs (CAPs), Temporary Instructions (TIs), Unresolved Items (URIs), NCVs, NRC Bulletins (BL), Generic Letters (GL), Inspector Follow-up Items (IFI), 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; Special Programs (SPs); nondestructive examination (NDE); NRC BLs; CDRs, pre-operational testing 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 (QA) PROGRAM**

### **Q.1 QA Oversight Activities**

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

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

During this inspection period, the inspectors continued to review problem evaluation reports (PERs), as part of the applicant's corrective action program, to verify that issues being identified under the corrective action program were being properly identified, addressed, and resolved by the applicant. In addition, the inspectors reviewed a QA assessment of the refurbishment program, Assessment Report NGDC-WB-11-015. This was performed to ensure the applicant's assessment was thorough and that necessary corrective actions were initiated.

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

No findings of significance were identified. The QA assessment was thorough and resulted in findings related to a lack of clarity, relative to some expectations for refurbishment inspections, and multiple examples of refurbishment work that was not accomplished as expected. These issues involved the refurbishment, field engineering, and planning groups. PERs were appropriately initiated; however, development of corrective actions was still in progress. The applicant indicated that a broad integrated review for corrective actions would be performed.

##### **c. Conclusions**

Generally, the issues identified in the PERs and QA assessment were properly identified, addressed, and resolved.

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

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

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

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

During the inspection period, the inspectors independently assessed applicant controls, associated with Unit 2 construction work activities, to prevent adverse impact on Unit 1 operational safety. The inspectors attended routine Unit 1/Unit 2 interface meetings to

assess the exchange and sharing of information between the two site organizations. Periodic construction and planning meetings were observed to assess the adequacy of the applicant's efforts to identify those construction activities that could potentially impact the operating unit. This included the review of selected work activities which the applicant had screened as not affecting Unit 1 to verify the adequacy of that screening effort. Additionally, the inspectors independently assessed selected construction activities to verify that potential impacts on the operating unit had been identified and adequately characterized with appropriate management strategies planned for implementation. Furthermore, the inspectors performed independent 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) 111234759, involving the hydrostatic testing of unqualified portions of the common component cooling water (CCS) system.
- WO 111874488, involving the heavy lift of the containment spray (CS) heat exchanger over the spent fuel pool while fuel was present and Unit 1 was operational.

b. Observations and Findings

No findings of significance 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 Piping – Work Observation (IPs 49063 and 37002)**

a. Inspection Scope

The inspectors observed work activities associated with the construction refurbishment and acceptance of safety-related piping systems and passive components within the Component Cooling System (CCS). The inspectors reviewed the work instructions and procedures to verify that they identified requirements and provisions for ensuring that the material condition of accessible portions of piping systems was evaluated and documented prior to final assembly of associated components. The inspectors observed activities to ensure that personnel were adequately qualified for the roles they performed, that procedures detailed necessary actions, and the procedures were followed by the craft. The inspectors also observed activities to verify that work activities promptly identified any failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances in safety or quality-related systems, structures, and components (SSCs), and that material identification and control measures were in place and appropriately implemented. Additional documents reviewed are listed in the Attachment.

The following area was inspected:

- Hydrostatic testing of Unit 2 portions of the CCS

The following sample was inspected:

- IP 49063 Section 02.02 - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Hydrostatic testing was performed per the associated WO and test package instructions.

**C.1.3 CS Heat Exchanger Replacement – Work Observation (IPs 49063 and 50073)**

a. Inspection Scope

The inspectors observed the removal and reinstallation of the 2A CS heat exchanger. The inspectors had previously observed the receipt inspection of the replacement heat exchanger (see integrated inspection report (IIR) 05000391/2011610, Section C.1.6). The inspectors observed storage, handling, and protection of the new heat exchanger to ensure that foreign material exclusion (FME) covers were installed as required, critical surfaces were protected throughout the handling evolution, and that required inspections were performed. The inspectors reviewed the proposed lift route, to include basis documentation, organizational briefing packages, crane pre-check and surveillance documentation, path obstructions, and planned lift safety verification points. The inspectors observed the installation of the new heat exchanger to include verification of adequate measures of protection for the 41-ton heavy lift. This included training and qualification of operators, proper orientation and placement, preparation of seating surfaces and gasket placement, adherence to hold points, torque application of fasteners, and the quick turn-around processing of a needed field change revision to accept damage found on a flanged face. Additional documents reviewed are listed in the Attachment.

The following sample was inspected:

- IP 50073 Section 02.02.b – one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspected activities associated with the removal and replacement of the CS heat exchangers and their associated records were adequate. All observed activities were accomplished in accordance with applicable procedures.

#### **C.1.4 Reactor Coolant Pressure Boundary Piping – Work Observation (IP 49053)**

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

The inspectors observed foreign object search and removal (FOSAR) activities associated with Steam Generator 2. The inspectors reviewed the WO controlling these activities (WO 112735992) to verify that the WO appropriately addressed the potential loose parts (PLPs) identified by previous eddy current testing and visual examination as documented in PERs 281268 and 216972. The inspectors observed several in-process activities including tube cutting, pulling, and plugging. The inspectors reviewed activities to verify that the applicant adequately performed quality control (QC) inspection and work performance verification using qualified personnel. The inspectors also inspected applicant activities to verify that appropriate controls were in place for the use of special materials and tools. Additional documents reviewed are listed in the Attachment.

The following samples were inspected:

- IP 49053 02.01- two samples

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

No findings of significance were identified.

##### **c. Conclusions**

Steam generator tube cutting, pulling, and plugging activities observed were conducted in accordance with site procedures.

#### **C.1.5 In-service Inspection (ISI) – Review of Program (IP 73051), and ISI Inspection – Review of Procedures (IP 73052)**

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

The inspectors reviewed the most recent revision of the WB2 Pre-Service Inspection (PSI) Program Plan, Revision (Rev.) 5, and conducted interviews with the PSI program manager and PSI coordinator to ensure compliance with the requirements of American Society of Mechanical Engineers (ASME) Section XI (2001 edition through the 2003 addenda), 10CFR50.55a, and additional commitments made to the NRC. Portions of the PSI program continued to be developed; for example, ASME Section XI, subsection IWL examinations for the containment vessel, and subsection IWF for supports; and were, therefore, unavailable for inspection. Additional documents reviewed are listed in the Attachment.

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

No findings of significance were identified.

##### **c. Conclusions**

The review of the WB2 PSI Program Plan did not reveal any failures to comply with regulatory requirements or commitments.

### **C.1.6 Pre-service Inspection – Observation of Work and Work Activities (IP 73053)**

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

The inspectors reviewed the WB2 PSI Program Plan, Rev. 5, to confirm that a sample of the items being examined, the methods of examination, and the extent of examinations met the requirements of ASME Section XI, 10 CFR 50.55a, and the Final Safety Analysis Report (FSAR). The inspectors also conducted a walkdown of the pressurizer spray line and connecting piping to the Loop 1 and Loop 2 cold legs to ensure ASME Class 1 welds were captured in the ISI program, appropriately categorized, and that appropriate examinations were either conducted or scheduled to be conducted. Per the 2001 edition through 2003 addenda of ASME Section XI, system leakage and hydrostatic tests are not a part of PSI. Additional documents reviewed are listed in the Attachment.

The inspectors performed the following sample:

- IP 73053 02.01 – one sample

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

No findings of significance were identified.

#### **c. Conclusions**

For the samples reviewed, the PSI Program and Plan had been implemented as required by ASME Section XI, 10 CFR 50.55a, and the FSAR.

### **C.1.7 Electrical Components and Systems – Work Observation (IP 51053)**

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

The inspectors inspected the in-process installation of safety-related conduit 2VC9650B for System 292 (raceway systems within the auxiliary building) and System 74 (residual heat removal system (RHR)). The work was conducted inside the auxiliary building ventilation room A9 at elevation 737'. The inspectors reviewed WO 112859275 contained in Engineering Document Construction Release (EDCR) 54633 to verify that work done was in compliance with the latest revision of Modification and Addition Instructions (MAI) 3.1 and 5.1. The inspectors inspected the mounting hardware for the conduit supports, train identification (brown tape and tags), separation fittings (to verify required spacing with other redundant train conduits), sealing conduit fittings (to verify boundary integrity at wall penetrations), and pull fittings (to verify control of raceway total bend degree below 360).

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

No findings of significance were identified.

#### **c. Conclusions**

The inspectors concluded that the observed conduit installation activities satisfied procedural requirements.

**C.1.8 Electrical Cable – Records Review (IP 51065)****a. Inspection Scope**

The inspectors conducted inspections of engineering documents regarding the design and installation of the feeder connecting the 2B-B emergency diesel generator (EDG) to the 2B-B 6.9 kV shutdown board to determine whether NRC requirements, applicant commitments, and testing requirements were adequately met. The inspectors reviewed a TVA letter to the NRC, dated January 5, 1995, identifying elements of the testing performed in late 1994 on the 2A-A EDG to measure the load current split between different sized conductors. The aspects of the installation covered by the inspection included cable splices and terminations, separation, documentation of completed installation, and cable testing. Additional documents reviewed are listed in the Attachment.

**b. Observations and Findings**

No findings of significance were identified.

**c. Conclusions**

Design documents reviewed adequately evaluated the appropriate aspects of the feeder installation. The inspectors determined that calculations, developed by the applicant to assess the distribution of current between the conductors in this configuration, were appropriate. In addition, calculations were developed to include the effects of splices in the feeders. The calculated loads were within the cable continuous rating and the test results provided validation of the EDG feeder installation adequacy. The design and installation of the EDG safety-related feeders met all applicable requirements.

**C.1.9 Instrument Components and Systems - Procedure Review (IP 52051)****a. Inspection Scope**

The inspectors reviewed a work procedure for instrument and instrument line installation, with respect to applicable requirements, to ensure that FSAR commitments were properly implemented into the work procedure for adequate control and installation of instrument slope lines. The document reviewed was N3E-934, "Instrument and Instrument Line Installation and Inspection," dated October 18, 2003. The inspectors assessed the procedure to ensure that a process was in place that required each safety-related slope to go through a QC inspection, in order to make sure that slope requirements were met. The inspectors reviewed the corrective action section for instrument line slope deviations to ensure that deviations from requirements were adequately approved.

**b. Observations and Findings**

No findings of significance were identified.

**c. Conclusion**

The inspectors concluded that the slope criteria included in the procedure met applicable requirements.



## **P.1 Pre-Operational Activities**

### **P.1.1 Preoperational Test Procedure Review (IP 70300)**

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

The inspectors reviewed pre-operational test 2-PTI-099-04, "Safeguards System," Rev. 0000, to verify that the title described the purpose of the procedure, the cover page had appropriate information, each page had appropriate identification information, and the last page was clearly identifiable by marking. The inspectors reviewed the procedure to verify that it had a statement purpose section that clearly specified the function it performed and a job planning section preceding the instructions. The inspectors also reviewed the procedure to verify that precautions or explanations were placed immediately ahead of the steps to which they applied.

The following samples were inspected:

- IP 70300 02.01- one sample
- IP 70300 02.02- one sample
- IP 70300 02.03- one sample
- IP 70300 02.04- one sample
- IP 70300 02.05- one sample
- IP 70300 02.06- one sample
- IP 70300 02.11- one sample

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

No findings of significance were identified.

#### **c. Conclusion**

No conclusions can be made at this time. Additional inspection effort will be required in reviewing this preoperational test.

### **P.1.2 Preoperational Test Procedure Review (IPs 70300 and 70339)**

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

The objectives of this inspection were to review a preoperational test procedure to verify it met the good practice standards described in IP 70300 and to verify that the acceptance criteria met design requirements. The procedure reviewed was 2-PTI-070-01, "Component Cooling Water Pump/Valve Logic Test," Rev. 0. This inspection included a detailed step-by-step review of a valve test section and a pump test section with the test engineer. The good practice attributes reviewed included items such as cover page information, approvals, and page numbering; clear statement of objectives; planning information such as prerequisites, precautions, required tools, reference documents, and coordination requirements; appropriate QC hold points; signoff requirements including concurrent verification established where appropriate; clear concise steps for testing with action critical (acceptance criteria) steps identified and clear quantitative criteria; adequacy of alignment instructions; clear instructions for system restoration; and guidance for follow-up actions.

b. Observations

No findings of significance were identified. The procedure followed the good practice guidelines. Acceptance criteria met design established parameters. The test engineer demonstrated a thorough knowledge of procedure writing requirements and use of resources for procedure development.

c. Conclusions

The review showed that the applicant has established test procedure guidelines that include acceptable industry practices for test procedures.

#### IV. OTHER ACTIVITIES

##### OA.1.1 (Discussed) Cable Tray and Cable Tray Supports Corrective Action Program (CAP) (Temporary Instruction (TI) 2512/017 and IPs 51061, 48053)

a. Inspection Scope

Background: The Cable Tray and Cable Tray Supports CAP was established to resolve historical issues related to the structural adequacy of Seismic Category I cable trays and their supports. TVA committed to using the same approach used to resolve the Unit 1 CAP although the scope of the Unit 2 CAP only included those cable trays and cable tray supports that were not addressed by the Unit 1 CAP. For those cable trays and their corresponding supports that were determined to be within the scope of the Unit 2 CAP, TVA performed a 100 percent walkdown to determine their as-built configuration. Trays and supports with similar characteristics were grouped and a worst case or “bounding” example was selected and analyzed for each group. Unique trays or supports or those that could not be bounded were analyzed separately. Trays and supports that did not meet seismic requirements or other design criteria were modified accordingly.

Inspection Activities: The inspectors reviewed TVA’s assessment of which cable trays and cable tray supports had already been evaluated under the Unit 1 CAP to verify that areas of the plant were not inappropriately screened out. The inspectors performed walkdowns and reviewed Unit 1 documentation to independently verify that TVA had appropriately defined the Unit 2 CAP scope. Additional documents reviewed are listed in the Attachment.

##### Cable Tray Supports

The inspectors reviewed the applicant’s methodology for grouping and bounding supports and independently performed calculations on a sample of supports to determine whether they had been appropriately characterized by the applicant. The inspectors walked down a sample of supports to verify that their as-installed configuration matched design and construction drawings. A sample of supports that were modified as part of the CAP, were reviewed by the inspectors to verify that modifications were performed in accordance with site procedures and QC requirements.

The following supports were inspected:

- 2-CTSP-293-0020
- 2-CTSP-293-0168

- 2-CTSP-293-0168A
- 2-CTSP-293-0010
- 2-CTSP-293-0159
- 2-CTSP-293-0190
- 2-CTSP-293-0320
- 2-CTSP-293-0337
- 2-CTSP-293-0457
- 2-CTSP-293-0528
- 2-CTSP-293-0477
- 2-CTSP-293-0159A
- 2-CTSP-293-0222B
- 2-CTSP-293-0222C
- 2-CTSP-293-0052
- 2-CTSP-293-0032

The inspectors implemented a smart sampling approach that focused on worst-case supports with low margin. These supports, if found to be acceptable, would bound other supports with equivalent geometry and less adverse loading conditions. The 16 supports sampled enveloped 239 other supports and therefore bounded 255/728 of the overall support population. The inspectors determined this to be a representative sample that provided an accurate indication of overall support acceptability.

#### Cable Trays

The inspectors reviewed the applicant's methodology for grouping and bounding cable trays and independently performed calculations on a sample of trays to determine whether they had been appropriately characterized by the applicant. The inspectors also walked down a sample of trays and noted that, while the applicant had documented deficiencies correctly, field work to repair the deficiencies had not yet been performed. Upon reviewing EDCRs, PERs, WOs, and conducting interviews with applicant and contractor personnel, the inspectors concluded that the applicant had appropriately identified and planned the work needed to complete the cable trays, but that only a small portion of that work had been completed.

The following samples were inspected:

<b>Tray ID (as shown on 45W889)</b>	<b>Beginning Node</b>	<b>End Node</b>
5QA	1911	1912
4QP-A	1932	1952
4QU-B	1933	1934
2QA	1937	1938
2QE	1953	1942
2QB	1954	1930
1QA	1930	1924
1QB	1931	1916
4QV	1941	1942
5QA	1911	1912
3QE	1935	1945

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Cable Tray Supports

The inspectors reviewed the applicant's final closure package and concluded that reasonable assurance exists that the programmatic aspects of the CAP, related to cable tray supports, have been adequately implemented by TVA. Field work on the cable tray supports is essentially complete and the inspectors observed that work in this area complied with regulatory requirements and applicant commitments. Therefore, aspects of this CAP, related to cable tray supports, are considered closed; however, future inspection may be performed if needed.

Cable Trays

Although the inspectors were able to verify that TVA had appropriately bounded and grouped cable trays and identified deficiencies, field work needed to resolve those deficiencies was not complete at the time of this inspection. The inspectors determined that further inspection will be needed to verify that work has been adequately performed to physically resolve the cable tray deficiencies identified by the CAP.

**OA.1.2 (Discussed) NRC Bulletin (BL) 88-05: Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey (IP 92717)**

a. Inspection Scope

The inspectors observed performance of hardness testing on a sample of four flanges associated with BL 88-05, interviewed associated engineers, and reviewed N-GP-24, "Hardness Testing," Rev. 0005. The flanges tested were FE-1-152 at welds number 27 and 28, and FE-1-164 at welds number 19 and 20 from System 15, Steam Generator Blowdown. Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that the observed hardness testing met the requirements of the licensee's procedures and 10CFR50, Appendix (App) B.

**OA.1.3 (Discussed) Non-Cited Violation (NCV) 05000391/2011604-02: Failure to Maintain Adequate Design Specifications (IP 92702)**

a. Inspection Scope

Background: As described in NRC IIR 05000391/2011604, the inspectors opened this NCV to document a deficiency with the applicant's design specifications related to

material requirements for check valves. In response to BL 89-02, the applicant developed a list of prohibited materials for internal shafts, pins, and bolting in check valves similar in design to the Anchor darling model S350W valve. The inspectors determined that the applicant failed to incorporate those material requirements into the current design specifications for ASME class 1, 2, and 3 valves. The applicant entered this issue into their corrective action program as PER 356559.

Inspection Activities: The inspectors reviewed PER 356559 to determine if the applicant appropriately identified, evaluated, and resolved the concern in a timely manner. The inspectors assessed whether the applicant assessed generic implications and whether applicable programs and practices were enhanced, where appropriate. Specifically, the inspectors reviewed design specifications covering all ASME class 1, 2, and 3 check valves (WBNP-DS-501433-0904, WBNP-DS-501433-0905, WBNP-DS-501433-0914, G-678853, and 678970) to determine if the appropriate technical requirements were included in the specifications to preclude the procurement of valves with prohibited materials. Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified. The applicant incorporated the material requirements into design specifications WBNP-DS-501433-0904, WBNP-DS-501433-0905, and WBNP-DS-501433-0914. Design specifications G-678853 and 678970, which were vendor design specifications, did not include the applicant's material requirements for internal shafts, pins, or bolting. Although the check valves related to these two specifications did not utilize internal bolting, they did utilize internal shafts and/or pins. Therefore, the applicant initiated corrective action no. 11 to PER 356559 to revise procurement procedures to address the applicant's material requirements for safety-related check valves. This NCV will remain open pending the inspectors' review of the applicant's corrective actions to address these material requirements for check valves procured using specifications G-678853 or 678970.

c. Conclusions

Based on the activities reviewed, the inspectors concluded that additional inspection activities are required to close this NCV.

**OA.1.4 (Discussed) NRC BL 89-02: Stress Corrosion Cracking of High-Hardness Type 410 Stainless Steel Internal Preloaded Bolting in Anchor Darling Model S350W Swing Check valves or Valves of Similar Design (IP 92717)**

a. Inspection Scope

The inspectors reviewed the applicant's response to BL 89-02 in a letter dated April 25, 1990. In that response, the applicant committed to replacing suspect bolting or pins with bolting or pins of an acceptable material for all Unit 2 safety-related swing check valves that were designed similarly to the Anchor darling model S350W valve. The inspectors reviewed the applicant's actions to address BL 89-02 to determine if those actions were consistent with their commitments to BL 89-02.

As described in NRC IIRs 05000391/2010605 and 05000391/2011604, the inspectors previously inspected the applicant's review of all applicable check valves as well as field implementation of the applicable EDCRs.

As described in Section OA.1.3 of this report, the inspectors reviewed applicable design specifications to determine if the appropriate technical requirements were included to preclude the procurement of valves with prohibited materials.

b. Observations and Findings

No findings of significance were identified. As described in Section OA.1.3 of this report, this BL will remain open pending the inspectors' review of the applicant's corrective actions to address the material requirements for check valves procured using specifications G-678853 or 678970.

c. Conclusions

Based on the activities reviewed, the inspectors concluded that additional inspection activities are required to close this BL.

**OA.1.5 (Discussed) Construction Deficiency Report (CDR) 391/82-76 and Electrical Cable Issues CAP – Sub-issue: Cable Bend Radius Deficiencies (IP 51063)**

a. Inspection Scope

The inspectors reviewed TVA's engineering complete closure package to ensure that proposed actions would satisfy the concerns identified in CDR 391/82-76. Specifically, EDCR 55121 was reviewed because it encompassed issues that the applicant identified through walkdowns, which consisted primarily of circumstances where bend radius problems have been identified in the past. These issues of concern were identified as installation of cable in tight condulets and pull boxes or where cables were installed and spliced in constricted spaces.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

All documentation developed was adequate and properly detailed. Previous inspection efforts have reviewed field installation techniques, but additional observations of field installation are needed prior to closure to this CAP sub-issue and CDR.

**OA.1.6 (Discussed) CDR 391/85-37: Use of AMP – PIDG Type Lugs on Solid Wire. (IP 51053)**

a. Inspection Scope

The inspectors conducted a visual inspection inside panel L110-A, located in the Unit 2 Auxiliary Control Room, to verify that AMP PIDG cable lugs were installed only on stranded type wires. The lugs in question were associated with the cables from selector switches XS-63-77, XS-63-115, XS-63-127, and XS-63-130 to the terminal blocks inside the panel. The inspectors reviewed WOs 111219656 and 111080999 to identify any completed work covered by the CDR. The inspectors reviewed EDCR 53580 to determine the extent of conditions and the type of work that was performed.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors verified that the AMP PIDG lugs were used with stranded wires for the scope of WOs under review. Continued inspection is required to assess the applicant's scoping and extent of conditions for this CDR.

**OA.1.7 (Discussed) Unresolved Item (URI) 05000391/2011603-03: Corrective Actions Associated with Adverse Conditions in Motor Control Center (MCC) Buckets (IP 92701)**

a. Inspection Scope

Background: In February 2011, NRC inspectors identified quality issues in safety-related MCC replacement components while observing their ongoing installation. The inspectors documented the issues in URI 05000391/2011603-03. The URI issues are summarized below:

1. The inspectors identified both wiring and foreign material issues during the installation observations. The inspectors found that the installation team and preoperational startup testing team had been identifying similar issues. The applicant's actions had removed these procedure steps from the installation team's WOs to minimize the duplication of efforts between the two teams. The inspectors questioned the applicant's evaluation of this issue.
2. The applicant's receiving records did not identify the welding standards used for the MCC components, and it was not clear to the inspectors what welding specifications were utilized by the vendor.
3. The inspectors identified a deviation from the purchasing specification; where seismic qualification by testing was specified but instead a seismic equivalency analysis was used to credit the original MCC seismic qualification testing. The receiving documentation did not include the required supplier deviation disposition request (SDDR), as required by PO 78698, Rev. 0, for evaluation and approval of changes such as seismic qualification method and the use of weaker sheet metal in the MCC buckets.
4. The inspectors observed that the receiving procedures did not identify non-conformances such as wiring issues and foreign material or purchasing specification deviations. The inspectors needed to review the criteria used for receipt inspection.
5. A reportability evaluation letter issued by the vendor did not fully address the issues in the MCC components that had been installed into the plant. The vendor stated in the letter that because such (quality) issues are common in reverse engineering and that since no formal prototyping process was in place to capture them (quality issues) prior to the applicant receiving the components, that 10CFR21 (Part 21) did not apply. The inspectors questioned this evaluation.

The inspectors concluded that in order to close the issues outlined in this URI, the applicant would have to demonstrate that they had either properly resolved the issues or

had pending actions to resolve the issues. Subsequently, the applicant indicated that they had completed the corrective actions for this URI, and therefore could demonstrate that they had complied with NRC regulations.

Inspection Activities: The current inspection focused on the applicant's actions to address URI 05000391/2011603-03. The inspectors interviewed responsible engineering personnel and reviewed documents and records associated with the MCC replacement components. The inspectors reviewed the PERs associated with the corrective actions taken to correct the issues identified in the URI. Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

Observations

The inspectors determined that the applicant corrective actions addressed the foreign material item from URI Issue 1. The inspectors determined that PER 321192, written to identify and correct the foreign material found in the MCC components, had changed the organizational responsibilities for cleanliness inspection from Purchasing to QC. The inspectors consider those actions adequate.

The inspectors determined that PER 323458, written to identify and correct an issue with lugged and non-lugged wires under the same compression plate identified by the preoperational startup team, did not address the similar inspector-identified vendor wiring condition. The applicant indicated during the previous inspection that PER 323458 would address the NRC-identified issue but instead it only identified previous field wiring issues created during installation. The inspectors had also questioned the removal of steps from the installation WOs used to verify manufacturing quality prior to the installation of the MCC replacement components, but could not find evidence during the current inspection that the applicant addressed the concern.

During this inspection, the inspectors identified additional concerns stemming from the review of the information surrounding URI Issue 2. The inspectors determined that TVA purchasing specifications designated American Welding Society (AWS) standard D1.3 as the required standard for spot welding. The vendor stated in proposal letter PT9389EL Rev. 2, that they anticipated that welding would be spot welding for which AWS standards do not apply. The inspectors found no evidence of a formal technical evaluation or approval of this change. The inspectors found no evidence that the applicant receiving inspections identified that the changes occurred (URI Issue 4). Subsequently, the inspectors have determined that the vendor contracted a commercial fabrication shop to build the MCC component frames. The fabrication shop used the welding machine manufacturer's basic welding handbook instead of the specified standard. Because the use of the welding handbook is an unqualified welding procedure, the use of the welding handbook is less conservative than AWS standard D1.3 originally specified in procurement specifications. This issue will be re-evaluated along with the other URI issues during future inspections.

Findings

The inspectors identified the following NCV:

Introduction: The inspectors identified a severity level (SL) IV NCV of 10CFR50 App. B, Criterion XVI, for failure to establish measures that were sufficient to assure prompt



identification and correction of conditions adverse to quality. Specifically, NRC inspectors identified issues as URI 05000391/2011603-03 that potentially met the criteria as a condition adverse to quality. The applicant failed to enter these items in their corrective action program and evaluate the issues.

Description: The inspectors determined that the applicant failed to address deviations from purchasing specifications after the inspectors had identified the issues in URI 05000391/2011603-03. The inspectors determined that for identified issues TVA procedure NGDC PP-3, "Watts Bar Unit 2 Corrective Action Program," Rev. 7, states in part that a service request (SR) and/or PER will be initiated by Unit 2 personnel. Additionally, Bechtel procedure 25402-MGT-0003, "Corrective Action Program," Rev. 12, states that all personnel are responsible "To identify and promptly report problems and adverse conditions for evaluation and corrective action."

In NRC IIR 05000391/2011603, the inspectors provided information in the URI (Issue 2) that welding standards used for the welding processes were not included in the material receiving reports and that it was unclear as to what welding specifications the vendor utilized. The applicant did not place the issue into the corrective action program and subsequently failed to evaluate the issue and determine if any conditions adverse to quality existed. The inspectors determined that an unqualified procedure was used for welding instead of the specified standard.

In NRC IIR 05000391/2011603, the inspectors also provided information in the URI (Issue 3) that they had found evidence that the vendor deviated from the purchasing specifications for seismic qualification testing. The inspectors determined that the specified testing had not occurred. Instead, the vendor credited the original MCC seismic qualification by seismic equivalency analysis of the MCC replacement component frames to the original components. Again, the applicant did not place the issue into the corrective action program nor provide evidence of a formal technical evaluation or approval of the change. Additionally, the applicant did not provide evidence that the receiving inspections identified that the change occurred (URI issue 4).

The inspectors concluded that a violation had occurred because, when presented with the information during the exit meeting in February 2011 and in IIR 05000391/2011603, as URI 05000391/2011603-03, the applicant failed to include these issues into their corrective action program. The inspectors determined that these findings were more than minor because they represented an inadequate process and quality oversight function that, if left uncorrected, could adversely affect the quality of the fabrication and construction of safety-related components. The finding is a SL IV because it is not representative of a breakdown in the QA process.

The violation has a cross-cutting aspect in the area of problem identification and resolution, P.1(e), because the applicant did not recognize that documented NRC concerns are an alternative process for raising safety concerns, and then identify appropriate and timely resolution of identified issues.

Enforcement:

10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, the applicant failed to establish measures that were sufficient to assure that the issues identified by the NRC, and communicated to the applicant in February 2011, were promptly identified and corrected.

This finding was determined to be a SL IV violation using Section 6.5 of the Enforcement Policy. Because this was a SL IV violation and the examples supporting the violation were entered into the applicant's corrective action program (PER 502303), this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000391/2012602-01, Failure to Enter Identified Deficiencies into the Corrective Action Program.

c. Conclusions

The inspectors concluded that URI 05000391/2011603-03 will remain open. Through additional inspection results, the inspectors expanded the scope of the URI (Issue 2) associated with applicant oversight of welding standards used in the fabrication of safety-related equipment.

**OA.1.8 (Discussed) Moderate Energy Line Break (MELB) Special Program (SP) (TI 2512/040)**

a. Inspection Scope

The objectives of this inspection were to evaluate implementation of the MELB SP. This program was established due to the fact that TVA determined that there was inadequate documentation and assurance that design requirements were met to assure MELB criteria were met. The program consists of an iterative process of walkdowns to confirm field conditions relative to flood-related commodities (curbs, drains, doors, etc.), susceptible piping, and safe shutdown equipment locations; coupled with calculations being updated, as required. The applicant also planned to review previous plant modifications for effects on MELB or the need to modify Unit 2 equipment similar to Unit 1. Appropriate modifications were to be initiated as necessary to provide protection of safe shutdown equipment.

Previous inspections were conducted and documented in NRC IIRs 05000391/2009604, 2010602, 2011602, 2011603, 2011607, and 2011608. The applicant's plans were previously shown to be equivalent or exceed those performed for Unit 1. Remaining actions included sealing of conduits and completion of calculation updates. During this inspection the inspectors reviewed calculation updates to evaluate any effects on the planned actions for the MELB program as follows:

- WCG 1951, "Evaluation of Worst Case Concrete Shield Walls," Rev. 3
- WCGE023, "Review of Flood Protection Requirements for Watertight Doors and Hatches," Rev. 3
- N36232A, "Summary of Piping Analysis Problem No. N3-62-32A," Rev. 8
- N36729A, "Summary of Piping Analysis Problem No. N3-67-29A," Rev. 18
- WBNEEBMST1070005, "125V DC Protection and Coordination Calculation," Rev. 61
- WBNAPS2165, "Turbine Building Flooding Due to a Break in the Condenser Circulating Water System," Rev. 4

b. Observations and Findings

No findings of significance were identified. The calculations update did not indicate any additional actions were required for the MELB program.

c. Conclusions

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

**OA.1.9 (Closed) NCV 05000391/2010605-03: Failure to Perform Adequate QC Inspection (IP 35007)**

a. Inspection Scope

NCV 05000391/2010605-03 was associated with failure to perform adequate QC inspection. The applicant's general corrective actions were documented in PERs 255663 and 324535. The applicant's actions included cleaning and re-inspection of the pump impeller and discussions with both QA and QC personnel to emphasize expectations for hold points.

The inspectors reviewed the licensee's corrective action documentation (PERs), WO 08-953078-000 documenting the RHR pump 2A-A work, and the training records documenting attendance of discussions with QA and QC. The inspectors also reviewed the WO to verify appropriate inspections had taken place and independently verified that the as-left condition of the pump impeller met cleanliness requirements.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The applicant's actions were acceptable and appropriately documented; therefore, NCV 05000391/2010605-03 is closed.

**OA.1.10 (Closed) NCV 05000391/2010603-01: Marking and Segregation of Nonconforming Materials from Accepted Materials Available for Use (IP 35007)**

a. Inspection Scope

NCV 05000391/2010603-01 was associated with the marking and segregation of nonconforming materials from accepted materials available for use. The applicant's corrective actions were documented in PERs 234358 and 234489. The applicant's actions included making signs to identify material, making flags with QC hold tape, and coaching personnel regarding the identification of material not available for use.

The inspectors reviewed the licensee's corrective action documentation (PERs) and inspected the receiving/storage warehouses to confirm appropriate marking and segregation of material.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The applicant's actions were acceptable and appropriately documented; therefore, NCV 05000391/2010603-01 is closed.

**OA.1.11 (Closed) NRC BL 75-05: Operability of Category 1 Hydraulic Shock and Sway Suppressors (IP 35007)**

a. Inspection Scope

Background: BL 75-05 reported the discovery of eight inoperable hydraulic shock suppressors on main steam lines inside containment at the Three Mile Island I facility. The inoperability was discovered when the suppressors were removed for overhaul and testing during a planned maintenance program. The BL required that all power reactors with operating licenses or construction permits provide information pertaining to the design requirements and load margins, pre-installation testing, and surveillance/testing programs for shock suppressors on seismic Category 1 systems.

In June 1975, TVA responded to BL 75-05 stating that the suppressors had not yet been purchased, but provided the requested information regarding the design and testing of the suppressors. This item was initially closed by the NRC in IR 50-390/75-6 (Unit 1) and 50-391/75-6 (Unit 2).

There are only 20 Category 1 snubbers on Watts Bar Unit 2, five on each steam generator. These snubbers were originally purchased in accordance with Design Specification WBNP-DS-1935-2599-R1 and recently refurbished in accordance with Material Requisition 25402-011-MRA-SV00-00001. The 20 Category 1 steam generator snubbers are to be installed per EDCR 55880.

Inspection Activities: The inspectors reviewed the applicant's engineering complete commitment closure package for BL 75-05 and interviewed engineering personnel to assess the effectiveness of the applicant's programs and actions in meeting the intent of BL 75-05. The closure package included the TVA's response to BL 75-05, the snubber design specification, the material requisition for refurbishment, a sample refurbishment QA package, and the EDCR for installation. In order to verify an adequate program for ensuring continued operability, inspectors reviewed Unit 1 procedures and technical instructions governing the in-service maintenance and testing of Category 1 snubbers. Unit 2 snubbers will be maintained under a program identical to the Unit 1 program once placed in service. Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on the previous closure of BL 75-05 in NRC IR 50-390/75-6 and 50-391/75-6, review of the applicant's engineering completion closure package, and in-service maintenance and testing program, the inspectors determined that the requirements of BL 75-05 had been met. Refurbishment activities and in-service maintenance and testing requirements associated with the Category 1 snubbers are adequate to ensure operability. NRC BL 75-05 is closed; however, future inspection of completed work is possible at the NRC's discretion.

**OA.1.12 (Closed) CDR 391/82-07: Shock Arrestor Strut Assembly Interference (Bergen-Paterson Co.) (IP 35007)**

a. Inspection Scope

Background: In March 1981, the applicant identified a potential interference problem in a limited number of Bergen-Paterson shock arrestor assemblies. Specifically, a design change in the forward brackets (pipe clamps) could cause interference between the clamp and shock arrestor (snubber) when mounted in certain orientations. This issue was originally documented in non-conformance report (NCR) WBN MEB 8103 and tracked by the NRC as CDR 390/82-08 and CDR 391/82-07 for Units 1 and 2 respectively. NCR 3778R was written as a tracking NCR for the 10 CFR 50.55(e) reportability of NCR WBN MEB 8103. A Bergen-Paterson engineer visited the site in April 1981 and determined that Watts Bar had received 65 supports with the potential for the interference to exist. The applicant committed to modifying all 65 assemblies in their Watts Bar Nuclear Plant Units 1 and 2 – Shock Arrestor Strut Assembly Interference – WBRD-50-390/82-08, WBRD-50-391/82-07 -Final Report, dated March 15, 1982. The applicant documented completion of the modification for all Unit 1 strut assemblies in a partial release of NCR 3778R, dated February 28, 1982. Based on a previous review of field work completed under NCR WBN MEB 8103, inspectors had determined that CDR 390/82-08 had been adequately resolved for Unit 1 as documented in NRC IR 05000390/83-18 and 391/83-14.

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

- Reviewed the applicant's open item final closure report including any actions associated with PER 172777. PER 172777 was issued to track required Unit 2 actions for historical NCR WBN CEB 8103.
- Reviewed NCR 3778R to determine the extent of the condition, necessary modifications, and to verify documentation of work completion.
- Reviewed Watts Bar Nuclear Plant Units 1 and 2 – Shock Arrestor Strut Assembly Interference – WBRD-50-390/82-08, WBRD-50-391/82-07 -Final Report, dated March 15, 1982, to verify the applicant's commitments to disposition the shock arrestor assembly deficiency.
- Reviewed Internal Memorandum, Watts Bar Nuclear Plant – Notification of NRC Commitment Completion on WBN MEB8103, from John A. Raulston to J.W. Hufham, dated 08/13/1985, which documented completion of actions to resolve NCR WBN CEB 8103.
- Reviewed several walkdown packages to verify that installed shock arrestor assemblies identified in this CDR have been appropriately modified.
- Reviewed several drawing revision authorizations (DRAs) to verify deletion or substitution of affected shock arrestor assemblies that are either uninstalled or being replaced.
- Inspected several Bergen-Paterson shock arrestor assemblies to verify that appropriate modifications have been made.

Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on a review of the applicant's final completion closure package, and inspection of several modified arrestor assemblies, the inspectors determined that the applicant had resolved the original construction deficiency. CDR 391/82-07 is closed; however, future inspection of completed work is possible at the NRC's discretion.

**OA 1.13 (Closed) URI 391/86-21-04: Control of Qualified Replacement Parts (IP 35007)**

a. Inspection Scope

Background: In NRC IIR 50-390/86-21 and 50-391/86-21, dated February 2, 1987, the NRC identified the existence of an unqualified replacement part in a motor-operated valve operator installed in Unit 2. Specifically, a replacement terminal block for 2-FCV-3-116B-A was received on site as non-Class 1E and was subsequently installed in the Class 1E operator of 2-FCV-3-116B-A without appropriate evaluation under a commercial grade dedication program. The applicant opened PER 178010 to address this issue.

Inspection Activities: The inspectors reviewed the applicant's final closure package associated with PER 178010 to verify whether appropriate corrective actions were implemented. The inspectors noted that the applicant had elected to replace the operator for 2-FCV-3-116B-A, and the inspectors reviewed the associated material requisition form (25402-011-MRA-JV15-00005) to confirm that a QA Level 1 replacement was specified. The inspectors also reviewed applicant activities to confirm that a WO (112365007) was written to install the new operator.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on a review of the applicant's final completion closure package, the inspectors concluded that the applicant either implemented or initiated appropriate actions to resolve URI 391/86-21-04 by electing to replace the operator with a QA Level 1 component. Based on these proposed actions, URI 391/86-21-04 can be closed; however, future inspection of completed work is possible at the NRC's discretion.

**OA.1.14 (Closed) Inspector Follow-up Item (IFI) 391/90-27-13: Piping Subsystems Qualification (IP 35007)**

a. Inspection Scope

Background: In April 1990, the applicant committed to the NRC by letter that analysis and evaluation of the effects of flexibility of floor-mounted equipment to attached piping would be conducted before Unit 2 fuel load; additionally, any corrective actions resulting from this study would be complete as well. This analysis was initiated as a result of an NRC-identified inspection concern from the Sequoyah Nuclear Plant (reference NRC IIR 05000327(328)/86-27). The applicant had notified the agency by letter dated November 3, 1986, and initiated a condition adverse to quality report (CAQR) WBN 870542 in June 1987. The applicant further identified that the evaluation and corrective actions identified for WBN would be performed under the Corrective Action Plan (CAP) for the Hanger

Analysis and Update Program (HAAUP), or HAAUP-CAP program. This inspector follow-up item was closed for WBN Unit 1 in IIR 05000390(391)/93-22.

Inspection Activities: The inspectors reviewed the licensee's closure package associated with this issue and performed the following additional and independent activities:

- Reviewed WB-DC-40-31.7, "Design Criteria for Analysis of Category 1 and Category 1(L) Piping Systems," Rev. 23, to verify that equipment and component flexibility analysis requirements were consistent with those accepted by the agency in 1993.
- Reviewed applicant procedure TI-205, "Piping and Instrument Analysis," Rev. 2, which supersedes EAI-8.05, 8.10, and 8.15 reviewed by the agency in 1993, to verify that the administrative requirements governing quality records associated with piping analyses are consistent with regulatory requirements. Specifically, the inspectors reviewed Appendices P, Q, and R which describe applicability requirements for the Unit 2 completion project.
- Reviewed eight calculations, of approximately 360 completed for Unit 2, covering a range of systems, inclusive of both large and small bore piping analysis, and involving determinations of flexibility (both valve and equipment) and rigidity.

Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on a review of the applicant's final completion closure package, the inspectors concluded that the applicant either implemented or initiated appropriate actions to resolve the original construction deficiency. Based on these initiated and proposed actions, IFI 391/90-27-13 can be closed; however, future inspection of completed work is possible at the NRC's discretion.

**OA.1.15 (Closed) URI 05000391/2011610-01: Medium Voltage Cable Termination and Stress Cone Installation Dimensional Variance Acceptability (IP35007)**

a. Inspection Scope

Background: NRC IIR 05000391/2011610, Section C.1.2, documented concerns the NRC identified when observing the installation of medium voltage cable terminations with stress relief. The concerns were considered unresolved, pending the applicant's vendor inquiry into kit requirements and demonstration of adequacy to environmental qualification requirements, and were identified as URI 05000391/2011610-01. Concurrent with the issuance of the URI, the applicant issued PER 503750 to more thoroughly capture the inspector's concerns and also initiated an electrical engineering resolution for URI 05000391/2011610-01.

Inspection Activities: The inspectors interviewed electrical engineering staff and performed a review of the applicant's electrical engineering resolution document and its associated references. The inspectors attended craft training on termination application in order to assess the information provided to craft associated with the concerns.

b. Observation and Findings

No findings of significance were identified. The licensee demonstrated that the Raychem NHVT kit is not relied upon, in isolation, for satisfying environmental qualification requirements. Rather, the NHVT is complemented by the NMCK8 kit to provide an environmental seal between the terminated cable and the motor lead and is qualified by Raychem vendor report EDR-5037, "Performance Test of 8kV In-Line Type Motor Connection Splices Raychem Type NMCK8," Rev. 3. With regard to the acceptance criteria, the applicant demonstrated that general specification G-38 defers to vendor instructions when provided. Regarding the vendor provided instruction ambiguity, the applicant is working with the vendor to enhance kit instructions and has an action to enhance the training provided to the staff regarding kit application without modification.

c. Conclusions

Based on these actions, the inspectors determined that the applicant had resolved the inspectors' concerns. URI 05000391/2011610-01 is closed.

**OA.1.16 (Closed) IFI 05000391/92-29-06: Penetration Reevaluation Following a Safe Shutdown Earthquake (SSE) or Loss of Coolant Accident (LOCA) (IP92701)**

a. Inspection Scope

Background:

In October 1985, it became apparent to TVA that a number of Watts Bar Unit 2 Tube Turn Bellows containment penetration alignments were out of tolerance. In December 1985, TVA provided an interim report to the NRC that the subject bellows were being evaluated for use and any special conditions that might arise requiring repair or replacement. Through evaluation, TVA identified that a number of bellows would be useable "as-is" while others were useable "as-is" but with certain restrictions. These restrictions were to include the inspection of select bellows following a SSE or LOCA. NRC special inspection report (390/92-29 and 391/92-29) accepted TVA's evaluations but questioned how TVA would verify that the subject bellows would remain leak tight following a SSE or LOCA. TVA proposed corrective actions to ensure that the subject bellows would be verified as leak-tight through post-event inspection prior to resumption of normal use. This item was originally identified in NRC special IR 05000390/92-29 and 391/92-29 and pertained only to Unit 2.

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

- Reviewed the applicant's engineering completion open item closure report including any actions associated with PERs 143533 and 413617 which were issued to track required Unit 2 actions for historical document NCR 6173.
- Reviewed initial evaluations by TVA and vendors to qualify those penetration bellows that required additional evaluation following a SSE or LOCA.
- Reviewed calculation "SIS Containment Penetrations NCR 6173," Rev.1, to verify that credible criteria were utilized to classify bellows for use "as-is" with no restrictions.
- Reviewed the current alarm response, abnormal operating instruction, and technical instruction common to both units that direct engineering personnel to



evaluate the subject bellows following a SSE or LOCA.

- Reviewed the applicant's Unit 2 Preventative Maintenance Instruction 2-PENT-304-008C, "Inspection of Bellows Type Penetrations Following SSE/LOCA," Rev. 0, to ensure that the bellows requiring inspection were listed.

b. Observations and Findings:

No findings of significance were identified.

c. Conclusions:

Based on a review of the applicant's engineering complete closure package, the inspectors concluded that the applicant initiated appropriate actions to resolve the original construction deficiency. Based on these proposed actions, IFI 05000391/92-29-06 can be closed; however, future inspection of completed work is possible at the NRC's discretion.

**OA.1.17 (Closed) CDR 391/87-06: Ice Condenser Floor Drain Piping Inadequately Qualified (IP 92701)**

a. Inspection Scope

Background:

In March 1988, TVA provided a final report to the NRC that Watts Bar Units 1 and 2 ice condenser floor drain piping was inadequately qualified. TVA correspondence with Westinghouse resulted in the changing of the nomenclature of the components from "check valve" to "drain gate." Structural and seismic analyses were performed and the drain gate was reclassified as Safety Class C (ASME Section III, Class 3). Subsequent to this reclassification, TVA procured Class C piping and components, performed stress analyses to ensure the piping and drain gates could perform their safety function, and revised licensing basis documents to reflect the change. This deficiency was originally identified in historical NCR WBN NEB 8664 and captured for Unit 1 as CDR 390/87-06. Based on a previous review of proposed work and field verification of ice condenser drain lines, the NRC had determined that CDR 390/87-06 had been adequately resolved for Unit 1 as documented in NRC IIR, 05000390/94-22 and 05000391/94-22.

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

- Reviewed the applicant's engineering completion open item closure report, including actions associated with PER 143780, which was issued to track required Unit 2 actions for historical NCR WBN NEB 8664.
- Reviewed the select DRAs for floor drain, piping, and drain gate valves.
- Visually inspected several of the installed drain gates to ensure they were consistent with the information obtained in drawings.
- Reviewed the scope of the piping and supports to ensure alignment with Design Criteria WB-DC-40-36, "The Classification of Piping, Pumps, Valves, and Vessels," Rev.0014
- Reviewed EDCR 52813 Rev. B, outlining the scope of the work and the WOs necessary to complete the task.
- Reviewed the applicant's material requisition paperwork to verify that the proper safety-class of materials were procured to satisfy the resolution of the CDR.

b. Observations and Findings:

No findings of significance were identified.

c. Conclusions:

Based on a review of the applicant's engineering complete closure package, the inspectors concluded that the applicant initiated appropriate actions to resolve the original construction deficiency. Based on these proposed actions, CDR 391/87-06 can be closed; however, future inspection of completed work is possible at the NRC's discretion.

**OA.1.18 (Closed) CDR 391/90-02: Lack of Containment Isolation Valves on Instrument Lines (IP 92701)**

a. Inspection Scope

Background:

In September 1990, TVA informed the NRC of CAQR WBP 900321 and WBP 900364. These documents identified a deficiency in the instrument lines that penetrated primary reactor containment. A final report on these issues was presented to the NRC (WBRD 50-390(391)/90-02), dated October 1990. In this final report, TVA identified seven Unit 1 and seven Unit 2 pressure sensing instrument lines used in engineered safety feature (ESF) system actuation that penetrated primary containment and only had hand tightened thread caps on the test connection portion of the line. Evaluation by TVA indicated that this did not satisfy General Design Criteria (GDC) 56 and alterations would be required. Specifically, installation of two normally-closed series isolation valves would be required on the test tee of each instrument line. TVA resolved the issue on Unit 1 through the issuance and completion of DCN M-11799-A.

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

- Reviewed the applicant's engineering completion closure report including any actions associated with PER 144166 which was issued to track required applicant commitments to install the required valves and enter the valves into the containment isolation test program.
- Reviewed select DRAs for valve placement and installation.
- Reviewed EDCRs 55172 Rev. A and 53617 Rev. A, outlining the scope of the work and the WOs necessary to complete the task.

b. Observations and Findings:

No findings of significance were identified.

c. Conclusions:

Based on a review of the applicant's engineering complete closure package, the inspectors concluded that the applicant initiated appropriate actions to resolve the original construction deficiency. Based on these proposed actions, CDR 391/90-02 can be closed; however, future inspection of completed work is possible at the NRC's discretion.

**OA.1.19 (Closed) PSI Data Review and Evaluation (IP 73055)****a. Inspection Scope**

The inspectors reviewed the licensee's system for maintaining QA non-destructive examination (NDE) records required by ASME Section XI by reviewing QA record procedures, QA audits, conducting walkdowns of QA record storage facilities, and conducting interviews with QA personnel to ensure the record keeping system met the requirements of 10 CFR 50, Appendix B and ASME Section XI.

The inspectors reviewed NDE records associated with the ultrasonic testing (UT) of welds from two systems within the reactor coolant pressure boundary. Specifically, the inspectors reviewed records for 8" ASME Class 1 elbow-to-pipe weld RHRS-181, and 4" ASME Class 1 pipe-to-elbow RCF-D145-02. The inspectors verified initial, intermediate and final calibration and calibration checks were performed; ensured the examination data collected was properly recorded (no recordable indications were detected in either exam); and verified the NDE reports were evaluated by Level II or Level III examiners. Additional documents reviewed are listed in the Attachment.

The inspectors performed the following samples:

- IP 73055 02.01 – one sample
- IP 73055 02.04 – two samples (RCS Class 1, and RHR Class 1)

**b. Observations and Findings**

No findings of significance were identified.

**c. Conclusions**

The inspectors concluded the sampled records, related to PSI of pressure retaining pipe welds, met the requirements of ASME Section XI. The inspectors concluded that all the steps of IP 73055 had been completed with no remaining open issues, as documented in the following NRC IIRs (05000391): 2009604, 2010603, 2011605, 2011608, and this inspection report, and that IP 73055 is closed.

**OA.1.20 (Closed) Reactor Vessel Internals (Welding) Observation of Welding and Associated Activities (IP 55093)****a. Inspection Scope**

The purpose of IP 55093 was to observe whether activities pertaining to any field welding of reactor vessel internals were accomplished in accordance with regulatory requirements. The following table lists the inspections that were performed under this IP.

<b>IP Section</b>	<b>Inspection Report</b>	<b>Sample Quantity</b>
02.01 – Welding Identification	05000391/2011604	6
02.02 – Weld Preparation	05000391/2011604	6
02.03 – Welding Material	05000391/2011604	2
02.04 – Observation of Welding	05000391/2011604	6

Section 02.04 of IP 55093 requires observation of one welding activity for safety-related welding. The inspection report shown in the above table describes the observations

performed by the inspectors for six completed stainless steel fillet weld locations joining the 3" diameter portion of the conical shape funnel guides and thermal sleeve tubes beneath the upper head of the reactor vessel. The inspectors reviewed the contents of the Bechtel welding records for these six field welds to determine whether the welding procedure, weld joint alignment, welder qualifications, control of weld filler metals, QC hold points, final weld dimensions, and surface appearance met the requirements of the following:

- ASME B31.1 "Power Piping" Code, 1973
- Bechtel "General Welding Standard," GWS-1,
- Bechtel "Nondestructive Examination Standard Visual Examination," VT – ANSI B31.1

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed reactor vessel internal welds, procedures, and records were found to conform to the applicable requirements. IP 55093 is considered closed; however, if additional welding activities are performed, internal to the reactor vessel, inspection may be performed at the NRC's discretion.

**OA.1.21 (Closed) Heat Code Traceability CAP (IPs 49063 and 49065, TI 2512/024)**

a. Inspection Scope

Background: As described in NRC IIR 05000391/2010603 and 05000391/2010604, the inspectors previously inspected selected portions of the applicant's efforts to address this CAP. Specifically, the inspectors reviewed the applicant's program to review, evaluate, and document the qualifications of all materials in ASME Class 1, 2, and 3 systems. As a result of this CAP, the applicant identified material discrepancies that required resolution and documented those discrepancies in boundary information transmittals (BITs).

The previous inspections verified the adequacy of applicant's actions to identify the BITs, but did not review the resolution of those BITs. The actions to resolve the BITs involved either replacing the materials, removing and abandoning the lines, or upgrading the materials.

Inspection Activities: The inspectors identified 24 BITs that the applicant issued to address material discrepancies identified through their review of this CAP. At the time of this inspection, nine BITs were sufficiently complete for the inspectors to review. The inspectors selected the following nine BITs to determine if the applicant appropriately addressed the identified concerns: 44, 371, 376, 786, 1265, 1268, 1656, 1683, and 1781.

Of these nine BITs, the applicant replaced the materials identified in BITs 371, 1656, and 1683; removed and abandoned the lines containing the materials in BITs 376, 1265, and 1268; and performed an ASME material upgrade evaluation for the materials identified on BITs 44, 786, and 1781.

For BITs 44, 371, 786, 1656, 1683, and 1781, the inspectors reviewed the identified issues, reviewed the applicable weld diagrams, walked down the lines in question, and determined if the installed materials were qualified for the ASME class of the lines. To make this determination, the inspectors recorded traceability markings (such as heat numbers and material receiving report numbers) of the installed materials and reviewed records such as certified materials test reports, certificates of compliance, welding operation sheets, NDE reports, WOs, and material receiving reports to determine:

- if the installed materials conformed with construction/installation specifications;
- if the installed materials were appropriately identified using a permanent, low stress marking method;
- if the installed materials were the actual materials specified in the documents that the applicant used to maintain traceability as required by ASME Section III; and,
- if the installed materials were qualified to the ASME class of their respective lines.

For BITs 44, 786, and 1781, the inspectors also reviewed the materials upgrade evaluation to determine if the applicant's conclusions were consistent with the requirements of ASME Section III.

For BITs 376, 1265, and 1268, the inspectors walked down the lines to determine if the affected materials were removed and if the cut lines were capped using approved work orders appropriate to the circumstances using materials certified to the ASME class of the lines.

The inspectors reviewed documentation associated with these nine BITs to determine if the records:

- adequately documented the current status of non-conformances and deviations;
- were legible, completed, and indicated that they were promptly reviewed by qualified personnel;
- were being properly identified and stored; and,
- could be retrieved in a reasonable time.

For the remaining 15 BITs, the inspectors reviewed the applicant's planned corrective actions to determine if the applicant had an adequate program to control the work and thus ensure that the concerns identified in the BITs would be appropriately resolved.

Additional documents reviewed are listed in the Attachment.

The following samples were inspected:

- IP 49063 Section 02.02 - 1 sample
- IP 49065 Section 02.01 - 1 sample

b. Observations and Findings

No findings of significance were identified. The inspectors did not identify any discrepancies between the intended resolution and the applicable requirements of ASME Section III.

c. Conclusions

Based on the review of the applicant's closure report and the samples inspected, the applicant appropriately identified the discrepant materials installed in ASME Section III

class 1, 2, and 3 lines. The applicant was effectively controlling the corrective actions to adequately address all BITs associated with the heat code traceability CAP. TI 2512/024 is closed.

**OA.1.22 (Closed) CDR 391/88-02: Stress Corrosion Cracking of Internal Check Valve Bolting in Emergency Raw Cooling Water (ERCW) (IP 50075)**

a. Inspection Scope

Background: In 1988, the applicant notified the NRC of a deficiency that was identified with the bolting material used inside some check valves installed in the ERCW system. The bolts that secured the internal flapper assembly to the valve body experienced accelerated corrosion and failure due to stress corrosion cracking. The bolts were made of a high hardness Type 410 stainless steel which was known to be susceptible to stress corrosion cracking when stressed (torqued) and exposed to chlorides. The ERCW system constituted an aqueous chloride environment because of the sodium hypochlorite added to the water to control Asiatic clams.

Inspection Activities: As described in NRC IIRs 05000391/2010605 and 05000391/2011604, the inspectors previously inspected the applicant's review of all applicable check valves in the ERCW system as well as field implementation of the applicable EDCRs, to determine if the applicant adequately addressed this CDR. Specifically, the inspectors reviewed the applicant's efforts to identify all ERCW valves with susceptible materials and to replace them with parts manufactured from acceptable materials. The inspectors previously reviewed all completed WOs for all ERCW valves that contained susceptible materials to determine if the modifications were completed per the engineering design change document.

b. Observations and Findings

No findings of significance were identified. The inspectors reviewed the CDR and the previous inspection activities as described above and determined that no additional inspection activities were warranted for this item. The applicant replaced all prohibited materials, in all applicable safety-related ERCW swing check valves, with parts manufactured from acceptable materials.

c. Conclusions

Based on a review of the applicant's engineering complete closure package and other items reviewed, the inspectors concluded that the applicant adequately addressed the issues identified in this CDR. CDR 50-391/88-02 is closed.

**OA.1.23 (Closed) 10CFR21 (Part 21) Notification Number 86-03, Broken External Springs on Main Steam Isolation Valves (MSIVs) (IP 50075)**

a. Inspection Scope

Background: In 1986, Atwood and Morrill Co, Inc. notified the NRC of a defect in MSIV external closure springs manufactured by Duer Spring and Manufacturing Company. The springs that failed were installed at Fermi-2. The nature of the failure was quench cracks that developed during the manufacturing process. The Part 21 notice identified that Duer Spring and Manufacturing Company also manufactured the MSIV external closing springs used at WBN Unit 2.

Inspection Activities: The inspectors reviewed refurbishment activities completed on all four MSIVs to determine if the suspect springs were replaced with qualified safety-related springs. The inspectors reviewed design specification WBNP-DS-3835-2020, Rev. 1, to determine the applicable technical and quality requirements for the springs and other actuator parts. Using this information, the inspectors reviewed purchase order (PO) 16101, which ordered new springs for all MSIVs, and material receiving report MRR-06785, which documented the receipt of all 16 springs (4 springs per MSIV), to determine if:

- the vendor was on the applicant's Evaluated Suppliers List and approved to supply the items on the PO;
- all relevant technical and quality requirements were included in the procurement documents for all of the replacement MSIV actuator parts, including the springs;
- records confirmed that required material characteristics, performance tests, nondestructive tests, and other specifications for the springs were met; and,
- all required quality documentation was furnished with the springs.

The inspectors reviewed WOs 09-952624-000, 09-952626-000, 09-952627-000, and 09-952628-000 to determine if the applicant replaced all 16 springs with the new springs procured under PO 16101. Additionally, the inspectors reviewed the WOs to determine if the work steps used to refurbish the actuators were consistent with maintenance instruction 0-MI-1.002, "Main Steam Isolation Valve Maintenance," Rev. 0. The inspectors performed field walkdowns of all four MSIVs to determine if the springs were installed in accordance with the MSIV vendor drawing 3824-01-H. Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified. The applicant replaced all 16 MSIV external closure springs with new safety-related springs. All 16 springs were inspected using wet fluorescent magnetic particle examination with no cracks identified. As described in NRC Information Notice 86-81, Supplement 1, magnetic particle testing was an appropriate method to identify cracks in MSIV external closure springs.

c. Conclusions

All 16 springs, that were the subject of this Part 21 notice, were replaced with new springs that were verified to be free of cracks. The applicant disposed of the original springs. Part 21 Notification Number 86-03 is closed.

**OA.1.24 (Closed) NCV 05000391/2011602-01: Failure to Perform Work with Approved Work Instructions (IP 92702)**

a. Inspection Scope

Background: As described in NRC IIR 05000391/2011602, the inspectors opened this NCV to document work performed on a safety-related support without an approved WO. The applicant entered this issue into their corrective action program as PER 320115.

Inspection Activities: The inspectors reviewed PER 320115 to determine if the applicant appropriately identified, evaluated, and resolved the concern. The inspectors assessed whether the applicant assessed generic implications and whether applicable programs

and practices were enhanced, where appropriate. Specifically, the inspectors reviewed proposed and implemented corrective actions to determine if they were properly prioritized and whether they addressed the apparent cause of the violation. Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified. The applicant initiated WO 111749016 to inspect and rework, as necessary, the affected support. Additionally, the applicant provided a human performance brief to affected personnel to reinforce the requirement to perform all safety-related work using an approved WO.

c. Conclusions

Based on the activities reviewed, the inspectors concluded that the applicant adequately addressed the issues identified in this NCV. NCV 05000391/2011602-01 is closed.

**OA.1.25 (Closed) Electrical Issues CAP – Sub-issue: Motor Operated Valve (MOV) Torque Switch and Thermal Overload Bypass Capability (TI 2512/020 and IP 51055)**

a. Inspection Scope

As discussed in NRC IIR 05000391/2011607, the inspectors previously reviewed selected portions of the applicant's program to address the electrical CAP sub-issue of MOV torque switch and thermal overload bypass capability. For this inspection, the inspectors reviewed completed WOs that verified the wires for the thermal overload bypass relays were installed per controlled drawings. The inspectors reviewed the following WOs to determine if the work was performed in accordance with the controlling design change document and applicant procedures and if the required inspections were performed, recorded, reviewed, and evaluated by qualified personnel:

- WO 110951911 (EDCR 53287)
- WO 111947827 (DCN 54912)
- WO 110830794 (EDCR 54499)
- WO 111208390 (EDCR 53293)
- WO 110831880 (EDCR 54499)
- WO 110828033 (EDCR 54499)

The inspectors selected these WOs because the WOs were intended to verify the wiring for all safety-related valves with thermal overload bypasses in Systems 63 (Safety Injection) and 67 (ERCW). The inspectors selected these systems because they represented two of the most risk-significant systems containing MOVs in the Unit 1 probabilistic risk assessment. The inspectors also reviewed the WOs to determine if all replacement wires were appropriately qualified for the intended service.

The inspectors selected three electricians who performed work on the above WOs and reviewed their training records to determine if they were qualified and trained to perform the work as documented in the WOs.

The inspectors reviewed planned WOs to inspect and test the thermal overload relays for all safety-related valves. The inspectors reviewed WOs 112534544 (MOV Board 2A1), 112534869 (MOV Board 2A2), 112534906 (MOV Board 2B1), and 112534928 (MOV Board 2B2). The inspectors reviewed these WOs to determine if the applicant



had approved WOs to inspect and refurbish, as necessary, the thermal overload bypass relays for each MOV that calculation WBN-OSG-4095, "Selection Criteria for MOVs Requiring Thermal Overload Bypass and/or Torque Switch Bypass," Rev. 20, identified as requiring a thermal overload bypass.

The inspectors reviewed WBN-OSG-4095 to determine if the applicant correctly identified the valves that required either a thermal overload or torque switch bypass. To make this determination, the inspectors reviewed the Final Safety Analysis, the Technical Requirements Manual, the Unit 1 Mitigating Systems Performance Indicator Basis Document, system descriptions, selected Unit 1 operating procedures, system drawings, and calculation MDQ0029992009-0310, "Generic Letter 89-10 MOV Population for Watts Bar Unit 2," Rev. 1, to identify the active MOVs that were relied upon during a design basis accident. The inspectors compared those MOVs to the MOVs included in WBN-OSG-4095 to determine if scope of the calculation was consistent with the inspectors' reviews.

The inspectors selected 18 MOVs to determine if WBN-OSG-4095 correctly identified the required bypasses. To make this determination, the inspectors reviewed the normal and accident positions during various modes of operation and then reviewed WBN-OSG-4095 to determine if the conclusions in the calculation were consistent with the inspectors' reviews.

The inspectors reviewed the applicant's corrective action program to determine if the applicant was identifying thermal overload/torque switch bypass-related issues at an appropriate threshold. The inspectors selected six PERs for a more detailed review to determine if the applicant's evaluation of the issues and corrective actions were commensurate with the safety significance of the identified issues. For each of the PERs, the inspectors also determined whether:

- the records were legible, complete, and promptly reviewed by qualified personnel;
- records were routinely processed, timely evaluated, and controlled through established channels for resolution of the identified causes as well as the immediate problem; and,
- records were properly identified and stored, indicated the current status, and could be retrieved in a reasonable time.

Additional documents reviewed are listed in the Attachment.

The following samples were inspected:

- IP 51055 Section 02.04 - 1 sample

b. Observations and Findings

No findings of significance were identified. The inspectors did not identify any deficiencies with calculation WBN-OSG-4095. For each MOV that the inspectors selected for thermal overload bypass testing, the applicant had completed WOs that documented the wiring checks and planned WOs to test the bypass relays.

c. Conclusions

Based on review of the applicant's closure report and the samples inspected, the MOV torque switch and thermal overload bypass electrical CAP sub-issue activities reviewed were adequate and completed in accordance with applicable drawings and

specifications. The applicant's identification of valves that required either a thermal overload or torque switch bypass, including the selection of the required bypasses, was appropriate. WOs to test the ability of the thermal overload bypass relays to perform their intended safety function were either completed or planned. This sub-issue of TI 2512/020 is closed.

**OA.1.26 (Closed) Generic Letter (GL) 95-07: Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves (IP 92717)**

a. Inspection Scope

As described in NRC IIRs 05000391/2011602 and 05000391/2011607, the inspectors previously reviewed portions of the applicant's implementation of GL 95-07. For this inspection, the inspectors reviewed two change control records for adherence to the applicant's design control procedures. The inspectors reviewed approved WOs for all GL 95-07 related modifications to determine if the applicant's scope of work was consistent with their response and regulatory commitments to GL 95-07 as documented in the NRC Safety Evaluation Report (SER), dated August 12, 2010, "Watts Bar Nuclear Plant, Unit 2 – Safety Evaluation Regarding Generic Letter 1995-07 (TAC No. MD6717)."

The inspectors reviewed EDCR 53580 (for valves 2-FCV-63-25, 63-26, 63-72, 63-73, 63-172, 72-44, and 72-45), EDCR 53292 (for valve 2-FCV-72-2), EDCR 53287 (for valve 2-FCV-72-39), and EDCR 52636 (for valves 2-FCV-63-8, 63-11, 74-1, 74-2, 74-8, 74-9, 74-33, and 74-35) to determine if the scope of work was consistent with the SER.

Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

Design change documents and approved WOs existed for all valves identified in the SER. The scope of work for the design change documents and WOs was consistent with the SER.

c. Conclusions

Based on review of the applicant's engineering complete closure package, the applicant's actions, related to GL 95-07, were consistent with both the approach used for Unit 1 and the regulatory commitments documented in the SER. GL 95-07 is closed.

**OA.1.27 (Closed) NCV 05000391/2011606-02: Failure to Provide an Adequate Technical Basis for an Increase in Circuit Breaker Interrupting Rating (IP 92702)**

a. Inspection Scope

Background: This NCV involved a violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," for failure to establish design control measures to assure that the design basis for those SSCs covered by Appendix B are correctly translated into specifications, drawings, procedures, and instructions. The inspectors determined that molded case circuit breakers, ITE model EF3 – 14kA at 480VAC were used in MCCs with an available short circuit current in excess of the breaker interrupting rating. Documentation provided to the inspectors did not have sufficient technical basis to support upgrading the breaker's interrupting rating to the level indicated in the calculation EDQ00299920080004 "480V Class 1E Protection, Coordination and Thermal

Overload heater Calculation – Unit 2,” Rev. 12, and calculation WBN-EEB-ED-Q000-999-2007-0002, “AC Auxiliary Power System Analyses,” Rev. 18.

Inspection Activities: The corrective actions for the NCV involved providing the technical basis for the use of ITE EF3 breakers on equipment at higher available fault current than the breaker interrupting rating listed by the manufacturer. The inspectors reviewed calculation WBN-EEB-MS-TI08-0008, “480V 1E Coordination / Protection,” Rev. 146, that provided an evaluation on the adequacy of the ITE EF3 molded case circuit breakers used in safety-related MCCs. The inspectors interviewed the responsible design engineers to discuss the calculation and actions planned by TVA to address the issue of the interrupting rating with these breakers. The second corrective action was to replace the breakers with units that exceed the available fault current, without having to depend on other components in the combination starters, and maintain full compliance with TVA commitments. The inspectors reviewed EDCR-2 53287, Rev. A to verify requirements for breaker replacements. The inspectors reviewed DRA – Job Number 25402 / Field Change Request (FCR) 55769-A drawings 45B2766-2E, Rev. 5 and 45B2786-17F, Rev. 3, to assess the details and instructions provided for the replacement of these breakers.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the replacement of the ITE EF3 molded case circuit breakers with type ED63 breakers, which have a higher interrupting rating (25,000 amps), has addressed the issue identified in the NCV. NCV 05000391/2011606-02 is considered closed.

**OA.1.28 (Closed) Supplemental Safety Evaluation Report (SSER) Appendix HH – Item 4 - Cable Sidewall Bearing Pressure (SWBP) Criteria for Signal Level and Coaxial Cables (IP 51063)**

a. Inspection Scope

Background: NRC staff was tasked with conducting inspection activities to verify that TVA’s maximum SWBP for signal level and coaxial cables do not exceed the manufacturer’s maximum SWBP criteria. This item was previously inspected and documented NRC IIR 05000391/2010604, Section OA.1.9, Electrical Cable CAP – Sub-issue: Cable Sidewall Bearing Pressure.

Inspection Activities: The inspectors observed a number of cable pulls to ensure that the applicant was not exceeding the maximum SWBP criteria.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors’ review determined that TVA had taken adequate corrective actions to specify a maximum SWBP criteria, for signal level and coaxial cables, that did not exceed the manufacturers specifications. This issue is closed.

**OA.1.29 (Closed) NCV 05000391/2011602-02: Follow-up on Failure to Perform Adequate QC Inspections (IP 92702)**

a. Inspection Scope

Background: This NCV involved a violation of 10CFR50, Appendix B, Criterion X, "Inspection," for failure to establish an adequate program and execute the program to assure quality inspections of cable installations conformed to the documented instructions, procedures, and drawings for accomplishing the activity. This NCV was documented as NCV 05000391/2011602-02; "Failure to Perform Adequate QC Inspections." The applicant created PER 352630 in response to the NCV.

Inspection Activities: The inspectors interviewed construction field engineers and QC inspectors, reviewed work completion records, reviewed training and briefing documentation, reviewed revised construction project procedures, and performed walkdowns to evaluate the adequacy of corrective actions in response to the NCV. The inspectors reviewed Bechtel project procedures 25402-000-GPP-0000-N3000, "Simplified Work Activity Planning (SWAP) System," Rev.3, and 25402-000-GPP-0000-N3303, "Cable Installation," Rev. 3, for changes made to address the issues identified in the NCV. The inspectors reviewed MAI-3.2, "Cable Pulling for Insulated Cables Rated up to 15,000 Volts," Rev. 21, including Cable Installation/Pull Back Data Sheets 1 and 5 of the MAI. The inspectors reviewed additional WOs 112450807 and 09-954025-005 on cable installations to determine if there was any evidence of repetitiveness associated with the issues identified in the NCV.

b. Observation and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that construction and QC personnel had an adequate understanding of the requirements for installation and documentation of cable supports. The inspectors did not identify any examples where the established QC process, for cable and cable support installation, failed to ensure an adequate final installation of permanent cable supports in accordance with defined requirements. NCV 05000391/2011602-02 is closed.

**OA.1.30 (Closed) NRC BL 75-03: Incorrect Lower Disc Spring and Clearance Dimension in Series 8300 and 8302 Automatic Switch Company (ASCO) solenoid valves (IPs 37002, 51053)**

a. Inspection Scope

Background: In 1975, BL 75-03 identified an issue with safety-related valves manufactured by ASCO, which failed to operate properly due to an incorrect lower disc spring and/or improper lever to lower disc stem clearance. BL 75-03 identified that 8300 and 8302 series solenoid valves had the potential for similar failures. The BL required licensees to determine if ASCO solenoid valves, of the types specified, were planned for use in safety-related systems and the actions they planned to take to prevent the failures of the type described above. For Unit 2, the applicant intends to replace all ASCO solenoid valves. NCO080008030 was written to track this issue for Unit 2.

Inspection Activities: The inspectors reviewed the open items/commitment completion form (NCO080008030) and the applicant's engineering complete closure package to determine the intended scope of work. The inspectors reviewed WOs 110822748 and 112265364, which address incorrect lower disc spring and clearance dimension in affected valves, to verify that the applicant's replacement commitment of these safety-related valves was directed by applicant procedure 25402-000-GPP-000-TI216, "Watts Bar Unit 2 Completion Project Refurbishment Program," Rev.03. The inspectors reviewed an updated master equipment list (MEL) associated with NCO 080008030 and WO 111126063 to verify that all safety-related ASCO valves had either an EDCR or WO associated with them. The inspectors reviewed an associated material receiving instruction (MRI) 25402-011-MRI-JV04-00005, dated April 21, 2010, to verify that new solenoid valves had been received.

The inspectors reviewed WO 10-951081-000 to verify that it had the appropriate signatures. The inspectors walked down seven ASCO flow solenoid valves associated with System 67 (ERCW) to verify that the installation was done in accordance with design drawings, that they were installed at the correct location, configuration, and orientation, and that the equipment IDs had been maintained. The inspectors also inspected the valves to verify that associated conduits maintained specified physical and electrical separation and independence between redundant components, and that the valves specified in WO 10-951081-000 were the valves installed in the field. The inspectors reviewed the vendor manual associated with the valves and specification N3E-934, "Instrument and Instrument Line Installation and Inspection," Rev. 8, to verify that the valves were installed in accordance with design and construction specifications. Additional documents reviewed are listed in the Attachment.

The specific valves inspected were as follows:

- WBN-2-FSV-067-0188-A
- WBN-2-FSV-067-0186-B
- WBN-2-FSV-067-0184-A
- WBN-2-FSV-067-0182-B
- WBN-2-FSV-067-0176-A
- WBN-2-FSV-067-0170-B
- WBN-2-FSV-067-0168-A

The following samples were inspected:

- IP 51053 2.02.e- seven samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

Based on a review of the applicant's engineering complete closure package and inspection results, the inspectors concluded that the ASCO solenoid valves were installed in accordance with the design drawings and specifications. The inspectors verified that the applicant had developed a program to replace all these solenoid valves rather than repairing them. BL 75-03 is closed.

**OA.1.31 (Closed) URI 05000391/2011606-01: Electrical Design Issues Requiring Additional Review (IP 92701)**

a. Inspection Scope

As discussed in the seventh example of URI 05000391/2011606-01, electrical issues requiring additional inspection, the inspectors observed a condition in a switchyard cable vault where the offsite power supply output cables, from the C and D common station service transformers (CSSTs), were routed through a common space and the cables crisscross each other. The existing Unit 1 and the proposed Unit 2 FSARs, page 8.2-15, states that the cables in the cable vault are fire wrapped: however, the inspectors observed that all of the cables in the cable vault were not fire wrapped. Specifically, the inspectors noted that the 1B-B 6.9kV shutdown board normal and alternate main feeder cables were not fire wrapped. The inspectors were concerned that routing both redundant offsite power paths through a common cable vault may not meet 10CFR50 App. A, General Design Criteria 17. Specifically, Criteria 17 requires that electric power, from the transmission network to the onsite electric distribution system, shall be supplied by two physically independent circuits designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. The applicant issued PER 332015 to address the fire wrapping commitment outlined in the proposed FSAR. The inspectors reviewed records of corrective actions performed under PER 332015 and WO 112021342 that added Scotch Brand 77 fire and arc proofing tape to the cables inside the cable vault to assess the adequacy of corrective activities.

As discussed in the eight example of URI 05000391/2011606-01, the inspectors observed in calculation EDQ00299920080016, "6.9 KV Protection and Coordination Calculation – Unit 2," Rev. 3, that the centrifugal charging pump (CCP) motor performance curve indicated that the CCP would accelerate to full speed within 6 seconds at 100 percent of rated voltage and 9.5 seconds at 80 percent of rated voltage. The sequence step loading of the diesel generator has the safety injection pump coming on 5 seconds following start of the CCP. This would result in a minimum overlap of one second and the overlap could be higher based on the tolerances of the timing relays that sequence diesel generator loading. Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified. Regarding example seven, the inspectors concluded that the wrapped cables conform to the FSAR description. TVA's position is that the application of fire wrapping to the cables ensures that a fault on one circuit would not affect another circuit. These cables supplying nonsafety-related offsite power are common to Units 1 and 2 and the use of fire wrapping to provide cable separation was found acceptable for the licensing of Unit 1 and continues to be acceptable for the licensing of Unit 2.

Regarding example eight, the applicant located the actual performance information for the CCP pump motor and determined that the acceleration times are 2.2 seconds at 100 percent voltage and 4.7 seconds at 80 percent voltage. Inspectors observed that the breaker coordination curves were revised in Rev. 6 of the calculation listed above to reflect these starting times.

c. Conclusion

Based on the information provided and the inspection performed, the inspectors concluded that examples seven and eight of the URI are closed.

Examples one through six of the URI were previously inspected in NRC IIR 05000391/2011608 and example nine of the URI was closed in NRC IIR 05000391/2011612. Therefore, the URI 05000391/2011606-01 is complete and closed.

**OA.1.32 (Closed) TI 2515/30, Inspection Requirements to Review Pressurized Water Reactor (PWR) Licensee Actions Taken in Response to NRC BL No. 79-21**

a. Inspection Scope

The inspection requirements of TI 2515/30 were to verify the actions set forth in BL 79-21, "Temperature Effects on Level Measurement," were addressed. Inspection and closure of BL 79-21 was documented in NRC IIR 05000391/ 2010605, Section OA.1.31. Therefore, the inspection objectives of TI2515/30 were accomplished during the inspection of BL 79-21.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

No additional inspection is required and TI 2515/30 is closed.

**OA.1.33 (Closed) NRC BL 88-10: Non-conforming Molded Case Circuit Breakers (MCCBs) (IP 37002)**

a. Inspection Scope

Background: BL 88-10 was issued because equipment being procured as new and assumed to meet all applicable plant design requirements and/or original manufacturer's specifications could possibly not conform to these requirements and specifications because, in fact, refurbished electrical equipment was being supplied. Specifically, since MCCBs have factory-calibrated and sealed elements; any unauthorized modification or refurbishing of these MCCBs could jeopardize their design capability and reliability. In addition, the National Electrical Manufacturers Association (NEMA) reaffirmed its position that neither the tests delineated in this bulletin, a visual inspection, nor a combination of testing and inspection, were adequate to ensure the performance of non-traceable MCCBs. The NRC requested "that addressees take actions to provide reasonable assurance that MCCBs, including circuit breakers used with motor controllers, purchased for use in safety-related applications without verifiable traceability to the circuit breaker manufacturer perform their safety functions."

Inspection Activities: The inspectors discussed BL 88-10 with the applicant. The inspectors performed a walkdown of the warehouse to review the MCCBs specification sheets and to select samples for the applicant to perform traceability to the manufacturer. The inspector also selected samples of installed MCCBs from WOs provided by the applicant. The inspectors selected five samples for the applicant to

perform traceability. The inspectors reviewed the applicant's final completion closure package (NCO890075011) and applicant procedure 25402-000-GPP-000-TI216 "Watts Bar Unit 2 Completion Project Refurbishment Program," Rev.3. Additional documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the applicant procedures require the replacement of the MCCBs in Unit 2. The inspectors noted that the refurbishment program procedures identified the MCCBs throughout the plant, and as a required action, are to be replaced with new MCCBs. The inspectors determined that the applicant was able to demonstrate traceability to the manufacture as newly procured components.

c. Conclusions

Based on a review of the applicant's final completion closure package and field inspections, the inspectors concluded that the applicant had met the requirements of BL 88-10. BL 88-10 is closed.

**OA.1.34 (Closed) TI 2515/105 and BL 88-04: Potential Safety-Related Pump Loss (IP 92717)**

a. Inspection Scope

The purpose of this inspection was to ensure that the applicant had implemented the planned design changes similar to those previously accepted for Unit 1. Two potential design problems were identified in the BL. The concerns involved the potential for dead-heading of one or more pumps that have common mini-flow lines or other susceptible configurations and the potential for pump damage due to an inadequate mini-flow capacity. The applicant's review resulted in the need for modification of the RHR system by adding full flow check valves downstream from the heat exchanger and the take-off for the charging pump/RHR spray connection in each train. The inspectors previously reviewed the applicant's engineering assessment that led to the addition of the RHR check valves and considered this to be adequate (see NRC Report 05000391/2011603). During this inspection the inspectors observed the valves installed in the field and reviewed the associated installation documentation.

b. Observations and Findings

No findings of significance were identified. The applicant's documentation of this issue was acceptable and appropriate modifications were implemented.

c. Conclusions

Based on a review of the applicant's final completion closure package and field inspections, the inspectors concluded that the applicant's actions were acceptable. TI 2515/105 and BL 88-04 are closed.



## **V. MANAGEMENT MEETINGS**

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

On March 2, 2012, the resident inspectors presented the inspection results to Mr. Hruby and other members of his staff. Although some proprietary information may have been reviewed during the inspection, no proprietary information was included in this inspection report.

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Applicant personnel**

A. Bangalore, Electrical Engineer, Bechtel  
D. Beckley, Electrical Design, TVA, Unit 2  
J. Boykin, Quality Control, TVA  
D. Charlton, Licensing, TVA, Unit 2  
W. Crouch, Engineer, TVA  
R. Enis, Mechanical Engineer, TVA, Unit 2  
A. Hart, Construction Supervisor, Bechtel  
D. Helms, Engineer, TVA, Unit 2  
R. Johnson, Site Support Manager, TVA, Unit 2  
I. Khan, Electrical Engineer, Washington Group  
J. Martin, Quality Manager, Bechtel  
P. Olson, Start-up Manager, TVA, Unit 2  
J. Robertson, Engineering Manager, Bechtel  
G. Scott, Licensing, TVA, Unit 2  
C. Stephenson, Licensing, TVA, Unit 2  
D. Stinson, Site Vice President, TVA, Unit 2  
R. Wigall, Engineering Manager, TVA, Unit 2

### **INSPECTION PROCEDURES USED**

IP 35007	Quality Assurance Program Implementation During Construction
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 49053	Reactor Coolant Pressure Boundary Piping – Work Observation
IP 49063	Piping – Work Observation
IP 49065	Safety-Related Piping – Records Review
IP 50073	Mechanical Components – Work Observation
IP 50075	Safety-Related Components – Records Review
IP 51053	Electrical Components and Systems – Work Observation
IP 51055	Electrical Components and Systems – Record Review
IP 51063	Electric Cable – Work Observation
IP 70300	Preoperational Test Procedure Test Review
IP 73051	In-service Inspection – Review of Program
IP 73052	In-service Inspection – Review of Procedures
IP 73053	Pre-service Inspection – Observation of Work Activities
IP 73055	Pre-service Inspection Data Review and Evaluation
IP 92701	Follow-up
IP 92702	Follow-up on Corrective Actions for Violations and Deviations
IP 92717	IE Bulletins for Information and IE Information Notice Follow-up
TI 2512/017	Inspection of Watts Bar Nuclear Plant Cable Tray and Supports CAP
TI 2512/020	Inspection of Watts Bar Nuclear Plant Electrical Issues CAP Plan
TI 2512/024	Inspection of Watts Bar Nuclear Plant Heat Code Traceability CAP Plan
TI 2512/040	Inspection of Watts Bar Nuclear Plant MELB SP
TI 2515/107	Electrical Distribution System Functional Inspection (EDSFI)

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened and Closed

05000391/2012602-01	NCV	Failure to Enter Identified Deficiencies into the Corrective Action Program (Section OA.1.7)
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### Discussed

2512/017	TI	Cable Tray and Cable Tray Supports Corrective Action Program (Section OA.1.1)
88-05	BL	Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey (Section OA.1.2)
05000391/2011604-02	NCV	Failure to Maintain Adequate Design Specifications (Section OA.1.3)
89-02	BL	Stress Corrosion Cracking of High-Hardness Type 410 Stainless Steel Internal Preloaded Bolting in Anchor Darling Model S350W Swing Check valves or Valves of Similar Design (Section OA.1.4)
391/82-76	CDR	Electrical Cable Issues CAP – Sub-issue: Cable Bend Radius Deficiencies & Cable Bend Radius Deficiencies (Section OA.1.5)
391/85-37	CDR	Use of AMP – PIDG Type Lugs on Solid Wire (Section OA.1.6)
05000391/2011603-03	URI	Corrective Actions Associated with Adverse Conditions in MCC Buckets (Section OA.1.7)
2512/040	TI	Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break (MELB) Special Program (Section OA.1.8)

### Closed

05000391/2010605-03	NCV	Failure to Perform Adequate QC Inspection (Section OA.1.9)
05000391/2010603-01	NCV	Marking and Segregation of Nonconforming Materials from Accepted Materials Available for Use (Section OA.1.10)

75-05	BL	Operability of Category 1 Hydraulic Shock and Sway Suppressors (Section OA.1.11)
391/82-07	CDR	Shock Arrestor Strut Assembly Interference (Bergen-Paterson Co.) (Section OA.1.12)
391/86-21-04	URI	Control of qualified replacement parts (Section OA.1.13)
391/90-27-13	IFI	Piping subsystems qualification (section OA.1.14)
05000391/2011610-01	URI	Medium Voltage Cable Termination and Stress Cone Installation Dimensional Variance Acceptability (Section OA.1.15)
391/92-29-06	IFI	Penetration Reevaluation Following a SSE or LOCA (Section OA.1.16)
391/87-06	CDR	Ice Condenser Floor Drain Piping Inadequately Qualified (Section OA.1.17)
391/90-02	CDR	Lack of Containment Isolation Valves on Instrument Lines (Section OA.1.18)
73055	IP	Pre-service Inspection Data Review and Evaluation (Section OA.1.19)
55093	IP	Reactor Vessel Internals (Welding) Observation of Welding and Associated Activities (Section OA.1.20)
2512/024	TI	Heat Code Traceability CAP (Section OA.1.21)
391/88-02	CDR	Stress Corrosion Cracking of Internal Check Valve Bolting in ERCW (Section OA.1.22)
86-03	Part 21	Broken External Springs on MSIVs (Section OA.1.23)
05000391/2011602-01	NCV	Failure to Perform Work with Approved Work Instructions (Section OA.1.24)
2512/020	TI	Electrical Issues CAP – Sub-issue: MOV Torque Switch and Thermal Overload Bypass Capability (Section OA.1.25)
95-07	GL	Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves (Section OA.1.26)
05000391/2011606-02	NCV	Failure to Provide an Adequate Technical Basis for an Increase in Circuit Breaker Interrupting Rating (Section OA.1.27)

Item 4	SSER (App HH)	Cable SWBP Criteria for Signal Level and Coaxial Cables (Section OA.1.28)
05000391/2011602-02	NCV	Follow-up on Failure to Perform Adequate QC Inspections (Section OA.1.29)
75-03	BL	Incorrect Lower Disc Spring and Clearance Dimension in Series 8300 and 8302 ASCO solenoid valves (Section OA.1.30)
05000391/2011606-01	URI	Electrical Design Issues Requiring Additional Review (Section OA.1.31)
2515/30	TI	Inspection Requirements to Review PWR Licensee Actions Taken in Response to NRC BL No. 79-21 (Section OA.1.32)
88-10	BL	Non-conforming MCCBs (Section OA.1.33)
2515/105	TI	Potential Safety-Related Pump Loss (Section OA.1.34)
88-04	BL	Potential Safety-Related Pump Loss (Section OA.1.34)

## LIST OF DOCUMENTS REVIEWED

### II. MANAGEMENT OVERSIGHT AND CONTROLS

#### C.1.2 Piping – Work Observation

WO 111234759, CCH Sys 070 WBN-2-PIPE-070-C Pressure Test 2-070-47W859-3-2-B5-4  
PER 466193, ASME Sys 70 Arc Strikes on Hydro 2-070-47W859-3-2-B5-4, 11/22/2011

#### C.1.3 CS Heat Exchanger Replacement – Work Observation

WO 111874488, Replace Existing Shell and Tube Bundle for 2A Containment Spray Heat  
Exchanger, Rev. 0  
PER 285062, Historical ASME Related Issue with WBN-2-HTX-072-2A CS HX, 11/17/2010

#### C.1.4 Reactor Coolant Pressure Boundary Piping – Work Observation

WO 112735992, Steam Generator PLP Tube Plug and Tube Pull

#### C.1.5 In-service (ISI) Inspection – Review of Program (IP 73051), and ISI Inspection – Review of Procedures (IP 73052)

##### Procedures

PDI-UT-2, Generic Procedure for the Ultrasonic Examination of Austenitic Pipe Welds, Rev E

##### Other

Letter from HSB Global Standards to Mr. David Stinson, SUBJ: Pre-service Inspection Program  
Plan for Watts Bar Nuclear Plant Unit 2 Revisions 4 and 5, dated 10/20/1022  
Pre-service Inspection Program Plan, Watts Bar Nuclear Plant, Unit 2, Rev 5

#### C.1.6 Pre-service (PSI) Inspection – Observation of Work and Work Activities (IP 73053)

##### Corrective Action Documents

SR 488498, Grinding sparks not captured from overhead work activities, 1/12/2012

#### C.1.8 Electrical Cable – Records Review (IP 51065)

FSAR WBNP-101, calculation WBPE0829206002, Rev. 4 dated 4/6/1994 on Diesel Generator  
Underground Ductbank Analysis  
Maintenance Instruction 0-MI-57.108 – Insulation Resistance and Continuity Tests for Rotating  
Machinery, Valves, Cables, Buses, and Transformers Rev. 0003  
Electrical Design Guide DG-E2.4.6, Rev. 2 Equipment Typical Data  
Drawing 15W880-1, Rev. 2 – Conduit & Grounding Conduit Bank Node Diagram NV5A 7 5B  
Drawing 45W2781-6, Rev. 8 – Diesel Generator Bldg Unit 2 Wiring Diagrams - Diesel Gen 2B-B  
Misc Panels Wiring Diagram  
ICRDS reports for cables 0PP710B and 0PP711B  
Tyco Electronics Corporation – HVS in-line splices for single conductor shielded cable (5-35kV)  
selection data sheet, Cable Terminating, Splicing, and Testing for Cables Rated Up to 15,000  
volts associated with Supplemental Raychem Application Data Sheet High Voltage Stress  
NHVT Kit for cables PP710B and PP711B (#4/0, 250 MCM).

#### IV. OTHER ACTIVITIES

##### OA.1.1 Cable Tray and Cable Tray Supports CAP

Watts Bar Nuclear Plant Unit 2 Cable Tray and Cable Tray Supports Corrective Action Program Closure Report (Final Version, dated 11/2/2011)  
 WCG-2-347: Qualification of the Steel Containment Vessel for Cable Tray Supports  
 WCG-2-348: WB2 Cable Tray Seismic Qualification Walkdown Guides  
 WCG-2-365: Structural Evaluation of MK C5, D5, E5, and F5 Cable Tray Supports  
 WCG-2-862: Selection of Critical Embedded Plates for Cable Tray Supports  
 WCG-2-528: WBNP Cable Tray Support Calculation for ODS3006-5  
 WCG-2-551: WBN2 Seismic Category I Cable Trays Bounding Evaluation (Group 4)  
 WCG-2-613: WBN2 Seismic Category I Cable Trays- CAP Closure Summary  
 WCG-SB-970-0187: Cable Tray Support (CTS) # 1-CTSP-293-0187  
 WCG-2-555 WBN2 Seismic Category I Cable Trays – Bounding Evaluation of Outliers (Group 8)  
 Calculation 50054.01-C-001, “Cable Tray Qualification, Watts Bar Nuclear Plant”  
 Calculation for Cable Tray Support 2-CTSP-293-0052  
 General Engineering Specification, “G-32, Bolt Anchors Set in Hardened Concrete”  
 WB-DC-20-32: Integrated Interaction Program Screening and Acceptance Criteria  
 WB-DC-20-21.1, “Category I Cable Tray Supports”  
 Limited Scope Walkdown Package 3007  
 Limited Scope Walkdown Package 3008  
 Limited Scope Walkdown Package 3003  
 Limited Scope Walkdown Package 3011  
 Limited Scope Walkdown Package 3012  
 WCG-2-531, “WBN2 Seismic Category I Cable Trays – Resolution of Miscellaneous Outliers”  
 Drawing Series 48W970-1/2/3/4/5 and 48W952

##### OA.1.2 NRC BL 88-05, Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey (IP 92717)

###### Procedures

N-GP-24, Hardness Testing, Rev 0005

###### Corrective Action Documents

PER 234500, Historical/ASME related: Materials supplied by West Jersey Manufacturing Inc or Piping Supplies Inc, 6/4/2010

###### Other

EQUOTIP Hardness Tester Conversion Tables, Impact Device D  
 EQUOTIP Hardness Tester User Manual

##### OA.1.3 NCV 05000391/2011604-02, Failure to Maintain Adequate Design Specifications

###### Design Specifications

WBNP-DS-501433-0914, Rev. 4, “ASME Section III NPS 4 and Smaller Manual valves (Class 1 Valves Only)”  
 WBNP-DS-501433-0904, Rev. 18, “ASME Section III MOVs – All Sizes and Manual Valves 2-1/2” and Larger (Class 2 and 3 Valves Only)”  
 WBNP-DS-501433-0904, Rev. 19, “ASME Section III MOVs – All Sizes and Manual Valves 2-1/2” and Larger (Class 2 and 3 Valves Only)”  
 WBNP-DS-501433-0905, Rev. 35, “ASME Section III NPS 2 and Smaller Manual Valves (Class 2 and 3 Valves Only)”

Westinghouse Specification G-678853, "ASME Section III Class 1 Valves"  
 Westinghouse Specification 678970, "ASME Section III Class 1 Valves"

#### Drawings

5061D45, Rev. A, "Swing Check Valve"  
 934D177, Rev. A, "Swing Check Valve"  
 934D181, Rev. A, "Swing Check Valve"  
 934D183, Rev. A, "Swing Check Valve"  
 934D185, Rev. A, "Swing Check Valve"  
 934D186, Rev. A, "Swing Check Valve"  
 934D187, Rev. A, "Swing Check Valve"

#### Miscellaneous

PER 356559  
 PER 400884  
 Commitment Completion Form NCO880118006, Rev. 1

### **OA.1. 7 URI 05000391/2011603-03 for quality issues in MCC buckets. (IP 92701)**

#### Corrective Action

TVA Problem Evaluation Reports, 323458 dated 2/14/2011 and 321192 dated 2/9/2011  
 Trend Summary Package (corrective actions for vendor related quality problems), PER 243820.  
 QualTech Nonconformance Reports 9028-01-01-01 TVA number 25402-011-V1A-ECM1-00882-009

#### Procurement Document

25402-011-3PS-ECM1-00002 Rev 0, Engineering Specification For Replacement Starter Buckets for 480Volt Motor Control Centers For Watts Bar Nuclear Plant, Unit 2 (additional/Clarification to TVA Specification 1844), dated 6/23/09  
 PT9389EL Rev 2, Trentec proposal, dated August 11, 2009  
 5-84646, Specification 1844 480-Volt Motor Control Centers For Watts bar Nuclear Plant Units 1 and 2,  
 Material Receiving Reports (MRRs) 78698-MRR-18444 dated 10/27/10 and 78698-MRR-19616 dated 11/17/10  
 78698-MRA-ECM1-00001 Rev 3, Purchase order dated 9/3/09

#### Misc

L9001.S1 Rev. 4 and Rev. 8, Seismic Equivalency Analysis for Vendor Replacement Buckets and Applicant 1E Buckets September 7, 2010  
 QA surveillance reports that document the applicant's observations of the MCC buckets construction and assembly at the vendor facilities, 25402-011-YQAECM1-(10016, 10017, and 10018).

### **OA.1.11 BL 75-05: Operability of Category I Hydraulic Shock and Sway Suppressors**

#### Procedures

TI-203, Snubber Program, Rev. 4, 12/14/2010  
 1-TRI-0-5, Snubber Visual Inspection (Hydraulic and Mechanical), Rev 13, 02/18/2011  
 1-TRI-0-8, Snubber Functional Testing (Paul Munroe Snubbers), Rev 7, 01/20/2011



Specifications

Design Specification WBNP-DS-1935-2599-R1, Steam Generator Hydraulic Suppressor Systems, dated 04/29/1975

Miscellaneous

NGDC PP-19-2 Open Items/ Commitment Completion Form for BL 75-05, dated 12/22/2011  
Browns Ferry, Sequoyah, Watts Bar, and Bellefonte Nuclear Plants IE Bulletin 75-05 –

Inoperable Hydraulic Shock Suppressors Final Report, dated 06/16/1975

Material Requisition 25402-011-MRA-SV00-00001, Refurbishment of 20 Paul Munroe Hydraulic Snubbers, dated 11/24/2008

QA Documentation Package for Tennessee Valley Authority, Watts Bar Unit 2, TVA Purchase Order: 00063534, Release No: 00169, Large Bore Hydraulic Snubber Refurbishment, Enertech Project Number: 520103, dated 05/21/2010

Engineering Document Construction Release 55880, Installation of snubbers and missing components for the Unit 2 Reactor Coolant System support structures, dated 08/03/2010

**OA.1.12 CDR 391/82-07: Shock Arrestor Strut Assembly Interference (Bergen-Paterson Co.)**Problem Evaluation Reports (PERs)

PER 172777, TROI Item (50.55e) WBN MEB8103: Shock arrestor strut assembly interference (Bergen-Paterson & Pacific Scientific Co., status date 03/07/2011)

Walkdown Packages

WBN2-PD-003-2336-07, Support 2-03A-370, Rev. 2, 04/14/2009

WBN2-PD-003-2328-25, Support 2-03A-423, Rev. 0, 05/20/2009

WBN2-PD-063-2334-19, Support 2-63-022, Rev. 1, 10/23/2009

WBN2-PD-072-1985-02, Support 72-2CS-R149, Rev. 1, 02/04/2009

WBN2-PD-003-1798-50, Support 2-03B-35, Rev. 0, 01/30/2009

WBN2-PD-074-2326-14, Support 2-74-011, Rev. 0, 04/22/2009

Drawing Revision Authorizations (DRAs)

52431-69, 68, 78, 79, and 80

52439-88, 168, and 169

52457-12, 13, 17, 18, 19, 20, 25, 26, 116, 117, 127, 128, 149, 150, 151, 186, 187, 193, and 194

52491-1, 2, 27, 28, 32, 33, 93, 94, 95, 116, 117, 118, 131, 145, 146, and 147

52492-67, 68, 136, 137, 203, 204, and 289

52497-30 and 81

52521-7, 8, 9, 12, 13, and 14

52522-80 and 81

52523-291, 292, and 293

53867-98, 99, 132, and 133

Historic Documents

Nonconformance Report WBN MEB 8103, dated 02/27/1982

Nonconformance Report 3778R, dated 07/16/1985

Watts Bar Nuclear Plant Units 1 and 2 – Shock Arrestor Strut Assembly Interference – WBRD-50-390/82-08, WBRD-50-391/82-07 -Final Report, dated March 15, 1982

Internal Memorandum, Watts Bar Nuclear Plant – Notification of NRC Commitment Completion on WBNMEB8103, from John A. Raulston to J.W. Hufham, dated 08/13/1985

### **OA.1.14 IFI 391/90-27-13: Piping subsystems qualification**

WCGACQ1076, Nozzle Load Qualification for the Regenerative Heat Exchanger, Rev. 2  
 WCGACQ0074, Equipment Flexibility Design Input for the Hanger and Analysis Update Program, Systems 32, 67, 70, and 82, Rev. 3  
 N3-62-13R, Analysis of Letdown Line from Regenerative Heat Exchanger to SCV Penetration X-15, Rev. 2 (large bore with flexible equipment)  
 N3-62-52A, Analysis of Charging Line from CCP Discharge to In-line Anchor on Charging Line and BIT Inlet Line, Rev. 3 (large bore rigid)  
 N3-62-32A, Analysis of CVCS Piping in Aux Bldg from CCP to the Reciprocating Pumps, Rev. 8 (large bore rigid)  
 N3-03-16A, Analysis of MFW bypass and AFW Supply from In-line Anchor with N3-03-15A and N3-03-19A to Anchor with N3-03-20A and Steam Generator #1, Rev. 6 (large bore with valve flexibility)  
 67-205, Analysis of ERCW Supply from In-line Anchor 67-200 to RHR Pump 2A-A Room Cooler, Rev. 2 (small bore with valve flexibility)  
 N3-63-A30R, Analysis of Accumulator #2 Relief Line from Accumulator Nozzle through Relief Valve 2-RFV-063-0603, Rev. 4 (small bore with flexible equipment)  
 N3-72-04A, Analysis of Containment Spray Discharge from HX-2A to RWST at N3-72-03A and N3-63-08A, Rev. 005 (large bore with flexible equipment)  
 70-019, Analysis of Component Cooling Return from RHR Pump 2B-B Seal Water Heat Exchanger to Inline Anchor with Problem N3-70-36A and sense lines off of 2-FE-70-152 to Anchors, Rev. 008 (small bore rigid)

### **OA.1.19 Pre-service Inspection Data Review and Evaluation (IP 73055)**

#### Procedures

NPG-SPP-31.2, Records Management, Rev. 0002

#### Corrective Action Documents

SR 488643, Temperature and humidity detector in QA record storage vault, 1/12/2012  
 SR 487926, Care, handling and storage of radiographic film, 1/11/2012  
 SR 488671, Integrity of fire-rated cabinet rating compromised, 1/12/2012

#### Other

ISI-2068-W-05, Reactor Coolant System Piping 068 (RCS) – Weld Locations, Rev 03  
 ISI-2074-W-09, Residual Heat Removal System 074 (RHR) – Weld Locations, Rev 03  
 Sketch WBN-E-2882 IC-145, Rev 4  
 NDE Report R-P1730, UT for RCF-D145-02  
 NDE Report R-P1737, UT for RHRS-181  
 ANSI N45.2.9-1974, Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants  
 Bechtel Surveillance 25402-WBN-SR-11-1589, QC Monthly Inspection of WBN2 Storage Facilities  
 Bechtel Surveillance 25402-WBN-SR-11-2018, Human Engineering Discrepancy Closure Packages  
 Bechtel Surveillance 25402-WBN-SR-11-2046, Review of ASME records transmittals and storage IAW PER 442519 CAP action 003  
 Bechtel Surveillance 25402-WBN-SR-11-2056, Review of ASME records transmittals and storage IAW PER 442519 CAP action 010

Bechtel Surveillance 25402-WBN-SR-11-1709, Temporary Storage of QA records  
Quality Assurance Audit – NGDC1003, ASME Section III and Pre-service Inspection Activities,  
2/2/2011

TVA-NQA-PLN89-A, Nuclear Quality Assurance Plan (NQAP) (Quality Assurance Program  
Description), Rev 0025

WB-DC-40-33, Quality Assurance Records Storage Facility – (Unit 1 / Unit 2), Rev. 0007  
SSA1104, Site Audit Report, TVA Quality Assurance – Nuclear Power Group (NPG) – Watts  
Bar Nuclear Plant (WBN) – Document Control & Records, 3/30/2011

SSA0902, Final Report, Nuclear Assurance – TVA Nuclear Power Group (NPG) Wide –  
Document Control and Quality Assurance Records Audit Report, 5/1/2009

### **OA.1.21 Heat Code Traceability CAP**

#### BITs

44, Rev. 1  
89  
371, Rev. 2  
376  
786  
1265  
1268  
1656  
1657  
1683  
1781

#### BIT Resolution Engineering Evaluations

44  
786  
1683  
1781

#### Material Receiving Reports

05666  
06636  
17171  
17760  
20054  
24207  
24570  
WBN-P75-7996

#### Work Orders

WO 08-951038-001  
WO 08-951038-007  
WO 09-951671-005  
WO 110756670  
WO 111099021  
WO 111119432  
WO 113023919

Design Change Documents

EDCR 52326  
 EDCR 52943  
 EDCR 53122  
 EDCR 53321  
 EDCR 53421  
 EDCR 53580  
 EDCR 53618  
 EDCR 53756

Corrective Action Documents

PER 144033  
 PER 501892

**OA.1.23 10 CFR Part 21 Notification Number 86-03: Broken External Springs on Main Steam Isolation Valves**Work Orders

09-952624-000  
 09-952626-000  
 09-952627-000  
 09-952628-000

Miscellaneous

Maintenance Instruction 0-MI-1.002, Rev. 0, "Main Steam Isolation Valve Maintenance"  
 Purchase order 16101, "Parts and Materials for main Steam Isolation Valve Refurbishment"  
 Material Receiving Report 06782  
 Material Receiving Report 06785  
 Design Specification WBNP-DS-3835-2020, Rev. 1, "Main Steam Isolation Valves"  
 Bechtel Evaluated Suppliers List

**OA.1.24 NCV 05000391/2011602-01: Failure to Perform Work with Approved Work Instructions**Corrective Action Documents

PER 320115  
 WO 111749016

**OA.1.25 TI 2512/020: MOV Torque Switch and Thermal Overload Bypass Capability**Calculations

WBN-OSG4-079, Rev. 0, "Justification of SI Signal as Initiating Signal to Bypass Thermal Overload Protection Devices of Safety Related MOVs."  
 MDQ0029992009-0310, Rev. 1, "Generic Letter 89-10 MOV Population for Watts Bar (Unit 2)"  
 WBN-OSG-4095, Rev. 20, "Selection Criteria for MOVs Requiring Thermal Overload Bypass and/or Torque Switch Bypass"

Work Orders

112534869  
 112534928  
 112534544  
 112534906  
 110951911  
 111947827

110830794  
111208390  
110831880  
110828033

Corrective Action Documents

SR 494944  
PER 278291  
PER 371206  
PER 374572  
PER 375372  
PER 411343  
PER 441913

Miscellaneous

Design Criteria Document WB-DC-30-15, Rev. 5, "MOV Thermal Overload and Torque Switch Bypass"  
Selected Electrician Training Records  
EDCR 54499-A  
FCR 57205-A  
FCR 57411-A

**OA.1.26 GL 95-07: Pressure Locking and Thermal Binding of Safety Related Power-Operated Gate Valves**

Design Change Documents

EDCR 52636-A  
EDCR 53580-A  
EDCR 53292-A  
EDCR 53287-A

QA Surveillance Reports

25402-WBN-SR-10-1410  
25402-WBN-SR-11-1540  
25402-WBN-SR-11-1824

**OA.1.30 BL 75-03: Incorrect Lower Disc Spring and Clearance Dimension in Series 8300 and 8302 ASCO solenoid valves (IP 37002, 51053)**

Work orders

112859275  
112450807  
09-954025-005  
111219656  
111080999  
112021342  
110822748  
112265364  
10-951081-000  
111126063

Drawings

DWG-I-213, Connection Drawing for 2-FSV-067-0168  
 DWG-I-214, Connection Drawing for 2-FSV-067-0170  
 DWG-I-219, Connection Drawing for 2-FSV-067-0176  
 DWG-I-219, Connection Drawing for 2-FSV-067-0176  
 DWG-I-220, Connection Drawing for 2-FSV-067-0182  
 DWG-I-221, Connection Drawing for 2-FSV-067-0184  
 DWG-I-222, Connection Drawing for 2-FSV-067-0186  
 DWG-I-216, Connection Drawing for 2-FSV-067-0188  
 2-47W600-222, Electrical instruments and Controls, Rev 0

Other Documents

EDCR 54633  
 2-PTI-099-04, Safeguards System, Rev. 0000  
 WBN-VTD-A610-1190, ASCO Installation and Maintenance Instructions for 3-Way direct acting solenoid valves, Rev. 0

NRC Identified PERs

PER 501699, Incorrect model numbers written in Work Order  
 PER 501744, Updated list of valves in closure package to include all solenoid valves

**OA.1.31 URI 05000391/2011606-01: Electrical Design Issues Requiring Additional Review**Calculations

EDQ00099920080014, Rev. 15, Diesel Generator Loading Analysis  
 EDQ00299920080016, Rev. 6, 6.9 KV Protection and Coordination Calculation – Unit 2  
 PER 332015

**OA.1.33 NRC BL 88-10: Non-conforming Molded Case Circuit Breakers (IP 37002)**Misc

25402-000-GPP-0000-TI216, Watts Bar Unit 2 Completion Project Refurbishment Program  
 Revision 3, dated 9/24/2009  
 NCO890075011 dated November 17, Watts closure package for BL 88-10

**LIST OF ACRONYMS**

AFW	auxiliary feedwater
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
BL	Bulletin
B&PV	boiler and pressure vessel
CAP	corrective action program
CAQ	condition adverse to quality
CDR	Construction Deficiency Report
CFR	Code of Federal Regulations
CGD	commercial grade dedication
DRA	Drawing Revision Authorization
E&CF	event and causal factor
ECF	Employee Concerns Program
EDCR	Engineering Document Construction Release
EOC	extent of condition
EPRI	Electric Power Research Institute
EQ	environmental qualification
FSAR	Final Safety Analysis Report
FWIV	feedwater isolation valve
FWRV	feedwater regulating valve
GDC	General Design Criteria
HELB	high energy line break
HFT	hot functional testing
ICRDS	Integrated Cable and Raceway Design System
IIR	Integrated Inspection Report
IMC	Inspection Manual Chapter
IP	Inspection Procedure (NRC)
MSIV	main steam isolation valve
MSLB	main steam line break
NCR	non-conformance report
NCV	non-cited violation
NDE	Nondestructive Examination
NEDP	Nuclear Engineering Departmental Procedure
NRC	Nuclear Regulatory Commission
NRR	NRC Office of Nuclear Reactor Regulation
PCI	PCI Energy Services
PDS	procurement data sheet
PER	Problem Evaluation Report
PMP	probable maximum precipitation
PT	penetrant test
PWR	pressurized water reactor
QA	quality assurance
QC	quality control
REV.	revision
RHR	residual heat removal
RIP	replacement items program
SCWE	safety conscious work environment
SL	severity level
SP	Special Program
SSC	systems, structures, and components

TI	Temporary Instruction
TVA	Tennessee Valley Authority
URI	Unresolved Item
VLF	very low frequency
WBN	Watts Bar Nuclear Plant
WO	work order