



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

February 3, 2012

Mr. Michael D. Skaggs
Senior Vice President
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Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2011610**

Dear Mr. Skaggs:

On December 31, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on January 20, 2012, with you 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. The NCV addressed problems with your commercial grade dedication program. Regarding this NCV, the NRC plans to monitor your corrective actions to ensure the problems are thoroughly addressed and may inspect those corrective actions in the future.

If you contest the non-cited violation in the enclosed report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTENTION: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Senior Resident Inspector at the Watts Bar Unit 2 Nuclear Plant.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

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 05000391/2011610 w/Attachment

cc w/encl: (See next page)

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* Previous Concurrence

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Electronic Mail Distribution

Letter to Michael D. Skaggs from Robert C. Haag dated February 3, 2012.

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INSPECTION REPORT 05000391/2011610

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2011610

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: 1260 Nuclear Plant Rd
Spring City TN 37381

Dates: November 20 – December 31, 2011

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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 six-week period of inspections in the areas of quality assurance, identification and resolution of construction problems, construction activities, and follow-up of other activities. The inspection program for Unit 2 construction activities is described in NRC Inspection Manual Chapter 2517. 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 III, "Design Control," was identified by the inspectors for failure to adequately incorporate the requirements for commercial grade dedication (CGD) contained in 10 CFR Part 21 into the CGD procedures, and for failing to establish measures for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of systems, structures, and components (SSCs). This resulted in multiple examples where CGD activities failed to adequately establish commercial grade items as basic components. (Section C.1.10)
- The inspectors concluded that concerns pertaining to several open items, including Temporary Instructions (TIs), and Unresolved Items (URIs), 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 Unit 2 Corrective Action Programs (CAPs)/Special Programs (SPs); electrical systems and components; mechanical systems and components; fire protection; nuclear welding; nondestructive examination (NDE); NRC Bulletins (BL); Construction Deficiency Reports (CDRs); and refurbishment.

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REPORT DETAILS

Summary of Plant Status

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

I. QUALITY ASSURANCE (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. This included a review of actions associated with PERs 454859 and 452512 referenced in integrated inspection report (IIR) 05000391/2011609, including observation of anchor bolt retraining (further discussed in Section T.1.1 of this report).

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

Q.1.2 Safety Conscious Work Environment (IP 35007)

a. Inspection Scope

The inspectors reviewed existing program requirements and recent safety-related concerns identified by the applicant's and contractor's employee concerns program (ECP). The inspectors verified that significant problems were documented under the corrective action program and were being properly identified, addressed, and resolved by TVA. On December 6, 2011, the inspectors observed an all-hands meeting that addressed safety conscious work environment. This included a discussion on the different avenues for reporting safety concerns.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors did not identify any issues or concerns regarding the ability of the applicant to provide a safety-conscious work environment.

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 selected 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:

- Adverse weather protection activities as reported in the Unit 1 IIR 05000390/2011005, Section 1R01

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

- Work order (WO) 111854032, involving the termination of power cables for the 2A-A residual heat removal (RHR) pump motor as discussed in Section C.1.2 of this report.

b. Observations and Findings

See IIR 05000390/2011005 for associated finding.

As discussed in the Unit 1 05000390/2011005 IIR, the licensee failed to develop and implement corrective actions in response to identification of adverse affects from placement of temporary Unit 2 completion facilities within the probable maximum precipitation (PMP) runoff areas. As a result the continued placement could adversely impact flood mitigation capabilities and had the potential to jeopardize the continued operability of safety-related equipment supporting Unit 1 operations. Enforcement

actions are addressed in IIR 05000390/2011005. This was an example where activities associated with the Unit 2 completion project affected Unit 1's continued operation.

c. Conclusions

With the exception noted above, adequate management oversight and controls were in place for other activities observed to identify construction activities which could potentially impact the operating unit, and an adequate level of protection had been implemented.

C.1.2 Electrical Cable – Work Observation (IPs 51063 and 37002)

a. Inspection Scope

The inspectors assessed whether activities relative to safety-related electric cable systems were being controlled and accomplished in accordance with NRC requirements, safety analysis report commitments, and applicant procedures. This was accomplished by inspecting documentation and physical installation, and independent evaluation of work performance, work in progress, and completed work. The inspectors observed medium voltage termination and stress cone installation for cable 2PP575, associated with the RHR pump 2A-A local to the pump, accomplished under WO 111854032.

The inspection was conducted to verify that:

- Latest approved revisions were utilized
- Specifications were complete
- Cable protection was adequate
- Segregation was maintained
- Cable identification was preserved
- Bending radius was maintained within limits
- Boundary conditions were specified and appropriate
- Quality control (QC) inspectors were present and performing their assigned tasks
- Installation and inspection activities were being documented during the activity

The following sample was inspected:

- IP 51063, 02.02.c – 1 sample

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

The inspectors identified the following unresolved item (URI):

Introduction: The inspectors identified a URI associated with the procedural guidance and adherence associated with the applicant's installation of Raychem NHVT-81G termination and stress-relief kits within the 6.9kV distribution system.

Description: On December 16th, the inspectors observed the installation of a Raychem NHVT series termination on the motor end of the power cables supplying the 2A-A RHR

pump motor in the RHR pump room – an environmental qualification (EQ) space for high energy line break (HELB) considerations. Work was being performed under WO 111854032 and was associated with cable 2PP575, specifically phase 3 for the cable in question. The licensee WO implementing instructions directed the installation of the termination kit in accordance with Raychem kit instructions (PII-55154) with QC verification of needed dimensional traits. The inspectors called into question the dimensional acceptability of the phase C cable – specifically in regards to the 1/2” dimension called out for exposed conductor between the attached lug’s shoulder and the stripped back insulation layer. This “void” area is to be filled by a ribbon adhesive that “flows” to fill all surface imperfections upon application of the heat gun to the outer shrink-wrap and serves to seal the critical interface between the stranded conductor and the cut-back insulation against water or vapor. The inspectors raised two questions during the review:

- (1) The craft had cut the ½ inch dimension short by a sufficient amount to be visually identified by the inspector from a reasonable distance. QC had accepted the installation dimension and the craft was proceeding to place the outer shrink wrap layers such that the dimensional variance would not be visible during follow-up measurements. Craft personnel, with QC concurrence, made the decision to rework the insulation cut to bring the dimension into tolerance against the read-out capability of their measuring device. Applicant procedures did not prescribe acceptance limits for the dimension in question. The applicant’s general specification G-38, paragraph 10.3.4.3, would permit a “minimum distance between the insulation and connector... sufficient to determine that the insulation has not been crimped in the connector.” The inspector questioned whether the craft’s termination and the general specification allowed minimum dimensions would adequately account for the seal provided by the ribbon adhesive and whether the EQ was challenged.
- (2) The ribbon adhesive is supplied in a 2-inch wide roll. Vendor instructions describing ribbon application to the termination on the lug end vaguely reflects applying the roll’s full 2” length such that excess is carried over onto the lug barrel. The craft was observed to cut the ribbon adhesive to the ½ inch length needed to fill the void between the lug shoulder and the stripped back insulation layer. The inspector questioned the impact of this kit modification to the termination’s environmental qualification.

The applicant initiated Service Request 490588, detailing concerns listed in paragraph (2). While inspector discussions with the applicant have begun the process of issue resolution for the tape shortening, discussions with the applicant, as well as the applicant’s discussions with the vendor, have not fully addressed the concerns raised in paragraph (1). Additional inspection is required to completely resolve the technical issues for the two items above and to determine whether any findings are more than minor. Consequently, these issues are identified as URI 05000391/2011610-1, Medium Voltage Cable Termination and Stress Cone Installation Dimensional Variance Acceptability.

c. Conclusions

Discounting the above identified URI, the inspectors determined that adequate measures were in place to ensure the applicant was prepared for the cable termination

and that procedures were adequate and followed during the termination installation, with appropriate QC oversight.

C.1.3 Safety-Related Piping – Records Review (IP 49065)

a. Inspection Scope

The inspectors reviewed WO documentation supporting the applicant's correction of an historical American Society of Mechanical Engineers (ASME) related issue with the 2B RHR heat exchanger. Specifically, the inlet nozzle-to-shell weld (a vendor weld) was demonstrated through an ASME Section XI penetrant test (PT) exam to contain foreign material within the weld midsection on its surface. The work was performed to correct this nonconforming condition. The inspectors reviewed WO 112610508 through the closure process and when it was entered into the records system. The inspectors reviewed the historical issue, the planned correction, and the work documents affecting the correction of the condition. The inspectors interviewed non-destructive evaluation (NDE) personnel regarding the records detailing their inspection and conclusions.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspected activities associated with safety-related piping and the associated records were adequate. Non-conforming conditions were adequately identified and corrected.

C.1.4 Electrical Components and Systems – Records Review (IP 51055)

a. Inspection Scope

The inspectors reviewed WO documentation supporting the applicant's alteration of the unit interface separation boundary through the replacement of a molded case circuit breaker within panel 2-BD-278-M007B. The inspectors reviewed the associated WO, its data sheets, and the technical report for item CKJ931J and performed in-field verifications of the installed equipment. The inspectors inspected to verify that appropriate personnel prepared each quality record, appropriate reviews were documented, and that reviews addressed adequacy and accuracy. The inspectors evaluated these attributes against applicant procedures and commitments to ensure that all requirements were fulfilled. The inspectors checked to ensure that the most recent and approved design and construction documents were used; specified electrical components and associated items were installed in the location specified; materials and methods met applicable specifications; required inspections were performed, recorded, reviewed, and evaluated by qualified personnel; inspection records were complete and satisfied documentation requirements; and physical separation and independence requirements were met. Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspected activities associated with electrical components and systems and their associated records were adequate. Records were prepared, reviewed, and retained in accordance with applicant procedures and all applicable requirements.

C.1.5 Reactor Vessel and Internals Work Observation (IPs 50053 and 37002)

a. Inspection Scope

The inspectors observed reactor vessel stud hole remediation to determine whether the work activities on the reactor pressure vessel were accomplished in accordance with work procedures, specifications, and ASME Boiler and Pressure Vessel (B&PV) 1971 edition through 1971 winter addenda. Specifically, the inspectors observed the machining of the threads' crest on stud holes 19 and 20 and complete removal of five threads on stud hole 20.

The inspectors reviewed WO 112862194 to determine whether QC inspection hold points were established and inspected in accordance with PCI Energy Services (PCI) quality assurance traveler 902522-01. The inspectors reviewed machinists' qualifications to determine whether the operators were qualified in accordance with procedure PI-902522-02, Revision1.

The inspectors reviewed PCI nonconformance report (NCR) 90122-98 and PCI visual inspection test report 902522-12 to determine whether hammer marks on the reactor pressure vessel flange were evaluated and dispositioned in an adequate manner.

The inspectors also performed a quarterly storage inspection of the reactor pressure vessel to determine whether protective devices were installed around the top of vessel to prevent entry of foreign objects and debris. The inspectors inspected the reactor pressure vessel to determine whether vessel side openings were protected to prevent entry of foreign objects and protected from construction damage.

Additional documents reviewed are listed in the Attachment.

The following sample was inspected:

- IP 50053, Section 02.03.b – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Reactor pressure vessel stud hole remediation activities observed were conducted in accordance with procedures, specifications, and ASME B&PV 1971 edition through 1971 winter addenda. Reactor pressure vessel stud hole remediation is on-going and will warrant additional inspections.

C.1.6 Preservice Inspection – Observation of Work and Work Activities (IP 73053)**a. Inspection Scope**

The inspectors observed the preservice inspection of containment spray 2A heat exchanger tubes to determine whether eddy current testing was accomplished in accordance with approved procedures and ASME B&PV code of record. The inspectors reviewed NDE level II examination personnel qualifications to determine whether the personnel were qualified in accordance with ASME B&PV code of record. The inspectors also reviewed calibration records to determine whether eddy current equipment calibrations were current. The inspectors reviewed eddy current examination results to determine whether indications were recorded and dispositioned in accordance with procedures.

Additional documents reviewed are listed in the Attachment.

The following samples were inspected:

- IP 73053, Section 02.02 – 1 sample
- IP 73053, Section 02.03.c – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The preservice inspection of containment spray 2A heat exchanger was conducted in accordance with procedures and ASME B&PV code of record.

C.1.7 Reactor Coolant Pressure Boundary Piping – Work Observation (IPs 49053 and 37002)**a. Inspection Scope**

The inspectors observed steam generator electropolishing to determine whether activities associated with the reactor coolant pressure boundary piping were being accomplished in accordance with applicant procedures. Specifically, the inspectors observed the electropolishing of steam generator number 4 on the hot leg side. The inspectors reviewed WO 111463822 to determine whether the refurbishment activities associated with the steam generators included an appropriate scope of work and assured design requirements were met. The inspectors reviewed liquid penetrant examination reports to determine whether NDE of the refurbishment activities were accomplished in accordance with ASME B&PV code of record. The inspectors reviewed ultrasonic examination records to determine whether material thickness in the steam generator's bowls was in compliance with design specifications.

The inspectors also reviewed applicant work instructions, applicable requirements and standards, and interviewed responsible management regarding pressurizer internal cleanliness verification and remediation (housekeeping) under WO 111094974. The inspectors verified the craft's understanding of the scope, requirements, and acceptance criteria associated with the specific task and overall compliance with American National

Standards Institute (ANSI) N45.2.1, 1973. The inspectors entered the pressurizer on two separate occasions to observe the status of the work and interviewed or interfaced with the applicant's staff regarding their specific observations and questions. After the first entry, the applicant made the decision to conduct a video-documented visual inspection of the pressurizer under WO 112716006. The inspectors reviewed the work documents, observed a mock-up demonstration at the vendor's offsite facility, and witnessed portions of the physical work activity. Numerous indications were identified by the inspection, as documented in the WO. The applicant plans to re-enter the pressurizer manually to characterize the indications and plan any necessary remediation.

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The steam generator remediation activities were conducted in accordance with procedures, specifications, and ASME B&PV code of record. The pressurizer remediation activities were conducted in accordance with procedures and ANSI standards. Remediation work on the steam generators and pressurizer is ongoing and will warrant additional inspections.

C.1.8 Electrical Cable – Work Observation (IP 51063)

a. Inspection Scope

The inspectors reviewed the installation of medium voltage #2/0 - 8 kilovolt (kV) cable terminations for phase "A" of cable 2PP575A associated with WO 111854032. The cable is the feeder from the 6.9 kV shutdown board 2-BD-211-A/14-A to the RHR pump motor 2-MTR-74-10-A. The inspectors reviewed the WO package contents and interviewed the design engineer and the field engineer to get a clear understanding of all the aspects of the installation. The construction activities observed included very low frequency testing prior to termination and the installation of the stress cone. The inspectors reviewed the Integrated Cable Raceway Design System (ICRDS) record dated December 12, 2011, for accuracy. The inspectors reviewed the supplemental Raychem application data sheet for the high voltage stress kit for attributes associated with dimensions, shield, semi-conducting tape, and insulation. The inspectors observed the process of measuring the actual diameter on different points of the cable to determine the proper choice of stress cone kit to use. The inspectors reviewed the quality control inspection for dimensions obtained in the field to verify that results matched the drawings from the Okonite Company drawing CS-12779, Revision (Rev.) A, dated April 9, 2009. The inspectors observed the installation of the stress cone including cable preparation, installation of ground strap for shield, crimping of termination lug, application of discharge control compound and sealant tape, and the installation of stress cone tubing.

The inspectors observed the applicant perform training/practice cable termination exercises on spare pieces of cable cut from the same cable pulled for this feeder. The inspectors interviewed responsible individuals performing the cable testing prior to

terminating the cables to obtain a clear understanding of the methods and equipment employed. The inspectors assessed the availability and use of the latest approved revision of applicable construction specifications, drawings, and construction procedures, proper identification of cables, and protection of cables during and after completion of work. The inspectors observed the presence of QC inspectors to monitor in-progress work and conduct mandatory hold-point inspections. The inspectors observed cables for protection from physical damage and moisture intrusion at the completion of installation activities. Additional documents reviewed are listed in the attachment.

The following sample was inspected:

- IP 51063 Section 02.02.c – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that control room cable terminations matched drawing locations and were conducted appropriately.

C.1.9 Electrical Cable – Work Observation (IP 51063)

a. Inspection Scope

The inspectors inspected completed control cable termination inside the control room for cables 2V10003A and 2V10002A within panel 2-M-6. The inspectors reviewed Electrical Standard Drawing SD-E 15.3.4 Rev. 7 – Raceways, CA & W IDENT TAGS (Sequoyah NUC PLT & ALL SUBSEQUENT NUC PROJECTS) to verify that tagging was in accordance with established requirements. The inspectors reviewed Drawing Revision Authorization (DRA) 55801-033 under Engineering Document Construction Release (EDCR) 55801 for Drawing 45N2645-5 to verify that cables identified in the panel matched the drawing terminal points and that cable identifications were preserved and located where specified. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed terminations matched drawing locations and were properly identified.

C.1.10 (Closed) Unresolved Item (URI) 05000391/2011607-02: Commercial Grade Dedication Program (IPs 97201 and 43004)

a. Inspection Scope

Background: In this URI, the inspectors identified concerns with the commercial grade dedication (CGD) program as described in procedure Nuclear Engineering Departmental Procedure (NEDP)-8, "Technical Evaluation for Procurement of Materials and Services,"

Rev. 16. These concerns related to the definition of critical characteristics contained in 10 CFR Part 21 and the requirements of 10 CFR Part 50, Appendix B, Criterion III, for selection and review for suitability of application for parts associated with structures, systems, and components (SSCs). As a result, the applicant's CGD activities had insufficient documentation to demonstrate that the selected critical characteristics would provide reasonable assurance that the dedicated items would perform their intended safety function. Five examples were identified in the URI that led to this concern.

Inspection Activities: The inspectors interviewed responsible engineering personnel and reviewed documents and records associated with the dedication of commercial grade items for nuclear service to verify that activities associated with CGD met applicable regulatory requirements. The inspectors reviewed the five items in the URI that led to the concern and the additional CGD packages listed in the attachment. The inspectors reviewed engineering technical evaluations of commercial grade items to verify the evaluations identified the associated safety functions, postulated failure modes that may adversely affect the safety functions, effects of the equipment failures, and critical characteristics of the equipment that provided reasonable assurance that the items would perform their intended safety function.

The inspectors reviewed procurement data sheet (PDS) documents to verify the requirements of the technical evaluations were correctly translated into specifications for purchase and dedication of commercial grade items. The inspectors reviewed records of QA vendor survey reports and records of receipt acceptance inspection to verify that the applicant had properly developed and implemented a plan for CGD. The inspectors performed a walkdown of installed components in order to verify that the items were accurately installed and consistent with PDS and procurement documents.

The inspectors reviewed 1) PER 403095 (specific to WB2) issued for the CGD examples identified in NCV 05000391/2011607-01, 2) the URI 05000391/2011607-02, and 3) PER 417006 (a TVA corporate PER) with its associated apparent cause evaluation, which was written to address the CGD program questions raised by the URI, to determine whether the applicant understood the issue, had adequately evaluated the issue, and whether the extent of condition (EOC) review was adequate. The inspectors discussed the identified corrective actions for these PERs with applicant personnel to determine whether corrective actions would address the full scope of the issue.

The inspectors reviewed QA audits/surveillances/assessments performed under 10 CFR 50, Appendix B, Criterion XVIII, by the applicant and its contractor (Bechtel) to determine whether CGD activities in the procurement area (10CFR50, Appendix B, Criterion VII) had been adequately audited and assessed. The items reviewed are listed in the attachment.

The inspectors reviewed completed WO 110822748 for the installation of pressure regulators (CAT ID CDP309G) to verify that they were installed in accordance with the design package, EDCR 54946, Rev. A.

b. Observations and Findings

Apparent Cause Evaluation and Corrective Actions Observations:

The inspectors noted that the applicant determined the apparent cause of the CGD program concerns described in the URI was inadequate maintenance of the program consistent with industry and regulatory standards. The apparent cause evaluation was thorough with regard to the cause of why the procurement organization had not found the deficiencies identified from the two previous CGD violations and from the programmatic aspects identified in the URI. The apparent cause evaluation included an event and causal factor (E&CF) chart that laid out the history for CGD at TVA (not just Watts Bar) from 1991 until 2011 and provided a view of the EOC for this issue. However, two pertinent areas were not identified on the E&CF chart that pertained to CGD.

The first was the overall limited level of QA oversight activities and findings related to CGD over the 20-year period. Related to Watts Bar 2, the inspectors discovered that the applicant had not performed any audits, surveillances, or assessments of the CGD activities since the project was turned over to a contractor (Bechtel) in 2008. The inspectors also found that Bechtel had not performed a CGD program audit and that surveillance activities had not reviewed the content of the CGD technical evaluations to determine whether critical characteristics were being selected to provide reasonable assurance that the item being dedicated would perform its intended safety function. The guidance in ANSI 45.2.12 indicated that auditing should be performed as early in the life of an activity as possible. The applicant's and the contractor's QA activities could have identified this deficiency for correction if the level of involvement and timeliness of their actions had been focused on the earliest opportunity to verify adequate quality in the CGD program implementation.

The second area not identified on the E&CF chart was the Watts Bar Replacement Items Program Corrective Action Plan (RIP CAP). The RIP CAP was a key program for ensuring that CGD for Unit 1 was determined acceptable for initial licensing of the plant in 1995. The inspectors questioned whether or not the issues discussed in the URI could implicate the results from the Unit 2 RIP CAP, which had already been completed. Since the RIP CAP was not mentioned in the EOC and the applicant indicated that they had not evaluated the CGD issues for applicability to the RIP CAP, the inspectors questioned whether the EOC was adequate in identifying the full scope of the issue.

The inspectors identified additional areas of concern with respect to the applicant's EOC for CGD issues. First, the inspectors observed that the EOC associated with PER 348970, related to NCV 50-391/2011603-02, was limited to the electrical components specifically discussed in the violation. The NCV related to inadequate CGD of various electrical components, and the applicant missed an opportunity to identify the programmatic issues within the CGD program. Secondly, the inspectors noted that as part of the EOC for corporate PER 417006, the applicant and the other operating units within TVA sampled 30 CGD packages to evaluate for compliance to regulatory requirements. The issues identified in the EOC were summarized by TVA as "minor administrative shortfalls." The inspectors reviewed a sample of packages that included "minor administrative shortfalls," and noted that some required additional testing to provide reasonable assurance that the item would perform its intended safety function.

Findings:

The inspectors identified the following NCV:

Introduction: A SL IV NCV of 10 CFR 50 Appendix B Criterion III, "Design Control," was identified for failure to adequately incorporate the requirements for CGD contained in 10 CFR Part 21 into the CGD procedures and for failing to establish measures for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of SSCs. This resulted in multiple examples where CGD activities failed to adequately establish commercial grade items as basic components.

Description:CGD Procedural Inadequacies:

The inspectors identified programmatic deficiencies with the applicant's CGD procedure. As identified in the URI, procedure NEDP-8 used an incorrect definition of critical characteristics. Specifically, it left out the 10 CFR Part 21 definition of critical characteristics and instead used a definition from the Electric Power Research Institute (EPRI) document NP-5652 that has not been unconditionally endorsed by the NRC, as discussed in NRC Information Notice 2011-01. In addition, without the appropriate definitions, the procedure did not include adequate guidance for technical evaluations to document how critical characteristics selected would provide reasonable assurance that commercial grade items would perform their intended safety function. As a result, the applicant chose critical characteristics to verify that the item received was the item specified (EPRI NP-5652) instead of verifying that the item would perform its intended safety function (10 CFR Part 21).

During this follow-up inspection, the inspectors identified additional deficiencies with NEDP-8. For example, NEDP-8 called for evaluations for like-for-like replacements under certain conditions but did not provide any additional guidance on how to perform such an evaluation. Since evaluations for like-for-like replacements were to be used by the applicant to demonstrate suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the SSCs, as required by 10 CFR 50 Appendix B, Criterion III, they must be described in a procedure. The NRC has provided guidance on conduct of such evaluations in Generic Letter 91-05, "Licensee Commercial-Grade Procurement and Dedication Programs." However, the applicant was unable to provide any procedure that contained like-for-like guidance.

The inspectors also noted that NEDP-8 allowed for conditionally dedicated commercial grade items. These were items that required additional testing, such as a functional test, before acceptance. However, the procedure did not provide any guidance or reference as to how an item was to be conditionally dedicated. The applicant was unable to provide any procedure that contained this guidance.

CGD Deficiencies:

The inspectors had previously identified examples in the URI where the above mentioned problems, with procedure NEDP-8, resulted in critical characteristics being selected to verify that the item received was the item specified, rather than critical characteristics being selected to provide reasonable assurance that the item would

perform its intended safety function. The inspectors reviewed those examples again, discussed them with the applicant, and determined that in each case the applicant failed to adequately establish the commercial grade items as a basic component. These examples are summarized below:

- (1) The technical evaluation for Stock Code CEE179A, Valve, had pressure retention as its only required safety function. The critical characteristics listed in the PDS were configuration, material, manufacturer, part number, and weight, which neither the inspectors nor the applicant were able to tie to the safety function.
- (2) The technical evaluation for Stock Code BYM502Y, Cable Splice, listed electrical continuity and prevention of pull out under tension as the safety functions. The critical characteristics listed in the PDS were manufacturer, part number, insulation, wire size, color code, and base material. During this inspection, the inspectors reviewed the EOC for PER 403095 and noted that the applicant determined that no change was necessary for the technical evaluation. However, neither the inspectors nor the applicant were able to tie the critical characteristics identified to the safety function of the cable splices.
- (3) The technical evaluation for Stock Code CBM188P, Tubing Cap, identified no safety functions, although it was classified as safety-related. After further discussions with the applicant, the inspectors learned that the safety function was pressure retention. The critical characteristics listed in the PDS were material, configuration, nominal dimensions, manufacturer and part number, which neither the inspectors nor the applicant were able to tie to the safety function.
- (4) The technical evaluation for Stock Code CBK613D, Bearing, listed integrity as a safety function and fracture/seizure as failure modes. The critical characteristics listed in the PDS were part number, manufacturer, material of construction, dimensions, configuration, and workmanship. In order to verify the material of construction, the only requirement was for the inner and outer rings of the bearing to be magnetic. Neither the inspectors nor the applicant were able to tie the critical characteristics to the safety function.
- (5) The technical evaluation for Stock Code CBK631B, Bearing, did not clearly identify the item's safety function, although design functions were listed, and listed seizure/fracture as postulated failure modes. Without a specified safety function, the inspectors determined that the applicant had insufficient documentation to demonstrate that the critical characteristics selected were adequate to address the item's postulated failure modes.

In addition to the examples from the URI, during this follow-up inspection the inspectors identified an additional example of CGD deficiencies:

- The technical evaluation for Stock Code, G4821-2-1569, Diaphragm for Leslie Controls' valve actuator credited an audit/survey evaluation of the supplier to establish acceptability of the supplier's certification of conformance (CoC). The PDS provided instructions that the receipt inspector needed to verify the CoC for the specified content. The audit/survey evaluation documented that the facility where the diaphragms were manufactured was not implementing the requirements imposed by the procurement order. Based on the results of the audit/survey, the applicant's evaluation of Leslie Controls concluded that the

capability of the supplier to provide a valid CoC had not been adequately verified. As of December 9, 2011, the findings were still open. However, the applicant procured the item from Leslie Controls and took credit for the CoC to dedicate the item. The inspectors determined that the applicant improperly credited the audit in the technical evaluation to establish acceptability of the CoC in their review for suitability of the diaphragm for its safety-related function. The inspectors did not find any applicant documentation dedicating the items after receipt inspection due to the inadequate CoC.

The inspectors determined that these issues were more than minor in accordance with Inspection Manual Chapter (IMC) 2517 because they represented an inadequate quality oversight function which, if left uncorrected, could adversely affect the quality of construction, testing, analysis, or records for a safety-related SSC component. The issue was considered to meet SL IV criteria from the NRC Enforcement Policy (Section 6.5) because one or more QA criteria that had more than minor safety significance were not met and because the applicant failed to establish certain controls over dedication aspects defined in 10 CFR 21.

The finding is related to the Self and Independent Assessments area of the Problem Identification and Resolution cross cutting area, as defined in IMC 0310, because the applicant performed limited self-assessments/QA audits of the CGD program (P.3(a)). Specifically, the applicant and its contractor failed to perform thorough QA audit/surveillance/assessment activities of the WBN2 CGD program from the time of the restart of construction and turnover of the project to Bechtel, in 2008, until present. This limited level of involvement and timeliness of QA auditing activities contributed to this issue not being identified prior to NRC involvement.

Enforcement: 10 CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures be established to assure that applicable regulatory requirements are correctly translated into specifications, drawings, procedures, and instructions; and that measures be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the SSCs.

10 CFR 21 defines the dedication process for turning commercial grade items into basic components and states that dedication is an acceptable process undertaken to provide reasonable assurance that a commercial grade item to be used as a basic component will perform its intended safety function and, in this respect, is deemed equivalent to an item designed and manufactured under a 10 CFR 50, Appendix B, QA program. The assurance is achieved by identifying critical characteristics of the items and verifying their acceptability by inspections, tests, or analysis. 10 CFR 21 defines critical characteristics, in part, as those important design, material, and performance characteristics of a commercial grade item that, once verified, will provide reasonable assurance that the item will perform its intended safety function.

Contrary to the above, prior to December 2, 2011, the applicant failed to assure that applicable regulatory requirements for CGD were correctly translated into specifications, drawings, procedures, and instructions and failed to adequately establish measures for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the SSCs. Specifically, the applicant failed to translate the 10 CFR 21 definition of critical characteristics into NEDP-8, "Technical Evaluation for Procurement of Materials and Services." In addition, the

applicant failed to describe like-for-like evaluations and conditional dedication, which were methods for review for suitability of application of parts essential to the safety-related functions of SSCs in procedures. This resulted in multiple examples where CGD activities failed to adequately establish commercial grade items as basic components.

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, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000391/2011610-01, Commercial Grade Dedication Program Deficiencies. The applicant also stated that they intend to conduct a 100 percent EOC review.

c. Conclusions

The inspectors concluded that URI 05000391/2011607-02: Commercial Grade Dedication Program is closed. However, it was determined that programmatic deficiencies with the applicant's CGD procedure existed as discussed above in NCV 05000391/2011610-02.

T.1 Training and Qualification of Plant Personnel

T.1.1 Engineering Organization Training (IP 46071)

a. Inspection Scope

The inspectors observed two classroom training sessions that covered anchor bolt spacing requirements as part of the corrective actions implemented for PERs 454859 and 452512 associated with anchor installation training and work instruction gaps observed and documented in IIR 05000391/2011609. The training sessions were intended to be an overview of the requirements for anchor bolt spacing. The training included an overview of the applicable procedures, a description of why spacing is important, and 12 anchor spacing examples. The instructors stressed the importance of understanding the requirements and seeking help when uncertain. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed anchor bolt spacing and installation classroom training covered topics addressed in the corrective action documents.

IV. OTHER ACTIVITIES

OA.1.1 (Discussed) BL 80-04, Analysis of Pressurized Water Reactor Main Steam Line Rupture with Continued Feedwater Addition (IP 92717)

a. Inspection Scope

Background: The Bulletin identified the susceptibility of increasing the postulated containment pressure following a main steam line break (MSLB) inside containment in which continued feedwater addition occurred from the auxiliary feedwater (AFW) system at run out conditions. The BL was originally viewed as informational to Watts Bar since it was not operating and was not specifically listed in the BL enclosure as having to respond. TVA identified an analysis was needed to demonstrate the adequacy of containment for this susceptibility. Unit 1 actions were completed by TVA which involved the determination of temperature profiles inside and outside of containment following a MSLB. NRC IR 50-390/85-60 and 50-391/85-49 issued in December 1985 identified the subject BL to remain open for Unit 2 since it was unclear that the actions taken for Unit 1 would also be applicable to Unit 2. The MSLB analysis for Unit 2 was completed by Westinghouse in December 2009, and transmitted to TVA (LTR-CRA-11-196/WBT-D-3356) and has been incorporated into the Unit 2 Final Safety Analysis Report (FSAR) in Amendment 104, Section 6.2.1.3.10, Steam Line Break Inside Containment.

Inspection Activities: The inspectors reviewed the analysis performed by Westinghouse for Watts Bar Unit 2 dated December 21, 2009 (LTR-CRA-09-203 and transmitted to TVA by WBT-D-1410), for postulated high energy pipe break accidents inside containment to verify the assumptions and adequacy of the analysis. The inspectors reviewed an internal TVA letter dated December 5, 1979 that stated all of TVA's PWR plants are either protected from runout condition of the AFW following a MSLB or runout flow of the AFW was included in the MSLB analysis. The inspectors inspected to verify that the assumptions made in the mass and energy release analysis were a failure of the AFW runout control coincident with a MSLB and the AFW flow would be manually realigned by the operator after ten minutes. The inspectors conducted interviews with operator training personnel to verify that the appropriate operator actions have been demonstrated acceptable and repeatable to meet these requirements.

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors identified in the calculation's assumptions that main steam isolation valves (MSIVs) and the feedwater isolation valves (FWIVs) isolate within 10 seconds of the MSLB. When feedwater isolates, it is assumed that both the FWIVs and the main feedwater regulating valves (FWRVs) close within 5 seconds and therefore, if a failure of a FWIV is postulated then the FWRV is assumed to stop the feedwater flow. This assumption eliminates, from the analysis, the addition of feedwater from a condensate pump with offsite power available. Additional inspection effort is required during the closure testing of these valves to verify these assumptions remain valid. Additionally, the Westinghouse analysis stated that the assumed values for the AFW system flow in the calculation was 1400 gpm with runout protection operational, whereas with a failure of the runout protection an AFW flow value of 2040 gpm is assumed. Additional

inspection effort is required during the testing of the AFW system to verify these assumptions remain valid.

OA.1.2 (Discussed) BL 88-11, Pressurizer Surge Line Thermal Stratification (IP 92717)

a. Inspection Scope

Background: The BL identified that unexpected movement of the pressurizer surge line had been observed at operating nuclear power plants due to thermal stratification in the line. Licensees were requested to establish and implement a program to confirm pressurizer surge line integrity in view of the occurrence of thermal stratification and to inform the NRC of the actions taken to resolve this issue. TVA response for Unit 1 was deemed acceptable in IR 50-390(1)/94-55. NRC letter dated October 30, 1992, concluded TVA response and associated Westinghouse report were acceptable for Unit 1 and 2. Unit 2 actions are to complete modifications to accommodate surge line thermal movement and incorporated a temperature limitation during heat-up and cool down operations into the Unit 2 procedures. TVA applied the leak before break evaluation for the surge line. The NRC recognized acceptance of this philosophy permitted by General Design Criteria (GDC)-4 in an NRC letter dated April 28, 1993, and authorized elimination of a pressurizer surge line rupture from the design basis for both units.

Inspection activities: The inspectors reviewed documentation and drawings to identify modifications that were performed on the pressurizer surge line to accommodate surge line thermal movement. The inspectors performed walkdowns of the pressurizer surge line to identify potential interferences and verify the configuration with the piping schematics. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

A limitation of a 320°F ΔT between the pressurizer and the reactor coolant system (RCS) hot leg during heat-up and cool down was imposed. Additional NRC inspection is required to verify the incorporation of these temperature limits in Unit 2 operating procedures.

During hot functional testing (HFT) it must be verified that piping thermal deflections result in no adverse consequences such as contact with the pipe whip restraints. Therefore there must be an observation point within the HFT procedure for this verification. TVA committed to verifying through HFT that the surge line will not make contact with the whip restraints. Additional NRC inspection is required to verify incorporation of these activities into the HFT procedure.

OA.1.3 (Discussed) QA Records CAP (TI 2512/028, IP 51055)

a. Inspection Scope

The inspectors reviewed a sample of electrical QA records for cables, cable trays, electrical conduit and electrical equipment. The inspectors reviewed the applicant's

assessment of the records to verify that the records specified the correct component type and location, that the functional specifications were met, that the required QA/QC inspections were performed, and that they were complete and legible. To verify that records were retrievable, the inspectors observed document control personnel locating independent samples of records from within the vault.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspection results are too limited to support a conclusion on the QA Records CAP at this time.

OA.1.4 (Discussed) Electrical Cable Issues CAP – Sub-issue: Cable Bend Radius Deficiencies & (CDR 82-76) Cable Bend Radius Deficiencies (TI 2512/016)

a. Inspection Scope

Background: The Cable Issues CAP was initiated based on various employee concerns, conditions adverse to quality (CAQ) documents, and NRC findings related to cable installation and routing. The root cause of these concerns was primarily the absence or incompleteness of specific guidelines in the development of design input or output documents, and in some instances, the lack of procedural details for the installation of cables. One of the sub-issues identified was excessive bending of cable with the potential of damaging and adversely affecting cable performance. Damage can be caused by: (a) elongation stress to the insulation system, which could reduce the qualified life of the cable, (b) interfacial disruption of medium voltage cable's stress control layers of insulation and insulation shield, which could have increased the likelihood of corona degradation, and (c) conductor creeping, which would likely put radial stress on the insulation system.

Inspection Activities: The inspectors reviewed Watts Bar Unit 2 – Cable Issues Corrective Action Program Plan – Cable Bend Radius (CP 1.7) Closure Report, Rev. 000, dated January 14, 2011, to assess the resolution of the cable bend radius deficiencies regarding engineering and construction implementation. The inspectors reviewed EDCR 55121, Rev. A, to verify the listing of cable bend radius deficiencies identified in calculation EDQ00299920090005. The inspectors reviewed Electrical Design Standard DS-E12.1.5 Rev. 5, "Minimum Radius for Field-Installed Insulated Cables Rated 15,000 Volts and Less," to assess actual TVA cable bend radius requirements in comparison with information identified in ICRDS. The inspectors reviewed the Self Assessment Report 25402-SA-ENG-10-11, covering the period June 24, 2010 to August 11, 2010, on Cable Bend Radius to verify TVA's resolution process in addressing the Unit 2 Class 1E cable issues corrective action program on the Cable Bend Radius CAP sub-issue. The inspectors reviewed open WOs 110991683 and 110993942 on System 003, Main Feedwater System, to assess work performed to resolve cable bend radius issues for cables:

2PM1520F	2PM1640F	2PM1380G	2PM1740G	2PM1025G	2V1238B
2V1240B	2V1393B	2V1394B	2V1474A	2V1475A	2V1476A

The inspectors reviewed closed WOs 110993344 and 111697355 on System 293 to assess the resolution on cable bend radius for cables:

2V3046B	2V3072B	2V2021A	2V2031A	2V2011B
2V2061B	2V3101A	2V6228A	2V6229A	2V6377B
2V6378B	2V6397B	2V6398B	2V6399B	-----

The inspectors reviewed General Engineering Specification G-38 for "Installation, Modification, and Maintenance of Insulated Cables Rated up to 15,000 volts," Revision 20.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

All documentation developed was adequate and properly detailed. Additional representative samples of work remain to be inspected prior to closure to this CAP sub-issue and cable CDR. Additional documents reviewed are listed in the attachment.

OA.1.5 (Closed) BL80-11, Masonry Wall Design (TI 2515/37 and IP 46061)

a. Inspection Scope

Background: The purpose of IP 46061 was to confirm that commitments were met for actions required by BL 80-11, Masonry Wall Design. TI 2515/37 provides inspection requirements and additional guidance to review actions taken in response to BL 80-11. This IP includes control of specific materials, control of specific processes, review of as-built portions, review of records, and review of nonconformance reports associated with Masonry Wall Design.

IIR 05000391/2009602, Attachment 2 (ML091240420), documented reconstitution results and a review of all previous WBN2 NRC inspection reports to determine the status of IP 46061 requirements. This reconstitution review concluded that inspection requirements for this IP had been met, except for masonry walls unique to Unit 2. Since most structures are common to both units and were inspected during Unit 1 construction, the inspectors observed masonry wall construction for new Unit 2 work. Therefore, applicable sections of this IP were re-performed on a sampling basis for new construction activities and walls unique to Unit 2. This inspection effort provided assurance that IP requirements were met and that recent changes to programs or procedures for new work would not invalidate the results of previous inspection efforts performed during initial construction stages.

Portions of the following reports were previously credited for this inspection activity during reconstitution of Unit 2:

- Docket 50-391: 83-07, 85-08, 90-26, 91-03, 92-21, 93-01, 93-48, 93-69, and 95-46
- Docket 50-390: 89-02, 89-200

Also credited was the calculation audit dated 1/31/1992 (TAC R00514).

Inspection Activities: These activities were performed throughout 2011 and are documented in this IIR.

The inspectors reviewed changes made to the applicant's procedures and specifications in response to BL 80-11 to verify that the applicant had adequately addressed the issues discussed in the BL. A large number of masonry walls are located in areas considered common to both units; therefore, the applicant stated that many of the actions taken to address the BL for Unit 1 are applicable to Unit 2 as well. The basis for this assertion was provided to the NRC in the commitment completion form for NCO 080008028 (BL 80-11). The inspectors reviewed this information and supporting documentation and performed field walkdowns to determine which of the applicant's previously completed actions were applicable to Unit 2.

For those masonry walls not addressed by the Unit 1 program, the inspectors performed walkdowns, attended pre-job briefs, and observed work in progress (WO 09-954256-000) to determine whether:

- The applicant properly pre-planned the work
- Appropriate drawings and work procedures were available and used by the installers
- Installation requirements, construction drawings, specifications, and work procedures were technically adequate and of the latest approved issue
- Appropriate equipment and tools were specified and used
- Masonry block and mortar were adequately controlled
- Workmanship (e.g., mortar and block placement was appropriate) for the level of quality
- Mortar and blocks were tested as specified by implementation specifications
- QC hold points were observed

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions and work in progress to verify the adequacy of the applicant's response to BL 80-11, Masonry Wall Design. The inspectors concluded that the applicant's actions were adequate; therefore, BL 80-11 and TI 2515/37 are considered closed.

The procedures, records, work in progress, and as-built condition of masonry walls reviewed during this and previous inspection periods were found to conform to applicable regulatory requirements. Based on initial construction inspections and recent inspection efforts, IP 46061 is considered closed. It should be noted that if major changes to the applicant's instructions and procedures are identified through observation of future work activities associated with concrete masonry walls, the inspectors will inspect them as necessary to satisfy the requirements of this procedure.

OA.1.6 (Closed) URI 391/93-10-03: Unit 2 Unidentified Splices (TI 2512/016)**a. Inspection Scope**

Background: This issue involves NRC URI 391/93-10-03 concerning unidentified cable splices observed during field inspections of cable work performed by WO 93-01949-24, where the NRC identified three splices located in junction box 0-JB-292-4168-B that did not have any identification tags. The unidentified splices were associated with cables 2-PM-1-4425-B, 2-PM-3-4456-B, and 2-PM-3-4498-B.

Inspection Activities: The inspectors reviewed Form NGDC PP-19-2 with Tracking Number: PER 144179 for cable splices found to be damaged or unidentified/undocumented. The inspectors reviewed WO 10-951137-002 addressing all three cable listed above to assess the scope of work. The inspectors reviewed ICRDS to verify that splices and cables were properly identified in the design documents. The inspectors reviewed the In-Line Splice Data Sheets for all three cables to review appropriate verification by quality control.

b. Observations and findings

No findings of significance were identified. The three cables were removed and new splices are planned as new work to be performed.

c. Conclusion

The inspectors concluded that the identification of the cable splices has been adequately planned as new work and it is adequately tracked by the WO covering the scope. The inspectors consider this URI 391/93-10-03 closed.

V. MANAGEMENT MEETINGS**X.1 Exit Meeting Summary**

On January 20, 2012, the resident inspectors presented the inspection results to Mr. Michael Skaggs 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

D. Stinson, Site Vice President, TVA, Unit 2
 G. Scott, Licensing, TVA, Unit 2
 D. Charlton, Licensing, TVA, Unit 2
 C. Stephenson, Licensing, TVA, Unit 2
 D. Beckley, Electrical Design, TVA, Unit 2
 W. Crouch, Licensing, TVA
 A. Bangalore, Electrical Engineer, Bechtel
 I. Khan, Electrical Engineer, Washington Group
 A. Hart, Construction Supervisor, Bechtel
 J. Boykin, Quality Control, TVA
 C. Grunt, Construction Field Engineer, Bechtel
 M. Divirgilio, Procurement Engineering, Bechtel
 W. Elliott, Engineering, TVA, Unit 2
 M. Haghighi, Project Engineer Manager, PEG, Bechtel
 J. Williams, General Manager, Nuclear Engineering, TVA Nuclear Power Group
 L. Lynch, Procurement Engineering, Bechtel
 R. Johnson, Site Support 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 43004	Inspection of Commercial-Grade Dedication Programs
IP 46071	Concrete Expansion Anchors
IP 49053	Reactor Coolant Pressure Boundary Piping – Work Observation
IP 49065	Safety-Related Piping – Records Review
IP 50053	Reactor Vessel and Internals Work Observation
IP 51055	Electrical Components and Systems – Record Review
IP 51063	Electric Cable – Work Observation
IP 73053	Preservice Inspection – Observation of Work and Work Activities
IP 92701	Followup
IP 92717	IE Bulletins for Information and IE Information Notice Followup
TI 2512/016	Inspection of Watts Bar Nuclear Plant Cable Issues Corrective Action Program Plan

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000391/2011610-01	URI	Medium Voltage Cable Termination and Stress Cone Installation Dimensional Variance Acceptability (Section C.1.2)
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Opened and Closed

05000391/2011610-01	NCV	Commercial Grade Dedication Program Deficiencies (Section C.1.10)
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Discussed

80-04	BL	Analysis of Pressurized Water Reactor Main Steam Line Rupture with Continued Feedwater Addition (Section OA.1.1)
88-11	BL	Pressurizer Surge Line Thermal Stratification (Section OA.1.2)
2512/028	TI	QA Records CAP (Section OA.1.3)
82-76	CDR	Cable Bend Radius Deficiencies (Section OA.1.4)
2512/016	TI	Inspection of Watts Bar Nuclear Plant Cable Issues Corrective Action Program Plan (Section OA.1.4)

Closed

46061	IP	Masonry Wall Design (Section OA.1.5)
80-11	BL	Masonry Wall Design (Section OA.1.5)
2515/37	TI	Masonry Wall Design (Section OA.1.5)
391/93-10-03	URI	Unit 2 Unidentified Splices (Section OA.1.6)
391/2011607-02	URI	Commercial Grade Dedication Program (Section C.1.10)

LIST OF DOCUMENTS REVIEWED

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1.2 Electrical Cable – Work Observation (IPs 51063 and 37002)

WO 111854032, CCE EDCR 2 55229 Sys 074 WBN-2-BD-211-A-A, Rev. 1
 G-38, Installation, Modification, and Maintenance of Insulated Cables Rated Up to 15,000 Volts, Rev. 20
 WBNEQ-MOT-001, Westinghouse Motors on RHR, CVCS, CS, and SIS, R26
 WBNEQ-SPLC-002, Outside Containment Kits Raychem Corporation, R5
 PII-55154, NHVT Series Terminations 5-15kV Class Raychem Product Installation Instructions, Rev. AB
 PII-57083, NMCK8 Series Motor Connections 5-15kV Class Raychem Product Installation Instructions, Rev. C
 EDR 5060, Evaluation of Performance of S1119 Ribbon Adhesive (Raychem Test Report), 8/82
 E-mail exchange between Jonathan Cornelius, TE Energy, and Brenda Rutledge, WBN U2 Completion, dated December 20, 2011
 Electrical Power Cable Engineering, Second Edition, by William A. Thue

C.1.4 Electrical Components and Systems – Records Review (IP 51055)

WO 112970999, CRDR DCN 54199 Stage 4 SYS 278 Spare Breakers in Panel 2-BD-278-M7B Are Currently Under Unit 1, Rev. 0
 EQ11-0259, Test Data Sheet CKJ931J, dated 8/31/2011

C.1.5 Reactor Vessel and Internals Work Observation (IPs 50053 and 37002)

Drawings

30738-1715 rev. C, P.W.R Vessel Westinghouse Vessel Assembly

Corrective Action Documents

PER 261348, Slight Indications Made on Reactor Flange
 PCI NCR 90122-98, Evaluation of Hammer Marks on Reactor Flange
 PCI NCR 901220-129, Nonconforming storage condition of the RPV

Miscellaneous

PCI VT Reports 902522-01; 902522-02; 902522-03
 PCI Quality Assurance Traveler 902522-01, rev.0
 PCI Surveillance Activity Report S-901220-I512

C.1.6 Preservice Inspection – Observation of Work and Work Activities (IP 73053)

Drawing

D12572.01 rev.5, Outline/Assembly Drawing Vert. containment Spray H.X.

Procedures

N-ET-6 rev. 6, TVA Eddy Current Examination of Tubing in Balance of Plant Components
 IEP-207 rev. 6, Control of TVA NDE Equipment and Supplies
 0-MI-72.002 rev. 0, Inspection and Repair of Tubes in the Containment Spray Heat Exchanger

Work Order

WO 112800354, PSI of New Tubes in Containment Heat Exchanger 2A

Miscellaneous

NDE Personnel Qualification records for ID 02HMEEJ1U

Equipment Calibration Records for: Ecutech, Inc. OD Wear, EU04701; Eddy Current Tester 0031-0611

Eddy Current Examination Report for Containment Spray 2A, EDMS # L18 111228 800

C.1.7 Reactor Coolant Pressure Boundary Piping – Work Observation (IPs 49053 and 37002)

Procedures

PI-901340-01 rev.0, Watts Bar Unit 2: Replication of Surfaces for Analysis

PI-901340-SG4 rev.0, Watts Bar Unit 2: Steam Generator Loop 4 (SN 1611) Channel Head Electropolishing

25402-000-GPP-0000-N3505, Piping System Cleanliness

Specifications

G-29B, Material Fabrication and Handling Requirements for Austenitic Stainless Steel

Work Order

WO 111094974, Pressurizer Housekeeping Inspection

WO112716006, Remote Video Inspection of Pressurizer

Corrective Action Documents

PCI NCR 901340-69, Rejectable PT indications in SG4

Miscellaneous

PCI PT reports: PT-901340-130; PT-901340-131; PT-901340-202

PCI UT reports: UT-901340-027; UT-901340-051

Controlled cleanliness zone (I, II & III) entry & accountability log from WO 111094974

C.1.8 Electrical Cable -- Work Observation (IP 51063)

Drawings

The Okonite Company drawing CS-12779 Rev. A date 4/9/09

Miscellaneous

Supplemental Raychem Application Data Sheet for the High Voltage Stress NHVT Kit (Class 1E HELB Qualified)

C.1.9 Electrical Cable -- Work Observation (IP 51063)

Drawings

Standard Drawing SD-E 15.3.4 Rev. 7 – Raceways, CA & W IDENT TAGS (Sequoyah NUC PLT & ALL SUBSEQUENT NUC PROJECTS)

Miscellaneous

Drawing Revision Authorization (DRA) 55801-033

C.1.10 URI 05000391/2011607-02: Commercial Grade Dedication Program (IPs 97201 and 43004)

Commercial Grade Items Reviewed

Stock Code BRA090L, Relay Socket (review included the PDS, Technical Evaluation, and Material Receipt Records)

Stock Code CEF784K, Differential Pressure Switches (review included the PDS, Technical Evaluation, and Material Receipt Records)

Stock Code CDC146A, Circuit Breaker (review included the PDS, Technical Evaluation, and Material Receipt Records)

Stock Code CBX796N, Circuit Breaker (review included the PDS, Technical Evaluation, and Material Receipt Records)

Stock Code CDP309G, Pressure Regulators (review included the PDS, Technical Evaluation, and Material Receipt Records)

Stock Code WBC4730-2, D-Seal Type 316 Stainless Steel Tube Fittings (review included the PDS and Technical Evaluation)

Stock Code CQA459T, Fuse, Time Delay, 2 AMP, Glass Tube, Bussmann MDL-2-R (review included the PDS and Technical Evaluation)

Stock Code CNY354E, Mersen\Ferraz Shawmut Class R 30 AMP, 250V Fuse Holder (review included the PDS and Technical Evaluation)

Stock Code, FMR-D000-00001M0, Concrete, ready Mix Specification G-2 (review included the PDS and Technical Evaluation)

Stock Code, BRF306W Nut, Channel W/Spring, #8-32 (review included the PDS and Technical Evaluation)

Stock Code, CJJ799X Lubricant, Grease (review included the PDS and Technical Evaluation)

Stock Code, CQQ548K Breaker, molded Case, Heinemann (review included the PDS and Technical Evaluation)

Stock Code, CBK613D, Bearing (review included the PDS and Technical Evaluation)

Stock Code, G4821-2-1569 Diaphragm for Leslie Control's Valve Actuator (review included the PDS, Technical Evaluation, and Quality Assurance Supplier Audit)

Design Change Documents

EDCR 54946, Rev A, Replace Flow Solenoid Valves, Limit Switches, and Pressure Regulators for Flow Control Valves

WO: 110822748, CCI EDCR 54946 SYS 032 2-FSV-032-0081A

Procurement Documents

MRI 25402-011-MRA-JF00-00007, Rev 002, PO#: 83848, Differential Pressure Switches

MRI 25402-000-FMR-ENA0-00008, R1, PO#: 17710, Circuit Breakers

MRI 25402-000-FMR-JXF0-00008, Rev 1, PO#: 32242, Pressure Regulators

MRR 25402-011-MRA-JV05-00007, Rev 000, Pressure Regulators

MRR 25402-011-MRA-JV05-00007, Rev 001, Pressure Regulators

QA Audits/Surveillances

Surveillance Reports: 25402-WBN-SR-08-0006, 25402-WBN-SR-08-0094, 25402-WBN-SR-08-0242, 25402-3DP-G06G-00502, 25402-WBN-SR-08-0408, 25402-WBN-SR-09-0445, 25402-WBN-SR-09-0451, 25402-WBN-SR-10-1018, 25402-WBN-SR-11-1948,

Bechtel QA audits: 25402-WBN-AR-08-0004, 25402-WBN-AR-10-0006,

TVA QA audits: SSA0503, SSA0703, SSA0805, TVA 2008V-10, SSA 1007, SSA 1007, SSA1008, SSA0803, SSA0803

Self Assessments

CRP-ENG-02-003, SQN-ENG-04-002, CRP-ENG-05-002, NA-BF-08-006,

Corrective Action Documents generated from this inspection: SR 467944; SR 467951; SR 469686

Other Documents

PER 471174, QA 2 regulators instead of QA 1 regulators

PER 417006, Commercial Grade Dedication

PER 403095

NEDP-8, Rev. 0018, Technical Evaluation for Procurement of Materials and Services, 11/3/11

Apparent Cause Evaluation Report, Commercial Grade Dedication, PER 417006, 9/16/11

NRC IR 2011607

Bechtel Project Nuclear Quality Assurance Manual

TVA Quality Assurance Plan TVA-NQA-PLN89A

ANSI standard N45.2.12 - 1977, Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants

NRC Regulatory Guide 1.144, Auditing of Quality Assurance Programs for Nuclear Power Plants

T.1.1 Engineering Organization Training (IP 46071)

MAI 5.1B: Wedge Bolt Anchor Installation, Rev. 21

MAI 5.1C: Undercut Anchor Installation, Rev. 14

IV. OTHER ACTIVITIES

OA.1.1 BL 80-04, Analysis of Pressurized Water Reactor Main Steam Line Rupture with Continued Feedwater Addition (IP 92717)

Bulletin 80-04, Analysis of a PWR Main Steam Line Break With Continued Feedwater Addition, dated February 8, 1980

Westinghouse letter, Analysis of a PWR Main Steam Line Break with Continued Feedwater Addition for TVA Sequoyah and Watts Bar Nuclear Plants Unit Numbers 1 and 2, dated April 30, 1980

Westinghouse letter, TVA Watts Bar Nuclear Plant Unit 2 Steamline Break Final FSAR Markups, dated December 22, 2009

Westinghouse letter, Bulletin 80-04 Evaluation Analysis of a Main Steamline Break with Continued Feedwater Addition, dated August 2, 2011

OA.1.2 BL 88-11, Pressurizer Surge Line Thermal Stratification (IP 92717)

Bulletin 88-11, Pressurizer Surge Line Thermal Stratification, dated December 20, 1988

TVA letter to the NRC, Watts Bar Nuclear Plant Units 1 and 2 – NRC BL 88-11 response, dated March 30, 1992

TVA letter to the NRC, Watts Bar Nuclear Plant – Leak-Before-Break Evaluation of the Pressurizer Surge Line, dated April 28, 1993

Westinghouse Structural Evaluation of Sequoyah and Watts Bar Units 1 and 2 Pressurizer Surge Lines, Considering the Effects of Thermal Stratification, dated December 1990

EDCR 52521, Modification of Pipe Supports for the Pressurizer Surge Line, Rev. A

SDD WBN2-68-4001 (excerpts), Reactor Coolant System, Rev. 1

Calculation 0600250-13-01, Piping Analysis of Pressurizer Surge Line, Rev. 0

207030, Address Issues Identified in BFN PER 137614, Actions 040 and 041, 11/4/2009

349638, BFN NOER-11-015, Rigging Equipment Failure, 4/4/2011

451184, Paint On and Affecting 2-TS-30-176 in 2B-B RHR Pump Room, 10/20/2011

OA.1.4 Electrical Cable Issues CAP – Sub-issue: Cable Bend Radius Deficiencies & (CDR 82-76) Cable Bend Radius Deficiencies (TI 2512/016)

Miscellaneous

Watts Bar Unit 2 – Cable Issues Corrective Action Program Plan – Cable Bend Radius (CP 1.7) Closure Report Revision 000 dated 1/14/2011

Electrical Design Standard DS-E12.1.5 Rev. 5 – Minimum Radius for Field-Installed Insulated Cables Rated 15,000 Volts and Less

Self Assessment Report 25402-SA-ENG-10-11 on Cable Bend Radius

General Engineering Specification G-38 for Installation, Modification, and Maintenance of Insulated Cables Rated up to 15,000 volts, Revision 20

Calculations

EDQ00299920090005

OA.1.5 Masonry Wall Design (IP 46061), NRC Bulletin (BL) 80-11, and TI 2515/37

Commitment Completion Form for NC080008028 (Bulletin 80-11)

General Engineering Specification G-21 Installation, Modification, and Maintenance of Masonry

Including Materials and Construction

DRA Concrete Shield Walls, Elevation 692', Drawing 41N366-1

Field Change Request 57729-A

Work Order 09-954256-000

Shielding Block Wall Installation Surveillance Report 25402-WBN-SR-11-2048

Drawing 41W732-2, Concrete Misc Walls and Columns Outline and Reinforcement

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
ECP	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