



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
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ATLANTA, GEORGIA 30303-1257

March 18, 2011

Mr. Ashok S. Bhatnagar
Senior Vice President
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Tennessee Valley Authority
6A Lookout Place
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Chattanooga, TN 37402-2801

**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2011602**

Dear Mr. Bhatnagar:

On February 19, 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 March 2, 2011, with Mr. David Stinson and other members of your staff.

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

During this inspection period, your evaluations and methodologies to address issues associated with a number of Corrective Action Programs (CAPs) and Special Programs (SPs) were reviewed by the NRC staff. This inspection determined that adequate corrective actions were taken to resolve the issues associated with Containment Cooling and Use-As-Is SP. Based on the results of this inspection, these items are closed for Unit 2; however, future inspections may be conducted for new related activities.

Based on the results of this inspection, this report documents two NRC-identified findings which were determined to involve violations of NRC requirements. However, because these findings were Severity Level IV violations and were entered into your corrective action program, the NRC is treating them as non-cited violations consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest the non-cited violations in the enclosed report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the United States Nuclear Regulatory Commission, ATTENTION: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Senior Resident Inspector at the Watts Bar Unit 2 Nuclear Plant.

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

Sincerely,

/RA/

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

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

Enclosure: Inspection Report 05000391/2011602 w/attachment

cc w/encl: (See next page)

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Letter to Ashok S. Bhatnagar from Robert C. Haag dated March 18, 2011.

SUBJECT: WBN NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2011602

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2011602

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 19, 2011

Inspectors: T. Nazario, Senior Resident Inspector, Construction Projects Branch (CPB) 3, Division of Construction Projects (DCP) Region II (RII)
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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 (QA); identification and resolution of construction problems; construction activities; fire protection; and follow-up of other activities. The inspection program for Unit 2 construction activities is described in NRC Inspection Manual Chapter (IMC) 2517. Information regarding the WBN Unit 2 Construction Project and NRC inspections can be found at <http://www.nrc.gov/reactors/plant-specific-items/watts-bar.html>.

The inspection identified two NRC-identified Severity Level (SL) IV non-cited violations (NCVs).

Inspection Results

- A SL IV NCV of 10CFR50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" was identified for the failure to perform work on a safety-related system with an approved work instruction. Specifically, a loose support was adjusted in the field with no authorized or approved work instruction on that portion of the safety-related system. (Section C.1.8)
- A SL IV NCV of 10CFR50, Appendix B, Criterion X, "Inspection," was identified 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. Specifically, the conduct and documentation of inspections of safety-related electrical cables did not provide adequate assurance that the cables were installed in accordance with defined requirements. (Section OA.1.21)
- The inspectors concluded that concerns pertaining to several NRC Generic Letters, Bulletins, NCVs, Unresolved Items, and Construction Deficiency Reports have been appropriately addressed for Watts Bar Unit 2 and 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; nuclear welding; structural concrete and welding; nondestructive examination and in-service inspection activities; and refurbishment activities.

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REPORT DETAILS

Summary of Plant Status

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

I. Quality Assurance (QA) Program

Q.1 QA Oversight Activities

Q.1.1 Identification and Resolution of Construction Problems (Inspection Procedures (IPs) 35007 and 50090)

a. Inspection Scope

During this inspection period, the inspectors reviewed problem evaluation reports (PERs) as part of TVA's corrective action program to verify that issues being identified under the corrective action program were being properly identified, addressed, and resolved by TVA. The inspectors also conducted an in-depth review (Ref IP35007, Section A16.04.02.b) of PERs 163432 and 153427 to evaluate the adequacy of the corrective action program associated with the piping walk-down efforts. These two PERs documented a series of issues associated with the WBN Unit 2 piping walk-down program. The PERs contained over 30 corrective actions to address and evaluate the piping walk-down issues, and to implement enhancements to the piping supports walk-down program. Using Sections A16.04.01 of IP 35007 for guidance, the inspectors reviewed a sample of the corrective actions listed in the PERs to verify:

- Complete and accurate identification of the problem
- Effectiveness of immediate and preventive corrective actions
- Identification of the apparent cause – and associated disposition
- Identification of the corrective actions that are appropriately focused to correct the problem
- Assessment of the extent of condition and associated actions
- Completion and thoroughness of corrective actions documentation
- Identification and retrievability of the supporting QA records

In addition, the inspectors interviewed design engineers and members of the QA staff to evaluate the licensee's problem identification and corrective action summary. The inspectors reviewed the documentation associated with the closure action items and the 31 stress calculation summaries presented in the closure package. The inspectors reviewed portions of an additional 39 pipe stress calculations that had a stress ratio greater than 0.90. The inspectors reviewed the design activities associated with the calculations to verify that any significant design and field changes from approved drawings were adequately controlled and processed commensurate with the original design and were within the ASME Code allowables. The inspectors sampled applicable walk-down procedures and 15 additional PERs, associated with the piping walk-downs, for closure completeness. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Generally, the reviewed PERs and supporting documentation were found to conform to the applicable requirements.

II. Management Oversight and Controls

C.1 Construction Activities

C.1.1 Unit 1 and Unit 2 Construction Activity Interface Controls (IPs 49063, 50073, 50090 51053)

a. Inspection Scope

During the inspection period, the inspectors independently assessed the applicant's controls, associated with Unit 2 construction work activities, to prevent an adverse impact on Unit 1 operational safety. The inspectors attended routine Unit 1/Unit 2 interface meetings to assess the exchange and sharing of information between the two site organizations. Periodic construction and planning meetings were observed to assess the adequacy of the applicant's efforts to identify those construction activities that could potentially impact the operating unit. This included the review of selected work activities which the applicant had screened as not affecting Unit 1 to verify the adequacy of that screening effort. Additionally, the inspectors independently assessed selected construction activities to verify that potential impacts on the operating unit had been identified and adequately characterized with appropriate management strategies planned for implementation. Furthermore, the inspectors performed independent walk-downs of selected construction work locations to verify that controls to protect the operating unit provided an adequate level of protection and had been properly implemented.

Specific work activities observed included:

- Hydrostatic testing of the essential raw cooling water (ERCW) system under work orders (WOs) 111503756, 111503780, 111607166, 111607211, 111607409, and 111607626.
- Safety-related motor control center bucket change-out under WO 110752470

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

- Valve refurbishment activities under WO 08-953328-000
- Hanger installation and verification activities under WOs 110692056, 110692086, and 110693348

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

C.1.2 Safety-Related Piping - Work Observation (IP 49063)

a. Inspection Scope

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

The following area was inspected:

- Hydrostatic testing of Unit 2 portions of the ERCW system

The following sample was inspected:

- IP 49063 Section 02.02 - 1 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 Concrete Expansion Anchors – Work Observation (IP 46071)

a. Inspection Scope

The inspectors observed ongoing work activities associated with the torquing of safety-related anchor bolts to verify that activities were performed in accordance with Modification/Addition Instruction (MAI) 5.1B, "Wedge Bolt (WB) Anchor Installation," Rev. 19. The inspectors reviewed procedures and work instructions, check the calibration of equipment and set point values, and interviewed contractors and quality control (QC) inspectors associated with the task. For the anchor bolt applications observed, the inspectors reviewed QC attributes associated with control of materials and control of processes/activities to verify that the results were within acceptance limits. The

inspectors also reviewed torque values to ensure that proper values were used and also ensured that the projected length of the bolt, above the concrete surface measured by the QC inspector, met the acceptance criteria in MAI 5.1B. The following anchor bolts were inspected:

- 2 wedge bolt anchors on support 2-ISLS-998-3429 (WO 110692056)
- 2 wedge bolt anchors on support 2-ISLS-998-3421 (WO 110692056)
- 2 wedge bolt anchors on support 2-ISLS-998-3480 (WO 110693348)
- 2 wedge bolt anchors on support 2-ISLS-998-3495 (WO 110693348)

The following samples were inspected:

- IP 46071 Section 02.02.a – 8 samples
- IP 46071 Section 02.02.b – 8 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Field installation and verification of safety-related anchor bolts were performed per the approved refurbishment/construction program and procedures.

C.1.4 Concrete Expansion Anchors –Construction Refurbishment Process and Pull Tests (IPs 46071, 37002)

a. Inspection Scope

In its response dated September 22, 2009, TVA stated that anchor bolts were visually inspected under various programs (e.g., NRC Bulletin (BL) 79-14, “Seismic Analysis for As-Built Safety-Related Piping Systems,” Program). TVA also stated that QC documentation records were retrieved, reviewed, and evaluated to ensure proper installation of anchor bolts for safety-related pipe supports. Further, for any anchor bolts that did not have documentation, TVA planned to conduct a pull test. TVA stated that if the pull test did not demonstrate that the anchor had adequate capacity, the anchor would be replaced.

In the NRC Refurbishment Program letter to TVA dated July 2, 2010, the NRC staff noted that TVA had informed the staff during an onsite audit that a number anchor bolts did not have QC documentation. Because pull tests had not yet been performed on these anchor bolts, the NRC staff stated in the July 2, 2010 letter that additional NRC inspections would be conducted to follow up on the adequate implementation of this program requirement. During the inspection period the inspectors observed anchor pull tests in accordance with MAI-5.1A, “Expansion Shell Anchors (SSD) Installation,” Rev. 7. This completed the inspections specified in the July 2, 2010 letter. Anchor tests for the following supports were observed:

- 4 SSD anchors on support 2-ISLS-998-3514 (WO 110692086)
- 2 SSD anchors on support 2-ISLS-998-3502 (WO 110692086)
- 2 SSD anchors on support 100-1651 (WO 111170587)

Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Anchor bolt pull tests observed were performed per the approved refurbishment/ construction program and procedures.

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

a. Inspection Scope

The inspectors observed concrete pre-placement and mixing activities to confirm that these activities were performed as specified in WO 09-954408-001, “Modify Pipe Supports.”

The inspectors also reviewed activities associated with MAI-5.4, “Concrete Repair, Grouting, and Dry Packing,” and interviewed personnel involved with these activities. This was done to assess the following conditions prior to and during the placement process:

- The pre-placement inspection performed by QC was completed before any concrete was placed.
- The placement area was cleaned and joint preparation was as specified in the construction specification.
- Records were produced, reviewed, and indicated the proper mix, location, water additions, and temperature of the concrete mix and ambient conditions.
- Concrete temperature, slump, air content, and unit weight were determined at the proper location and frequency.
- Sampling and testing techniques conformed to the procedures specified in the applicable American Society for Testing and Materials (ASTM) standards.
- Test specimens, for concrete strength determination, were sampled at the required location and frequency and were molded and cured in accordance with specified requirements.

The following samples were inspected:

- IP 46053 Section 02.03.e – one sample
- IP 46053 Section 02.03.h – two samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Structural concrete activities observed were completed in accordance with applicable drawings, procedures, and specifications.

C.1.6 Magnetic Particle Examination of Safety-Related Welds (IP 57070)

a. Inspection Scope

The inspectors observed ongoing magnetic particle (MT) examination activities for the completed pipe weld, listed below, performed under WO 09-951985-006.

Specific MT examination observed included the following:

<u>Weld ID</u>	<u>Component</u>
2-067C-D174-16C-0-R1	6-inch Pipe/Flange, Class II, System 067/ERCW

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

The inspectors also reviewed the following records:

<u>Report</u>	<u>Component</u>
MT-135	I beam/gusset/end plate
MT-131	6-inch pipe/flange, Class II, System 067/ERCW

The inspectors reviewed these records to verify compliance with procedural requirements. The inspectors also reviewed one qualification record for MT inspection personnel.

The following samples were inspected:

- IP 57070 Section 02.02 - one sample
- IP 57070 Section 02.03 - three samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

C.1.7 Structural Steel and Supports – Work Observation (IPs 48053)

a. Inspection Scope

The inspectors observed structural steel bolting activities associated with the reactor coolant pump (RCP) 2 platform to verify that the activities were performed in accordance with associated construction specifications and work procedures. The inspectors observed the tightening of 11 bolted connections for the RCP 2 platform by the turn-of-the-nut method in accordance with MAI 5.2, "Bolting for Structural Connections," Rev. 7. The inspectors observed the QC inspection of the bolting activities and interviewed the QC inspector to determine his knowledge of the work being performed. The associated WO and Drawing Revision Authorizations (DRAs) were also reviewed. The following attributes were inspected:

- The platform was erected in accordance with the most current specifications and drawings.
- Fit-up and alignment met the tolerances in the specifications and drawings.
- Components were properly handled.
- Specified clearances were maintained.
- For bolted connections, bolts, nuts, and washers were of the specified type and grade and thread engagement was as specified.
- Proper tension was developed in the bolt. This was independently inspected by observing the match-marking of the bolt and nut after the snug-tight condition was achieved, and then comparing the marks after additional nut rotation was achieved in accordance with MAI 5.2, Rev. 7.
- Craft personnel properly followed the procedures by ensuring that the bolts met the required bolt tension. High strength bolts were brought into snug-tight condition to ensure that the parts of the joints were brought into good contact with each other before applying additional nut rotation using the turn-of-nut method.

NRC Integrated Inspection Report (IIR) 05000391/2010605, Section C.1.6, documented the inspection of structural steel welded connections which accomplished part of the inspection requirements of this procedure. In addition, Section C.1.17 of IIR 05000391/2010605 documented the inspection of anchor bolt torque activities, which also accomplished part of the inspection requirements of this procedure.

The inspectors performed the following sample:

- IP 48053 Section 02.03.c – one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The observed structural steel bolting activities during this inspection period were in accordance with applicable project procedures and QA requirements.

C.1.8 Instrumentation Installation Activities– Work Observation (IP 52053)

a. Inspection Scope

The inspectors interviewed personnel, reviewed documentation, and evaluated Unit 2 instrument installation activities as related to unresolved item (URI) 05000391/2010605-01, "Insufficient End Clearance of a Two Piece Clamp." URI 05000391/2010605-01 was issued due to inadequate end clearance associated with the 2A safety injection (SI) pump discharge instrument sensing line support (ISLS) 2-ISLS-998-3257.

b. Observations and Findings

The inspectors identified the following Severity Level (SL) IV Non-Cited Violation (NCV):

Introduction: In December 2010, the inspectors identified a URI related to inadequate end clearance for a two-piece clamp holding an instrument sensing line (ISL) to a unistrut support for instrumentation associated with the discharge pressure from the Unit 2A SI pump. A SL IV NCV of 10CFR50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" was identified for the failure to perform work on a safety-related system with an approved work instruction. Specifically, a loose support was adjusted in the field with no authorized or approved work instruction on that portion of the safety-related system.

Description: On December 14, 2010, the inspectors observed that a tubing clamp associated with the ISL for the process line piping portion of Unit 2A SI pump discharge pressure instrumentation had been worked on to attach the clamp to Support 2-ISLS-998-3257 and that the end clearance was inadequate. The inspectors had previously inspected this ISL in August and October 2010 but the field walk-down and inspection (which would include field work to properly assemble the clamp) of this process line section of the ISL had not been completed at that time. On December 14, 2010, the inspectors noted that the instrument clamp was connected to its associated support 2-ISLS-998-3257. A follow-up inspection for URI 05000391/2010605-01 was conducted during the week of January 31, 2011, to determine the status of this URI and identify what additional documentation or evidence could be provided to show the completion of this work activity.

The applicant could not provide any documentation to show that this support had been worked on using an approved WO or any other type of work control process document. As of February 4, 2011, WO 111749016, that the applicant initiated to perform a walk-down and inspection of the process line portion of this ISL and associated support(s), had not yet been started. The applicant issued PER 320115 to address the issue identified by the NRC inspectors related to work being performed on the tubing clamp attached to support 2-ISLS-998-3257. This finding is considered more than minor because it represents an uncontrolled work practice that can impact quality involving a safety-related System, Structure or Component (SSC).

Enforcement:

Appendix B, Criterion V, "Instructions, Procedures, and Drawings" of 10 CFR Part 50, states, in part, that: "Activities affecting quality shall be prescribed by documented instructions, procedures,... and shall be accomplished in accordance with these instructions, procedures...."

Contrary to the above, on December 14, 2010, the inspectors identified that a previously unattached safety-related ISL tubing clamp was found to be attached to its associated support (2-ISLS-998-3257). The applicant was unable to provide approved work instructions or a WO for the field work that had been performed.

Because this was a SL IV violation and the violation was entered into the applicant's corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy, 05000391/2011602-01, "Failure to Perform Work with Approved Work Instructions."

c. Conclusions

The applicant performed work in the field without approved work instructions for safety-related ISL work activities. URI 05000391/2010605-01 is now closed to the issuance of NCV 05000391/2011602-01.

C.1.9 Electrical Components and Systems - Work Observation (IP 51053)

Replacement of Motor Control Center Motor Starter Buckets

a. Inspection Scope

The inspectors interviewed responsible engineers and craft personnel and observed in-progress activities involving the replacement of safety-related motor starter buckets. In addition, inspectors reviewed engineering document construction release (EDCR) 53293 and implementing WO 11217876.

Specifically, the inspectors conducted direct observations of equipment and activities for the replacement of motor starter bucket 13D in motor control center 2-MCC-213-B2. Related quality documents were reviewed including records showing the results of receipt inspection, records showing the identification and physical condition of received buckets, and specifications showing quality requirements for replacement buckets.

Interviews were conducted with engineering personnel to evaluate the adequacy of measures to control revision status of applicable construction drawings and work instructions, provisions for evaluating nonconforming items, and specifications to guide acceptance inspections of installed buckets.

The inspectors interviewed craft personnel to verify appropriate qualification of persons responsible for installing replacement buckets, adequacy of provisions for assuring the correct identification and quality documentation for buckets being installed, proper use of instructions and tools for installing the buckets, implementation of measures for identifying and reporting nonconforming items, and evidence that inspections were either performed or scheduled.

The following samples were inspected:

- IP 51053 Section 02.02.a - one sample
- IP 51053 Section 02.02.d - one sample
- IP 37002 Section 02.02.c - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the sample of in-process replacement of motor buckets generally complied with applicable requirements.

Replacement of Control Relays

a. Inspection Scope

The inspectors observed in-progress work activities associated with replacement of safety-related control relays and interviewed responsible engineers and craft personnel. Specifically, the inspectors observed the replacement of relays in System 67, Essential Raw Cooling Water, panel 2-PNL-275-R78. Outdated Potter & Brumfield relays were being replaced with Allen Bradley 700 and Cutler Hammer relays. The inspection included a review of the associated work control package, WO 09-954559-000.

Direct observations of equipment and installation activities were performed to verify proper use of instructions and tools for installing the relays, to determine whether installed relays conformed to the requirements of the WO, and to evaluate the adequacy of quality documentation for installed relays.

Related quality documents were reviewed, including records showing the results of receipt inspection, records showing proper identification and protection of received relays, and specifications showing quality requirements for the new relays.

The inspectors interviewed responsible engineering and craft personnel to assess worker qualification, provisions to assure the quality of installed components was maintained, implementation of measures for identifying and reporting nonconforming items, and evidence that inspections were either performed or scheduled.

The following samples were inspected:

- IP 51053 Section 02.02.a - one sample
- IP 51053 Section 02.02.d - one sample
- IP 37002 Section 02.02.c - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the sample of in-process replacement of relays complied with applicable requirements.

IV. Other Activities

OA.1.1 (Discussed) QA Records CAP (TI 2512/028, IPs 50090 and 51055)

a. Inspection Scope

The inspectors reviewed a sample of civil QA records that consisted of hanger, electrical conduit, cable tray, electrical support, and NRC Bulletin (BL) 79-14, Program Documentation. The inspectors reviewed an independent (NRC selected) sample and the applicant's sample assessment of the records to verify that the records specified the correct component type and location, that the functional specifications were met (material, configuration, installation, bolt tightness, separation, etc.), 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 locate independent samples of records from within the vault.

The following samples were inspected:

- IP 51055 Section 02.02.c – 142 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

OA.1.2 (Discussed) NRC Generic Letter (GL) 95-07: Pressure Locking and Thermal Binding of Power-Operated Gate Valves (IPs 50073, 37002 and 62710)

a. Inspection Scope

The inspectors observed field work activities associated with the modification of two safety-related motor-operated valves (MOVs) to ensure these components were in compliance with GL 95-07, "Pressure Locking and Thermal Binding of Powered-Operated Gate Valves."

The inspectors reviewed the work instructions and procedures to verify that they identified requirements and provisions for ensuring that the material condition of safety-related mechanical components was evaluated and documented prior to final assembly of associated components (such as valves) in accordance with CCPP 25402-000-GPP-0000-N1302, "Watts Bar Unit 2 Completion Project Component Refurbishment Evaluation," Rev. 0003. The inspectors reviewed these instructions to verify that they were being followed during system restoration and that appropriate QC holdpoints were identified for in-process independent inspection of component assembly. The inspectors observed a sample of existing safety-related valves being modified to address concerns identified in GL 95-07. The inspectors interviewed personnel to verify their ability to perform their assigned duties, maintain QA/QC independence, and provide adequate management support for QA/QC functions.

The following areas were inspected:

- Identification marking and partial hole drilling to the disassembled containment sump supply valve to containment heat removal spray system MOV 2-FCV-072-0044-A per WO 08-953327-000
- Identification marking and partial hole drilling to the disassembled containment sump supply valve to CS MOV 2-FCV-072-0045-B per WO 08-953328-000

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Field refurbishment of safety-related piping system active mechanical components was performed per the approved refurbishment program, procedures, and engineering design documents. Additional inspections will be needed on modified valves to ensure program compliance with GL 95-07.

O.A.1.3 (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 the MELB criteria were met. The process 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 calculation updating, 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 and 2010602. During this inspection the inspector reviewed implementation of corrective actions for PERs 237421, 237422, and 254415; and reviewed QA Surveillance 25402-WBN-SR-10-1355, "Conduit Sealing Requirements in Work Orders." In addition, the inspector reviewed calculations associated with the sealant being used for conduits. These calculations included WBNAPS2-169, "Material Aging Calculation for Dow-Corning 738 RTV" and WBPEVAR9309002, "Justification for use of Dow Corning RTV 738 Sealant on Conduit Fittings and Junctions Boxes for MELB."

b. Observations and Findings

No findings of significance were identified. The QA surveillance was thorough and showed that an adequate process was in place to assure appropriate conduit sealing. Conduit walk-downs were in progress. The applicant's calculations showed that the use of 738 RTV sealant was acceptable. The applicant's plans were previously shown to be equivalent or to exceed those performed for Unit 1.

c. Conclusions

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

O.A.1.4 (Discussed) Microbiologically Induced Corrosion (MIC) SP (TI 2512/039)

a. Inspection Scope

The objectives of this inspection were to evaluate the implementation of the MIC SP. This program was established due to the fact that TVA had discovered MIC in Unit 1 piping and initiated special controls and monitoring. The applicant determined that similar actions were appropriate for Unit 2 piping that had not yet been incorporated into the program. The applicant's planned actions included establishing minimum wall thickness requirements for those systems identified as potentially affected by MIC, determining MIC-susceptible locations, establishing grids for inspection locations, completing modifications to allow flushing similar to Unit 1, and updating program documents. A previous inspection, documented in NRC IIR 05000391/2010602, concluded that the applicant's planned actions were equivalent to Unit 1 with the exception that no inspections were planned for Unit 2 systems based on raw water system studies. During this inspection the inspector reviewed QA Surveillance 25402-WBN-SR-10-1455, "MIC Special Program Implementation," reviewed samples of the specific grid location guidance for corrosion monitoring, and confirmed that the required modifications for MIC were scheduled.

b. Observations

No findings of significance were identified. The applicant had identified additional wall degradation in the Unit 1 raw water system requiring further study of the 15-year projection, which was in progress. The inspector noted that the applicant's Refurbishment Program had been established and required numerous inspections of carbon steel systems. The QA surveillance reviewed was thorough but only covered implementation of EDCRs.

c. Conclusions

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

OA.1.5 (Discussed) Electrical Issues CAP - Sub-issue: Cable Separation and Electrical Isolation (TI 2512/020 and IP 37002)

a. Inspection Scope

Background: The sub-issue was established as a result of various employee concerns, reports of conditions adverse to quality, and NRC findings related to electrical installations, materials, and equipment. In this instance, the applicant determined that examples of redundant divisions of enclosed raceways existed with less than the minimum required 1-inch separation. This sub-issue was further divided into three categories:

- Separation between redundant divisions of Class 1E raceways

- Internal panel separation between redundant enclosed divisions of Class 1E cables
- Coil-to-contact and contact-to-contact isolation between Class 1E and non-Class 1E circuit

Inspection Activities: The inspectors conducted interviews with the applicant's design personnel and inspected actions taken to resolve the sub-issue to verify that the applicant's program meets the applicable design criteria (WB-DC-30-4) and NRC regulations. The inspectors reviewed the sub-issue surveillance report, the applicant's self-assessment of the sub-issue, and the sub-issue closure report to determine whether actions taken by the applicant met the independence and separation requirement of Criterion 22 of WB-DC-30-4. In addition, the inspectors reviewed calculations WBN-EEB-EDQ00299920090002 and WBN-EEB-EDQ00299920090006 to determine whether the internal panels and the raceways of safety-related (Class 1E) circuits achieved independence from their redundant trains. To evaluate correction of deficient installations identified in the calculations, the inspectors conducted direct observations of two safety-related enclosures (panels M3 and M5) and two safety-related raceways (2PM763K and 2PP2360A) located in the Unit 2 control room.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the Class 1E cables observed in the control room enclosures were separated according to electrical divisions as required by design criteria WB-DC-30-4 and NRC regulations; however, installations were not yet complete. Additionally, the inspections of raceways 2PM763K and 2PP2360A found that actions taken for both raceways met defined separation and isolation requirements.

c. Conclusions

The inspectors concluded that ongoing construction activities inside the enclosures for Class 1E circuits had not progressed sufficiently to satisfy closure of the Electrical Cable Issues CAP- Sub-Issue Cable Separation and Electrical Isolation. Additional inspection will be required.

OA.1.6(Discussed) Cable Issues CAP - Sub-issue: Cable Splices (TI 2512/016 and IP 51063)

a. Inspection Scope

Background: An internal review by the applicant determined that splices installed in electrical conductors on Unit 2 may not meet requirements for environmental qualification and may not conform to materials tested by the vendor. The sub-issue for splices was established to identify and correct deficient splices and splices possessing indeterminate quality status.

Inspection Activities: The inspectors reviewed in-process activities for resolving the sub-issue for cable splices. The review was conducted to confirm that the activities complied with the applicant's commitments and NRC requirements.

Specifically, the inspectors conducted interviews with engineering personnel and reviewed results from the applicant's walkdown inspections of Class 1E electrical splices

to determine whether the work instructions and acceptance criteria were consistent with the engineering specifications contained in the integrated cable and raceway design system (ICRDS). In addition, the inspectors conducted direct observations of a sample of installed splices to verify the walkdown records accurately reflected the installed conditions.

Walkdown records contained in the following WOs were examined by the inspectors:

- Bend radius data sheet for cable 2PM1834G (WO WBN2-E-276-686-00)
- Bend radius data sheets for cables 2V4451A, 2V4600A and 2V4463A (WO WBN2-E-062-861-00)
- Bend radius data sheets for cables 2V867B and 2V868B (WO WBN2-E-077-2195-00)

Direct field observations were conducted for the following splices:

- Splice in 2V867B, located in containment in the vicinity of FSV-77-18B (valve was not installed)
- Splice in 2V868B, located in containment in the vicinity of FSV-77-18B (valve was not installed)
- Splice in 2PM1834G, located at panel 2-PNL-276-L186 and attached to differential pressure transmitter 2-PDT-30-42 (containment pressure differential transmitter)

b. Observations and Findings

The inspector's review of the WOs identified that the work instructions required walkdown personnel to record whether or not bends in cables and individual conductors "passed" or "failed" in comparison to allowable limits. The inspectors noted that many of the cable bends that "failed" walkdown measurements were located at cable splices. Direct inspections of selected splice locations found that two splices, identified as "failed" in the applicant's walkdown (2PM1834G and 2V867B), were installed in condulets that were too small to accommodate the bulky splices without excessively constricting the spliced conductors. Further, one of the splices (2PM1834G) could not be fitted into its conduit at all. The splice jacket was observed to be slightly deformed with a compression mark from previous handling.

A subsequent interview with responsible engineering personnel identified that the deficient splices were to be replaced under EDCRs 55117 and 53948. The persons interviewed stated that undersized condulets would be replaced with properly sized enclosures at that time. The inspectors reviewed the EDCR packages and confirmed the identified splices were listed for replacement.

c. Conclusions

The inspectors concluded that some splices in Class 1E cables were too bulky to be contained in the existing condulets without excessively bending the spliced cable or deforming the splice components; however, provisions were established using EDCRs to rework environmentally qualified splices, including the deficient installations identified in this inspection. Further inspection will be required to verify the adequate correction of this Cable Issues CAP Sub-Issue.

OA.1.7 (Discussed) Inspection of Watts Bar Nuclear Plant Employee Concerns Program (ECP) (TI 2512/015)**a. Inspection Scope**

The inspectors continued inspection efforts initiated in NRC IIR 05000391/2008010 Section Q.1.3 regarding the applicant's identification and resolution of historic corrective action tracking documents (CATDs). Specifically, the inspectors utilized the guidance in TI 2512/015 to evaluate the applicant's implementation of procedure 25402-3DP-G04G-00501, "Historical Document Review Process" Rev. 4. The inspection focused on verifying that the issue screening methodology and rationale, prescribed by the applicant's procedure, was followed to ensure that: 1) historical issues deemed "not-applicable" to Unit 2 and 2) historical issues deemed "applicable" to Unit 2 were properly screened for applicability and resolution. Additionally, for each CATD that was screened as "applicable" to Unit 2, the assigned corrective actions were reviewed for completeness in addressing the historic issue. Regarding those CATDs that were identified as "not-applicable" to Unit 2, the inspectors reviewed the screening criteria, used by the responsible organization, to verify that the appropriate determination of applicability occurred. The list of CATDs reviewed is listed in the Attachment to this report.

The following inspection requirements of TI 2512/015 were inspected:

- Section 05.03.k - 25 samples
- Section 05.06.a - 50 samples
- Section 05.06.b - 25 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the sample of documents reviewed complied with applicable requirements. Proper justification of screening "output" accompanied each CATD and planned corrective actions, when applicable, were appropriate.

OA.1.8 (Closed) Construction Deficiency Report (CDR) 391/85-12: Hydrogen Collector Piping Could Be Overstressed**a. Inspection Scope**

In March 1985, the applicant notified the NRC that the 8-inch hydrogen collector piping in the Unit 2 reactor building could become inoperable during a loss of coolant accident (LOCA). The high temperature in the reactor building lower compartment, resulting from a LOCA, could cause the hydrogen collector piping to come into contact with a support beam for the ice condenser, due to insufficient clearance between the support and the piping. As a result, the hydrogen collector piping could become overstressed. This deficiency was originally identified in historical Nonconformance Report (NCR) WBN MEB 8506 for Unit 2. A similar deficiency was identified for Unit 1 in NCR WBN WBP 8334 R1 when the analysis of the Unit 1 8-inch hydrogen collector piping determined it could impose excessive nozzle loads on the air return fan suction ductwork during a

LOCA. The seismic piping analysis for the hydrogen collector piping was originally performed for both Units 1 and 2, assuming that they were identical. The installed location of the ice condenser support beam on Unit 2 was slightly different from Unit 1. Even though the beam location was within construction tolerances, the changes made on the piping for Unit 1 did not correct the problem for Unit 2. Thus, the as-built installation differences between Unit 1 and Unit 2 required a different seismic piping analysis, N3-30-04R, and Engineering Change Notice (ECN) 5497, to correct the Unit 2 installation. The field work to eliminate the possible interference between the hydrogen collector piping and the ice condenser support beam for Unit 2 was completed prior to August 1, 1986, and FCR H-15080 was approved on August 4, 1986. Based on a review of completed ECN 5497, the inspectors had determined that CDR 391/85-12 had been adequately resolved for Unit 2.

In addition, to address Unit 2, the inspectors performed the following:

- Reviewed the applicant's open item closure report including any actions associated with Item NCO85-0104-001 and PER 172617 which was issued to track required Unit 2 actions for historical NCR WBN MEB 8506.
- Reviewed the final report to the NRC, dated March 19, 1985, (L44850319805), stating that the piping was being analyzed separately for Unit 2.
- Reviewed the coversheet from closed ECN 5497 (B26850725514).
- Reviewed Data Sheet No. 1 for ECN 5497 (B26850422516) documenting issuance of mechanical drawings.
- Reviewed Data Sheet No. 2 for ECN 5497 (B26850412500) documenting issuance of pipe stress analysis drawings associated with ECN 5497 and Stress calculation N3-30-04R.
- Reviewed Data Sheet No. 3 for ECN 5497 (B26850711500) documenting issuance of pipe support drawings associated with ECN 5497.
- Reviewed an excerpt from Piping Analysis Calculation N3-30-04R (B41860226984) showing Rev. 0 was issued for the configuration changes of ECN 5497.
- Reviewed the memo from D. M. Lake (Project Manager, WBN Nuclear Construction) to M.L. Rayfield (Project Engineer, WBN Engineering Project) dated August 8, 1986 (C24860808002).
- Reviewed completed NCR WBN MEB 8506 (B44850816006).

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

OA.1.9(Closed) Structural Welding General Inspection (IP 55100)

a. Inspection Scope

The purpose of this IP was to determine if the applicant was appropriately controlling structural welding in accordance with the codes and other requirements listed in their QA program under Special Processes. The WBN Unit 2 Reconstitution effort identified that

most of this IP was previously satisfied through historical inspection efforts. Specifically, the procedures, processes, and programs were the same for both units, and the Unit 1 reconstitution effort, outlined in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix N, "Welding and NDE," confirmed adequate reviews were completed, however; samples of new work performed and procedures used for WBN Unit 2 construction were inspected as documented in this and previous reports.

Reconstitution of the sections of this IP listed in the following table was determined to be previously satisfied; however, new work and programs were inspected and documented in the reports tabulated below.

IP Section	Inspection Reports
02.01 – Base Material and Filler Metal Compatibility for Welding	05000391/2010602 05000391/2010603
02.02 – Welding Procedures	05000391/2010603
02.03 – Welder Qualifications	05000391/2010603
02.05 – Preheat and Post Weld Heat Treatment	Post weld heat treatment of structural steel was not used on site. Preheat adequacy was verified during inspection of sections 02.02 and 02.04.
02.06 – Examination and Inspection of Welds	05000391/2009603 05000391/2009604 05000391/2010603

Section 02.04 of this IP required observation of 30 welds during welding activities. The reconstitution results were documented in NRC IIR 05000391/2009602 Attachment 2. It was determined that two samples had been taken previously and documented in reports 05000391/82-17 and 05000391/90-04 and an additional 28 samples were required. An additional 23 samples were taken and documented in their respective reports tabulated below.

Inspection Report	Sample Quantity
05000391/2009604	1
05000391/2010603	2
05000391/2010604	12
05000391/2010605	8

Additional inspection activities were performed during this inspection period as documented below. An additional nine samples of section 02.04 were taken.

The inspectors performed inspections of structural steel welding by observing 9 samples of in-process welding to verify the following requirements were met as applicable:

- American Welding Society (AWS) D1.1, "Structural Welding Code," 1972 edition with revisions 1973 and 1974
- AWS D1.1, "Structural Welding Code," 2002 edition for prequalified joint details, base materials, and qualification of welding procedures and welders
- American National Standards Institute (ANSI) N45.2.5 1974, "Structural Inspection and Testing During Construction Phase of Nuclear Power Plants"
- Bechtel Procedure "GWS-Structural" Rev. 4

- Bechtel Welding Procedure “WPS-No. P1-A-Lh (Structural)” Rev. 1

Documents reviewed are listed in the attachment

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

- Welding procedures, drawings, instructions, and data sheets were at the work station or readily available.
- Welding was performed in accordance with welding procedure requirements.
- Low-hydrogen electrodes were of the specified classification and properly controlled.
- Preheat and interpass temperatures were controlled and measured in accordance with the procedure.
- Surrounding plant equipment was protected from weld spatter, arc strikes, and work activities.
- Proper cleaning and fit-up were achieved, QC inspections and hold points were followed.
- Back-gouging was performed according to procedure requirements.
- Weld joint geometry was as specified and that surfaces to be welded were prepared, cleaned, and inspected in accordance with applicable procedures or instructions

The following welds were inspected during production:

Weld No.	Drawing No.	Work order No.	Component
FW-1A	WME-126 Rev. 0	110714144	Typical Conduit Support 181
FW-1B	WME-126 Rev. 0	110714144	Typical Conduit Support 179
FW-1C	WME-126 Rev. 0	110714144	Typical Conduit Support 179
FW-2	FSK-E-336 Rev. 0	110714194	Typical Conduit Support 14
FW-3	FSK-E-336 Rev. 0	110714194	Typical Conduit Support 14
FW-40	WM-M-764 Rev. 0	111149348	Pipe Support
FW-41	WM-M-764 Rev. 0	111149348	Pipe Support
FW-7	WM-C-129 Rev. 1	08-954513-005	RCP 2 Platform
FW-12	WM-C-129 Rev. 1	08-954513-005	RCP 2 Platform

The inspectors performed the following samples:

- IP 55100 Section 02.04 – 9 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The observed structural welds, procedures, and records were found to conform to the applicable requirements. This IP is considered closed; however, if major changes to the applicant’s instructions and procedures are identified in the area of structural welding, the inspectors will inspect those, as necessary, to satisfy the requirements of this procedure.

OA.1.10 (Closed) Containment Cooling SP (TI 2512/034)a. Inspection Scope

Background: The Containment Cooling SP was developed after TVA determined, in May 1987, that the containment building lower compartment temperatures, used in the environmental qualification of equipment important to safety, were developed based on non-conservative assumptions regarding long-term, post-accident heat loads. Specifically, previous analyses failed to consider the long term contribution of reactor coolant system decay heat under hot standby conditions following a main steam line break (MSLB). Recalculations, that factored in the additional decay heat, confirmed that the original analyses did not identify higher localized temperatures, over the long term following a MSLB, and identified that corrective actions would be required to ensure operability of the electrical equipment important to safety in lower containment and continued operation of the containment spray system.

This issue was identified as a violation of 10CFR50.49(e)(1), requiring that “The time-dependent temperature and pressure at the location of electrical equipment important to safety must be established for the most severe design basis accident during or following which this equipment is required to remain functional.” TVA created Condition Adverse to Quality Report (CAQR) WBF870061SCA to document the issue. Subsequently, in May 1989, TVA issued Volume 4 of its Nuclear Performance Plan, creating a Containment Cooling SP with the intent of resolving the issue. The Unit 1 PER and the violation of 10CFR50.49(e)(1) were closed in 1994. The Unit 2 construction completion project has written PER 144110 identifying and tracking the Unit 2 Containment Cooling SP. The key tasks for resolving the issue for Unit 1 were to develop time dependent temperature profiles for the lower compartment, which were then used for equipment qualification. This was accomplished by completion of the following items:

- Determining the long-term containment temperature profile for the lower compartment considering the design basis MSLB event.
- Upgrading the lower compartment cooler (LCC) units and associated ducting to safety related.
- Evaluating containment coatings transport and replacing nonqualified coatings.
- Using the revised calculated MSLB temperature profile to qualify components in the lower containment that are important to safety.
- Install curbs to direct containment spray away from outer crane wall.

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

TVA letter dated September 6, 1991, “WBN – Nuclear Performance Plan,” Volume 4, Revision 1, Section III.3.2, “Containment Cooling SP” proposed their approach for resolving the Containment Cooling SP for WBN2. In a letter from R. R. Baron to the NRC, dated September, 28 1995, TVA notified the NRC of the completion of the Containment Cooling SP on Unit 1. As stated in TVA letter to the NRC dated September 26, 2008, resolution of the Unit 2 Containment Cooling SP will be performed in a similar manner that was used for Unit 1.

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

Inspection Activities: Based on the information provided in the background section, the objective of this inspection was to gather and evaluate sufficient information to make a determination as to whether TVA's Containment Cooling SP had been adequately developed. This was done to ensure that the Unit 1 historical problems were being prevented and resolved for Unit 2. This inspection focused on a review of the adverse conditions involving containment cooling post-accident environmental conditions which were programmatically characterized by TVA as non-conservative and requiring evaluation.

The inspectors reviewed the TVA Containment Cooling SP Implementation Plan and held discussions with applicant engineering staff to understand the methodology for resolution of this SP. Initial discussions focused on applicant assumptions regarding the SP completion and validation that the Unit 2 approach would parallel those efforts which successfully completed the SP on Unit 1. The following steps were planned to resolve the SP for Unit 2:

- Revision to long-term lower containment temperature profile
- LCC and ductwork upgrade
- Coatings transport evaluation
- Component environmental qualification
- Install curbs to direct containment spray

Inspection efforts focused on the creation, acceptance, review, and implementation of various design change documentation. Initially, PER 144110 was reviewed to ensure that the planned PER actions supported completion of the Containment Cooling SP, as outlined in the applicant's implementation plan. Additionally, the inspectors reviewed the Containment Cooling SP Closure Report, design output documents, and design basis documents to ensure that the documents adequately addressed all design parameters and that issued modifications were planned to be implemented in support of resolution of the SP. Specific documents reviewed are listed in the Attachment to this report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions, associated with the Containment Cooling SP, to verify the adequacy of the applicant's actions associated with the Containment Cooling SP. The inspectors concluded that the programmatic aspects of TVA's implementation plan were adequate and, while not all actions were field-complete, all actions inspected were transferred to qualified programs for implementation. This SP is considered closed.

OA.1.11 (Closed) NRC BL 89-01: Failure of Westinghouse Steam Generator Tube Mechanical Plugs (IP 92717)

a. Inspection Scope

The inspectors conducted interviews, reviewed documentation, and observed field activities associated with the removal and installation of steam generator (SG) tube mechanical plugs to determine whether activities were conducted in accordance with the licensee's response to BL 89-01, "Failure of Westinghouse Steam Generator Tube Mechanical Plugs," and Section III of the ASME Boiler and Pressure Vessel (B&PV) Code, 1971 Edition through Summer 1971 Addenda.

The inspectors reviewed the licensee's responses to BL 89-01, its two supplements, and the associated NRC review of those responses to determine the licensee's commitments. The inspectors verified that the licensee's activities met the stated commitments.

The inspectors reviewed the SG tube plug removal and installation procedure PI-901295-01, "Plug Replacement and Mechanical Ribbed Plugging of SG Tubes at Watts Bar 2," Rev 0. The inspectors observed the removal of four Alloy 600 mechanical plugs and the subsequent installation of four Alloy 690 ribbed mechanical plugs, including verification of plug location. The inspectors reviewed material certification associated with the newly installed plugs, calibration of plugging equipment, and plugging operator certifications.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Licensee actions taken were adequate to ensure the commitments made for BL 89-01 have been met, and were found to conform to applicable regulatory requirements. BL 89-01 is considered closed.

OA.1.12 (Closed) TI 2515/145, TI 2515/150, Rev. 3, BL 2001-01, BL 2002-01, BL 2002-02: Reactor Pressure Vessel (RPV) Head and Vessel Head Penetration (VHP) Nozzles (IP 92717)

a. Inspection Scope

During this inspection period, the inspectors reviewed C-3217-00-01, "CRDM and Instrument Column Nozzle Stress Analysis for Watts Bar, McGuire 2 and Catawba 1," Rev 0. This review was done as a follow-up to inspection of the reactor VHP exams documented in NRC IIR 05000391/2010605, Section OA.1.20. The inspectors' effort focused on verifying that those volumes of the RPV head nozzles, subject to 20KSI or greater tensile stresses, were examined as required by First Revised Order EA-03-009, "Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors."

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

TI 2515/145, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles" (associated with BL 2001-01), was superseded by TI 2515/150, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzles" (associated with BL 2002-02). The licensee's commitments to both BL 2001-01 and BL 2002-02 were identical, as documented in TVA letter April 1, 2010 (ML100950044), and reviewed in NRC Safety Evaluation Report dated June 30, 2010 (ML10039515).

In addition, the licensee's response to BL 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Boundary Integrity," was identical to the above mentioned response for BL 2002-02 and BL-2001-01, as documented in TVA letter April 1, 2010 (ML100950044), and reviewed in NRC Safety Evaluation Report dated June 30, 2010 (ML10039515). No TI was associated with BL 2002-01.

Licensee actions required by BL 2001-01, BL 2002-01, and BL 2002-02; and inspected per TI 2515/150 were previously reported in NRC IIR 05000391/2010605, Section OA.1.20. In combination with the activities inspected during this reporting period, licensee actions taken were adequate to meet the pre-operational commitments made for BL 2001-01, BL 2002-01, and BL 2002-02, and to ensure the integrity of the examined RPV head nozzles. Inspection activities related to these bulletins and the associated TI 2515/145 and TI 2515/150 are complete and closed for the WBN2 construction project.

Additional post-operational commitments for BL 2001-01, BL 2002-01, and BL 2002-02 are to perform inspections in accordance with 10 CFR 50.55a(g)(6)(ii)(D)(2) through (6) and ASME Code Case N-729-1. These activities will be reviewed during the first refueling outage following initial operation.

OA.1.13 (Closed) Use-As-Is SP (TI 2512/043)

a. Inspection Scope

The objectives of this inspection were to evaluate the applicant's and contractor's implementation of the Use-As-Is SP. This program was established due to the fact that TVA determined that there was inadequate documentation for conditions adverse to quality (CAQs) with dispositions of "use-as-is" or "repair". The applicant initiated a plan to review all applicable CAQs. Previous inspections documented in NRC IIR 05000391/2009604 covered a review of the applicant's process, independent review of results and associated documentation, and field observations. During this inspection, the inspectors reviewed Calculation EPMJRL092688, "Use-As-Is/Repair Cumulative Effect Analysis & Matrix," Rev. 3; reviewed corrective actions for PERs 236794, 236940, and 255649; and reviewed closure documentation for a sample of six items from the open items list.

b. Observations

No findings of significance were identified. Plans and actions were shown previously to be equivalent or to exceed those for Unit 1. No significant cumulative effects were noted, appropriate corrective actions were implemented for PERs reviewed, and closure actions were well documented. Additional outstanding actions are adequately tracked by the open items list and most are complete.

c. Conclusions

This inspection completes the planned inspections for this SP with no significant findings identified; therefore, this program is closed.

O.A.1.14 (Closed) Service Water System Operational Performance Inspection (SWSOPI) (TI 2515/118, Rev. 2)

The inspectors' review of this TI indicated that the provisions of this TI have been previously covered via Unit 1 inspections or are subject to ongoing inspections via IP 71111.07, "Heat Sink Performance." Appropriate Unit 2 specific inspections have been planned using IP 71111.07; therefore, this TI is closed.

O.A.1.15 (Closed) NRC GL 89-13: Service Water System Problems Affecting Safety-Related Equipment

Subsequent to this GL, the NRC developed IP 71111.07, "Heat Sink Performance," for inspection in this area. Attributes of this GL are adequately covered by planned inspections in accordance with this IP. These inspections will cover testing of the essential service water system, inspection of the component cooling system heat exchanger B heat transfer test, review of inspections of heat exchangers which do not receive a heat transfer test, inspection of eddy current testing of the residual heat removal system heat exchanger A, and confirmation that Unit 2 heat exchangers, raw water system monitoring, and chemistry control for Unit 2 systems are incorporated into existing programs. Since, inspection requirements are adequately covered by planned inspections, this GL is closed.

O.A.1.16 (Closed) Spent Fuel Storage Rack (IP 50095)

The inspectors determined that the scope of this IP covered activities already completed under the WB Unit 1 effort since the fuel pool and storage racks were common to both Units. Therefore, this IP will not be completed for Unit 2 and is considered closed.

O.A.1.17 (Closed) URI 391/2010606-01: Evaluation of the Use of Temporary Supports When Equipment is Removed (IP 92701)

a. Inspection Scope

Previous inspections identified that temporary supports were not in place on suction and discharge piping for motor-driven auxiliary feedwater pumps. Normal industry practice is to have an engineering evaluation performed when piping and/or supports are temporarily removed to evaluate stress on the piping and the need for temporary supports. The inspectors discovered that the evaluation performed by the applicant indicated that temporary supports were required for this piping. This issue required evaluation of the stress on the piping, evaluation of the reason the supports were missing, and the extent of condition. The inspectors reviewed the applicant's actions for this problem documented in PER 244072. These actions included installation of the required temporary supports, walkdown for any other similar conditions on the major pumps, and performance of an engineering evaluation for the lack of temporary supports.

b. Observations and Findings

No findings of significance were identified. The applicant was able to determine that temporary supports had been previously installed but removed. No other problems were identified. The engineering evaluation determined that the piping was acceptable.

c. Conclusions

The applicant's actions were acceptable and appropriately documented. This issue constitutes a violation of minor significance that is not subject to enforcement action in accordance with the NRC's Enforcement Policy.

O.A.1.18 (Closed) URI 391/2010607-02: Potential Problems with Implementation of the Program for Reporting Significant Construction Deficiencies in Accordance with 10 CFR 50.55(e) (IP 92701)

a. Inspection Scope

The inspectors previously discovered that the use of new computer software for the corrective action program had resulted in evaluations not being performed for construction problems, as required by 10CFR50.55(e). These issues were sent to the Unit 1 personnel for evaluation for operations reportability requirements as required by 10CFR50.72 only. The inspector reviewed the applicant's corrective actions documented in PER 246908, independently reviewed the problems identified as potentially reportable that had not been properly evaluated, and reviewed eight additional problems identified in PERs for potential reportability. The applicant's actions included procedure changes and training to assure appropriate evaluations were performed, documentation of the missed evaluations, and performance of a briefing for the applicant's management committees on reportability requirements.

b. Observations and Findings

No findings of significance were identified. No problems were identified that should have been reported under 10CFR50.55(e). The applicant's actions appeared appropriate to address the problem.

c. Conclusions

The applicant's actions were acceptable and appropriately documented. This issue constitutes a violation of minor significance that is not subject to enforcement action in accordance with the NRC's Enforcement Policy.

O.A.1.19 (Closed) NCV 391/2010607-01: Ineffective Measures to Assure Prompt Identification and Correction of Conditions Adverse to Quality

a. Inspection Scope

This NCV involved multiple examples of PERs where various aspects of the corrective action program were not being met. The applicant's general corrective actions were documented in PERs 246208, 246901, and 284106. Additionally, specific examples cited were addressed in PERs 222079, 224070, 227742, 243282, 243529, 243820, 244072, and 246376. The applicant's actions included providing a project directive,

providing briefings and training to personnel involved in corrective actions for PERs, incorporating briefing information into required reading, initiating a procedure change to require a PER for all NRC-identified problems when the NRC inspection report is received (in addition to the PER initiated at the time the issue is identified), initiation of monthly QA surveillances of PERs for adequate development and completion of corrective actions, and evaluation and/or correction of the specific examples previously cited. The inspectors reviewed documentation of the applicant's actions associated with the above PERs, discussed the actions with QA management, and reviewed results of the first six QA surveillances. In addition, the inspectors confirmed PERs were appropriately initiated from the results of the QA surveillances.

b. Observations and Findings

No findings of significance were identified. The applicant completed appropriate actions for each of the specific issues cited and general corrective actions appeared to be resulting in improvement based on QA surveillance results. The QA surveillances appropriately selected a smart sample of issues and resulted in a thorough review.

c. Conclusions

The applicant's actions were acceptable and appropriately documented; therefore, this NCV is closed.

O.A.1.20 (Closed) CDR 391/87-05: Use-As-Is and Repair Dispositions for Construction Nonconformance Reports (IP 35007)

This CDR describes the problems associated with use-as-is and repair dispositions that led to development of the corresponding TVA SP. The SP corrective actions fully cover the issues identified in the CDR; therefore, this CDR is closed based on satisfactory inspection results for the SP (see Section OA.1.13)

OA.1.21 (Closed) URI 391/2010605-05: Evaluation of Quality Control Acceptance of Nonconforming Cable Support Installation (IP 92701)

a. Inspection Scope

Background: In NRC IIR 05000391/2010605, a discrepancy was identified in the verification and acceptance of an incomplete installation of electrical conductors. Work records documented that a vertical run of Class 1E cable was installed using a temporary cable support instead of the required permanent support. The work instruction required the electrical craft and an independent inspector to sign verifications that the required Kellums Grip supports were properly installed and inspected. The signatures were provided even though the required permanent installation had not been established. The inspectors noted that no formal action had been initiated to identify and control the incomplete configuration in a way that would assure it would be corrected before placement of the cable into service.

The applicant documented the condition in PER 296266. The inspectors concluded that in order to properly evaluate and disposition this issue, additional inspection would be required to determine the extent of condition for similar problems with quality control inspections.

Inspection Activities: The inspectors interviewed responsible construction engineers and quality inspectors, reviewed work completion records, and reviewed construction project procedures to evaluate the extent and significance of the condition identified in the URI.

Cable installation/pullback data sheets, contained in WO 09-953531-014, for cables 2V704A, 2V706A, 2V712A, and 2V714A were examined by the inspectors. To evaluate the requirements for installing cables and completing data sheets, the inspectors reviewed MAI-3.2, including Appendix B of the instruction. Bechtel project procedure 25402-000-GPP-0000-N3000 was reviewed to evaluate the adequacy of information pertaining to quality inspection attributes.

Interviews were conducted with quality inspection personnel, construction field engineers, and construction management to assess the effectiveness of communications of management expectations for construction and inspection. Documents reviewed are included in the attachment.

b. Observation and Findings

The inspectors identified the following SL IV NCV:

Introduction: A SL IV NCV of 10CFR50, Appendix B, Criterion X, "Inspection," was identified 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. Specifically, the conduct and documentation of inspections of safety-related electrical cables did not provide adequate assurance that the cables were installed in accordance with defined requirements.

Description: The inspector's review of cable installations performed under WO 09-953531-014 identified the following:

- In one instance involving cable 2V704A, the applicant's QC inspector signed verification in a final inspection that a vertical cable support was properly installed when, in fact, the required permanent support was not installed. Although the data sheet contained a note from the foreman and inspector describing the temporary condition, the document did not show that the condition had not been resolved prior to the final verification signature by the QC inspector. As a result, conflicting information was recorded regarding the status of the cable installation which, in turn, created uncertainty about how the condition would be rectified and re-inspected.
- In other instances involving cables 2V706A and 2V712A, the applicant's QC inspectors did not document failures to install required vertical cable supports as nonconforming items in accordance with Construction Completion Project Nuclear Quality Assurance Manual (PNQAM), Section WBN-15.1, Requirement 3.2. The PNQAM states, in part, that "Nonconformances shall be controlled and documented."

In these instances, the electrical craft workers and foremen had attested that the incremental placements of cable were completed in accordance with the construction procedure. In contrast, the final inspections by the applicant's QC inspectors determined that the required vertical cable supports were not installed.

The quality inspectors did not document the nonconforming installations, as required by the PNQAM, and withheld their final verification signatures until the installations had been corrected.

- An interview with a QC inspector identified that the individual possessed an inaccurate understanding of the requirements for inspecting “supports.” When questioned, the applicant’s inspector did not identify that the procedure-specified inspection attribute, “W27,” was related with correct installation of vertical cable supports. Further, MAI-3.2 did not contain any information about what kind of supports to inspect or how to determine that installations were acceptable. The procedure only stated that the quality inspection was to verify installation of supports according to inspection attribute “W27.” No description of the attribute was provided. Also, no description of the attribute was provided in the applicable Bechtel project procedure (25402-000-GPP-0000-N3000). A TVA corporate procedure was subsequently found to contain a description of an electrical inspection attribute listed as “W27.” However, the applicability of the corporate procedure to the work activity was not identified in the work instructions or the project procedure.

The inspectors noted that some follow-up actions had been implemented by the applicant since the URI was first discussed in IIR 05000391/2010605. As documented in PER 296266, a permanent vertical cable support for cable 2V704A was installed on January 11, 2011. As documented in WO 09-953531-014, a permanent support for cable 2V712A was installed on January 18, 2011. For cable 2V712A, QC inspectors also updated the WO data sheet with a late entry that documented they had inspected and verified correct installation of the permanent support on January 29, 2011. In addition to the above actions, the applicant stated that action would be taken to revise PER 296266 to evaluate and correct the deficiencies identified by the NRC inspectors.

The inspectors determined that the finding was more than minor in accordance with IMC 2517, because it represents an inadequate process, procedure, or quality oversight function which, if left uncorrected, could adversely affect the quality of the fabrication, construction, testing, analysis, or records of safety-related cables. The failure to correctly document the nonconforming conditions circumvented the approved process of entering the non-conforming conditions into the corrective action program, formally evaluating and tracking the status of the discrepant installations, and assuring that conditions would be corrected prior to placement of the cables into service. The finding was of very low safety significance because the conditions were identified before the cables had been released for service.

The apparent cause of this finding has a cross-cutting aspect related to ineffective communication of management expectations for use and adherence to procedures (H.4 (b)).

Enforcement: 10CFR50, Appendix B, Criterion X, “Inspections,” requires, in part, that a program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity. Such inspection shall be performed by individuals other than those who performed the activity being inspected.

Contrary to the above:

- On November 30, 2010, the final quality inspection, of the incremental installation of cable 2V704A between Tray Node 4A2436 to Tray Node 4A1924, incorrectly documented that the installation of a vertical cable support was correct when, in fact, the required permanent support had not been installed.
- On November 13, 2010, the final quality inspection of the incremental installation of cable 2V706A between Tray Node 3A1917 to Tray Node 3A1918 failed to identify that the installation, which had been certified as being in conformance to the procedure, did not comply with inspection acceptance criteria.
- On November 11, 12, and 16, 2010, the final quality inspections of the incremental installations of cable 2V712A between Tray Node 4A2448 to Tray Node 4A1934, Tray Node 4A1934 to Tray Node 4A1935, and Tray Node 4A1935 to Tray Node 4A1940, respectively, failed to identify that the installations, which had been certified as being in conformance to the procedure, did not comply with inspection acceptance criteria.
- The project procedures associated with inspection of electrical cables, including instructions in WO 09-953531-014, MAI-3.2, and project procedure 25402-000-GPP-0000-N3000, did not provide sufficient information for quality inspectors to understand the scope and intent of inspection attribute W27, "Supports."

Because this was a SL IV violation and it was entered into the applicant's corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy, NCV 05000391/2011602-02; "Failure to Perform Adequate QC Inspections."

c. Conclusions

The inspectors closed URI-391/2010605-05 and identified one NCV for failure of quality inspections of cable installations to assure the installations conformed to the documented instructions, procedures, and drawings for accomplishing the activity.

OA.1.22 (Closed) NRC BL 83-04, CDR 391/83-31: Failure of Under-Voltage Trip Function of Reactor Trip Breakers (RTBs) (IP 35007)

a. Inspection Scope

Background: BL 83-04 notified licensees about failures of General Electric Type AK-2 circuit breakers to trip open during testing of under-voltage trip attachments and directed the addressees to assure proper operation of all models of RTBs. Subsequently, the applicant issued CDR 391/83-31 to identify a design deficiency that was found in the Westinghouse Model DS-416 breakers supplied to Watts Bar.

Inspection Activities: The inspectors evaluated the status and adequacy of corrective actions for the Unit 2 construction completion project by reviewing commitment closure documents, interviewing responsible personnel, and performing field observations related to CDR 391/83-31 and BL 83-04.

Specifically, the inspectors reviewed commitment closure document NCO850274001 to verify successful modifications, design, and adequate inspection and testing of the DS-416 RTBs. The inspectors reviewed WOs 110834132 and 110960213 to verify completion of inspection and testing was properly documented and that the WOs implemented MI-99.001, "WBN Unit 1, RTB Inspection and Testing Procedure." The inspectors performed field observations of the installed RTBs to verify the labels clearly indicated the dates of inspection and testing on each RTB. In addition, the inspectors performed field observations of the spare RTBs, of the same type and model number as the installed breakers, to verify under-voltage trip attachment (UVTA) and shunt trip attachment parts were of the same type as documented on purchase and receipt documents. The inspectors also evaluated whether the as-installed quality of the attached parts was adequate. Finally, the inspectors interviewed personnel responsible for testing and installation of the RTBs to evaluate their qualifications and knowledge of RTB maintenance and operation.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the requirements in BL 83-04 have been met and design errors in the DS-416 breakers, also identified in CDR 391/83-31, have been corrected. NRC inspection efforts associated with BL 83-04 and CDR 391/83-31 are complete and these items are closed.

OA.1.23 (Closed) NRC BL 85-02: UVTA on WDB-50 RTBs (TI 2515/72)

a. Inspection Scope

Background: BL 85-02 notified licensees of reactor trip reliability problems associated with UVTAs on Westinghouse DB-50 RTBs. Addressees were advised that the facilities that had not completed installations of shunt trip attachments were performing UVTA force margin testing.

Inspection Activities: The inspectors reviewed commitment closure documents, interviewed responsible personnel, and performed field observations related to BL 85-02.

The inspectors reviewed commitment closure document NCO850509005 to verify the type and design of RTBs. The inspectors performed field observations of the installed RTBs to verify that the type installed at WBN2 was Westinghouse Model DS-416. The inspectors determined whether the as-installed model included UVTAs and shunt trip attachments in accordance with BL 85-02. The inspectors interviewed responsible personnel to assess their qualifications and knowledge of programs used to maintain the RTBs and to evaluate the adequacy of inspection, testing, and installation of WBN U2 RTBs.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that Watts Bar U2 uses Model DS-416 breakers instead of Model DB-50, and that the installed RTBs use

an automatic shunt trip attachment in accordance with BL 85-02. The inspectors further determined that Watts Bar U2 performed force margin testing in accordance with WBN procedure MI-99.001.

c. Conclusions

The inspectors determined that the applicable requirements in BL 85-02 have been met, including implementation of force margin tests for UVTAs. Therefore, inspection efforts associated with BL 85-02 are complete and closed.

OA.1.24 (Closed) TI 2515/64 Rev.1: Near-Term Inspection Follow-up to Generic Letter 83-28, TI 2515/91: Inspection Follow-up to Generic Letter 83-28, Item 4.1, and NRC GL 83-28: Item 4.1, Reactor Trip System Reliability (Vendor-Related Modifications)

a. Inspection Scope

Background: GL 83-28 informed licensees of required actions to address generic implications of the Salem ATWS event. GL 83-28, Item 4.1, specifically required licensees at pressurized water reactors to implement vendor recommended modifications to reactor trip breakers in use at their facilities. Licensees were advised to implement applicable vendor modifications and establish a vendor interface program to assure a source of continuing vendor technical information.

Inspection Activities: The inspectors reviewed the purchasing specifications and commitment completion documents NCO850509005 and NCO850274001, interviewed responsible personnel, and performed field observations of related equipment and documentation.

The inspectors performed field observations of the installed Model DS-416 RTBs to verify that WOs were properly implemented and that each breaker was correctly labeled. The inspectors also performed field observations of stored RTBs that had been delivered under the same purchase order as the installed RTBs. The observations were conducted to verify the part numbers were correct and to evaluate the as-installed quality of the UVTA and shunt trip attachment. The inspectors interviewed personnel, responsible for testing and installation of the RTBs to assess their qualifications and knowledge of RTB maintenance programs. The inspectors reviewed TVA procurement contract 65717 to verify the establishment of a technical interface with the RTB vendor. The inspectors also assessed the applicants' plans to apply the Unit 2 RTBs to the applicable maintenance program requirements currently in place for the Unit 1 RTBs. TI 2515/91 was closed for WBN Unit 1 in NRC IIR 05000390/1994-73.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the Westinghouse Model DS-416 RTBs at Watts Bar Unit 2 were provided the applicable upgrades and modifications recommended by the vendor.

c. Conclusions

The inspectors determined that the applicable requirements in GL 83-28, including the implementation of vendor-recommended upgrades and the establishment of a program to receive continuing technical information from Westinghouse, were met. Therefore,

inspection efforts associated with TI 2515/64 Rev.1, TI 2515/91, and GL 83-28 Item 4.1 are complete and closed.

V. Management Meetings

X.1 Exit Meeting Summary

On March 2, 2011, the resident inspectors presented the inspection results to Mr. David Stinson and other members of his staff. Although some proprietary information may have been reviewed during the inspection, no proprietary information was included in this inspection report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Applicant personnel

G. Arent, Licensing Manager, New Generation
R. Baron, Nuclear Assurance Project Manager, TVA, Unit 2
D. Beckley, Electrical Design Manager, Bechtel
B. Briody, Maintenance and Modification Manager, TVA, Unit 2
C. Crane, Construction Manager, Bechtel
B. Crouch, Licensing Manager, TVA, Unit 2
T. Franchuk, Quality Manager, Bechtel
E. Freeman, Engineering Manager, TVA, Unit 2
D. Helms, Lead Engineer CAPs & SPs, TVA, Unit 2
S. Hilmes, Lead Electrical CAPs & SPs, TVA, Unit 2
M. Lackey, ECP Rep, TVA, Unit 2
R. Michalski, Westinghouse Project Manager
D. Myers, Quality Assurance Manager, TVA, Unit 2
M. Pitre, Bechtel Lead Field Welding Engineer
J. Schlessel, Construction Manager, TVA, Unit 2
C. Stephenson, Licensing, TVA, Unit 2
D. Stinson, Vice President, TVA, Unit 2
T. Taylor, Lead Electrical Field Engineer, Bechtel

INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 46053	Structural Concrete - Work Observation
IP 46071	Concrete Expansion Anchors
IP 48053	Structural Steel and Supports – Work Observation
IP 49053	Reactor Coolant Pressure Boundary Piping – Work Observation
IP 49063	Safety-Related Piping - Work Observation
IP 50073	Mechanical Components – Work Observation
IP 50090	Pipe Support and Restrain Systems
IP 50095	Spent Fuel Storage Rack
IP 51053	Electrical Components and Systems Work Observation
IP 51055	Electrical Components and Systems – Record Review
IP 51063	Electric Cable – Work Observation
IP 52053	Instrument Components and Systems – Work Observation
IP 55100	Structural Welding General Inspection Procedure
IP 57070	Nondestructive Examination Procedure Magnetic Particle Testing Examination Procedure Review/Work Observation/Record Review
IP 62710	Power-Operated Gate Valve Pressure Locking and Thermal Binding
IP 92701	Followup
IP 92717	IE Bulletins for Information and IE Information Notice Followup
TI 2512/015	Inspection of Watts Bar Nuclear Plant Employee Concerns Program
TI 2512/016	Inspection of Watts Bar Nuclear Plant Cable Issues Corrective Action Program
TI 2512/020	Inspection of Watts Bar Nuclear Plant Electrical Issues Corrective Action Program Plan
TI2512/028	QA Records Corrective Action Program
TI 2512/034	Inspection of Watts Bar Nuclear Plant Containment Cooling Special Program Plan
TI 2512/039	Inspection of Watts Bar Nuclear Plant Microbe Induced Corrosion Special Program
TI 2512/040	Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break Special Program
TI 2512/043	Inspection of Watts Bar Nuclear Plant Use-As-Is CAQRS Special Program
TI 2515/064	Near-Term Inspection Followup to Generic Letter 83-28
TI 2515/072	Inspection of Response to IE Bulletin 85-02
TI 2515/091	Inspection Followup to Generic Letter 83-28, Item 4.1
TI 2515/118	Service Water System Operational Performance Inspection (SWSOPI)
TI 2515/145	Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles (NRC Bulletin 2001-01)
TI 2515/150	Reactor Vessel Head and Vessel Head Penetration Nozzles

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSEDOpened

05000391/2011602-01	NCV	Failure to Perform Work with Approved Work Instructions (Section C.1.8)
05000391/2011602-02	NCV	Failure to Perform Adequate QC Inspections (Section OA.1.21)

Discussed

2512/028	TI	QA Records CAP (Section OA.1.1)
95-07	GL	Pressure Locking and Thermal Binding of Power-Operated Gate Valves (Section OA.1.2)
2512/040	TI	Moderate Energy Line Break SP (Section OA.1.3)
2512/039	TI	Microbiologically Induced Corrosion SP (Section OA.1.4)
2512/020	TI	Electrical Issues CAP - Sub-issue: Cable Separation and Electrical Isolation (Section OA.1.5)
2512/016	TI	Cable Issues CAP - Sub-issue: Cable Splices (Section OA.1.6)
2512/015	TI	Inspection of Watts Bar Nuclear Plant Employee Concerns Program (Section OA.1.7)

Closed

05000391/2010605-01	URI	Insufficient End Clearance of a Two Piece Clamp (Section C.1.8)
85-12	CDR	Hydrogen Collector Piping Could Be Overstressed (Section OA.1.8)
55100	IP	Structural Welding General Inspection (Section OA.1.9)

2512/034	TI	Containment Cooling SP (Section OA.1.10)
89-01	BL	Failure of Westinghouse Steam Generator Tube Mechanical Plugs (Section OA.1.11)
2515/145	TI	Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles (Section OA.1.12)
2515/150	TI	Reactor Pressure Vessel Head and Vessel Head Penetration Nozzles (Section OA.1.12)
2001-01	BL	Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles (Section OA.1.12)
2002-01	BL	Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity (Section OA.1.12)
2002-02	BL	Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs (Section OA.1.12)
2512/043	TI	Use-As-Is SP (Section OA.1.13)
2515/118	TI	Service Water System Operational Performance Inspection (SWSOPI) (Section OA.1.14)
89-13	GL	Service Water System Problems Affecting Safety- Related Equipment (Section OA.1.15)
50095	IP	Spent Fuel Storage Rack (Section OA.1.16)
05000391/2010606-01	URI	Evaluation of the Use of Temporary Supports When Equipment is Removed (Section OA.1.17)
05000391/2010607-02	URI	Potential Problems with Implementation of the Program for Reporting Significant Construction Deficiencies in Accordance with 10 CFR 50.55(e) (Section OA.1.18)
05000391/2010607-01	NCV	Ineffective Measures to Assure Prompt Identification and Correction of Conditions Adverse to Quality (Section OA.1.19)
87-05	CDR	Use-As-Is and Repair Dispositions for Construction Nonconformance Reports

(Section OA.1.20)

05000391/2010605-05	URI	Evaluation of Quality Control Acceptance of Nonconforming Cable Support Installation (Section OA.1.21)
83-04	BL	Failure of Under-Voltage Trip Function of Reactor Trip Breakers (Section OA.1.22)
83-31	CDR	Failure of Under-Voltage Trip Function of Reactor Trip Breakers (Section OA.1.22)
85-02	BL	UVTA on WDB-50 RTBs (Section OA.1.23)
2515/064 Rev.1	TI	Near-Term Inspection Follow-up to Generic Letter 83-28 (Section OA.1.24)
2515/091	TI	Inspection Follow-up to Generic Letter 83-28, Item 4.1 (Section OA.1.24)
83-28 Item 4.1	GL	Reactor Trip System Reliability (Vendor-Related Modifications)(Section OA.1.24)

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Q.1.1 Identification and Resolution of Construction Problems

Procedures/Programs

25402-MGT-0003, Watts Bar Nuclear Plant Unit 2 Construction Completion Project – Corrective Action Program, Rev. 8
 TVA NGDC PP-3 Corrective Action Program, Rev 7
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 TVA Watts Bar Unit2, Walkdown Procedure for General Walkdown Requirements, WDP-GEN-1, Rev. 14
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 25402-000-GPP-0000-N1305, TVA Watts Bar Unit2, Construction Completion Project Procedure, Request for Information, Rev. 01

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

PER 163432
 PER 153427
 PER 222223
 PER 140726
 PER 146641
 PER 148445
 PER 149581
 PER 152061
 PER 155021

PER 159134
 PER 163422
 PER 167147
 PER 168749
 PER 163933
 PER 206268
 PER 205952
 PER 163432 Record Correction 1/19/2011

Lessons Learned

Lesson Learned, PER 163432
 Lesson Learned, PER 163432 Management Review and Assessment – Significant First Time Evolutions

Apparent Cause Evaluation

Attachment-1, PER 163432 Inaccurate Measurements and other errors in piping Walk downs

Piping Stress Calculation Summaries

Pipe Stress Evaluation, PER163432 Attachment-2
 Stress Calculation Summary, PER 163427 Stress Calculation No. 0600250-03-01, QA Surveillance No. 25402-WNB-SR-09-0449
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 Stress Calculation Summary, PER 163427 Stress Calculation No. 67216
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II. Management Oversight and Controls

C.1.2 Safety-Related Piping - Work Observation

Work Orders

WO 111503756, ERCW Hydrostatic Test Package 2-067-47W845-7-2-B6
 WO 111503780, ERCW Hydrostatic Test Package 2-067-47W845-7-2-B7
 WO 111607166, ERCW Hydrostatic Test Package 2-067-47W845-7-2-B1
 WO 111607211, ERCW Hydrostatic Test Package 2-067-47W845-7-2-B2

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 WO 111607626, ERCW Hydrostatic Test Package 2-067-47W845-7-2-B5

C.1.4 Concrete Expansion Anchors –Construction Refurbishment Process and Pull Tests

PER 327980, Mistake during HVAC anchor pull test

C.1.7 Structural Steel and Supports – Work Observation

Procedures and MAIs

MAI-5.2, Bolting for Structural Connections, Rev. 7
 CCPP 25401-000-GPP-0000-N3221, Structural Steel Erection, Rev. 3

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08-954513-005, Stage: Installation of platform 48N905-0PF04U2 located in Loop 2, elevation 723'-10 7/8" in accordance with EDCR 2633

Drawings

DRA No. 52633-001, Miscellaneous Steel, S.G., RC Pump & Press Rel. Tank Access Platform, Rev. 2
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 48N905, S.G., RC. Pump & Press Rel. Tank Access Platform SH-1, Rev. 39

Others

Form MAI-5.2-02, Rev. 6, Structural Bolting Connections for Work Implementation Document 08-954513-005, Connections: C1 and C3, C5, C2, C6, C11, C4 and C7,C8 and C9, C12, C13, C-14
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 Material Withdraw Request for Job No 25402, MWR-11858, dated 11/19/10
 Watts Bar Unit 2 Construction Completion Material Pick List, Job No 25402, MWR No. 03650, dated 4/9/10
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C.1.9 Electrical Components and Systems - Work Observation Design Control Documents

EDCR 53293, Rev. A, MCC Bucket and Breaker Replacement

Work Control Documents

WO 11217876, MCC Buckets for 2-FCV-70-89-B and 2-FCV-70-140-B

WO 09-954559-000, Control Relay Replacement in panel 2-PNL-275-R78, Essential Service Cooling Water

OA.1.1 QA Records CAP

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 O-CSP-290-4509/6, Electrical Supports Inspection 04A, 03/06/86
 O-CSP-292-1849, Electrical Supports Inspection 02A, 09/28/83
 O-CSP-292-2547/3, Electrical Supports Inspection 25A, 02/23/84
 O-CSP-292-3153/2, Electrical Supports Inspection 25B, 06/16/86
 O-CSP-292-3349/6, Electrical Supports Inspection 25A, 12/02/83
 O-CSP-292-3398/4, Electrical Supports Inspection 25A, 02/27/84
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 2-2PS-292-700-D, Conduit Inspection 35A, 01/24/85
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 2-3VC-293-1286-B, Conduit Inspection 25C, 08/30/85
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 2S61-VALVE-001, 79-14 Inspection 24A, 02/13/89
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 2030-DW915-03H-1653, Hanger Inspection 08A, 07/27/83
 2061-W462-9-0025, Hanger Inspection 04B, 07/05/83
 2062-A406-12-50, Hanger Inspection 02A, 05/07/85

2063-A435-14-91, Hanger Inspection 05A, 10/21/85
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 2067-A450-26-219, Hanger Inspection 04A, 12/09/85
 2074-74-2RHR-R79, Hanger Inspection 09A, 03/10/82
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 2R01-47W400-206, 79-14 Inspection 24A, 06/28/85
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 2R26-47W491-209, 79-14 Inspection 24A, 12/18/84
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 2R63-47W435-277, 79-14 Inspection 24A, 12/19/86
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 2R67-47W450-206, 79-14 Inspection 24A, 11/19/85
 2R67-47W450-251, 79-14 Inspection 24A, 06/02/87
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 2072-A437-4-97, Hanger Inspection 03A, 04A, and 08A; 08/13/85, 08/13/85, and 08/13/85
 2067-67-2ERCW-R59, Hanger Inspection 08B, 12/23/83
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2063-2-63-407, Hanger Inspection 03A, 04B, 07A, and 08B; 06/06/83, 06/04/85, 06/06/83, and 06/04/85
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 2062-A406-12-58, Hanger Inspection 03A, 04A, and 08A; 04/08/85, 04/08/85, and 04/08/85
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 2070-2-70-239, Hanger Inspection 03A, 04A, 07A, and 08C; 01/19/83, 01/19/83, 01/19/83, and 03/31/86
 2067-A450-26-175, Hanger Inspection 03A and 08A, 03/25/86 and 03/25/86
 2063-A435-15-57, Hanger Inspection 03A, 04A, and 08A; 02/20/85, 02/20/85, and 02/20/85
 2063-A435-2-11, Hanger Inspection 08A, 06/03/85
 2003A-2-03A-379, Hanger Inspection 01A, 02A, 03A, 04A, and 08B; 05/27/86, 05/27/86, 05/27/86, 05/27/86, and 08/29/86
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PER Reviewed

233454, Evaluate Impact of Missing Hanger Records, 12/22/2010

OA.1.5 Construction Refurbishment Program - Electrical Issues CAP- Sub-issue: Cable Separation and Electrical Isolation

Design Control Documents

WB-DC-30-4, Watts Bar Design Criteria, Separation / Isolation, Rev. 22
 Calculation WBN-EEB-EDQ00299920090002, Rev. 0, Verify Minimum Separation Distance between Redundant Class 1E Circuits Internal To Control Boards or Panels
 Calculation WBN-EEB-EDQ00299920090006, Rev. 0, Verify Minimum Separation Distance between Raceways in Redundant Class 1E Divisions

QA Audits and Surveillances

25402-WBN-SR-10-0888, Historical CAPs CP5.2 and CP5.5 Calculation Review

Miscellaneous Documents

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 Physical Cable Separation and Electrical Isolation (CP 5.2) Closure Report, Rev. 000

OA.1.6 Electrical Issues CAP - Sub-issue: Cable SplicesDesign Control Documents

EDCR 53948, Rev. A, "Install Valves and Complete Historical Changes in System 077"
 EDCR 55117, Rev. A, "Replacement of Unit 2 Splices"
 Calculation EDQ00299920090007, Rev. 0, Walkdown Data Sheets for Bend Radius in Class 1E Cables

OA.1.7 Inspection of Watts Bar Nuclear Plant Employee Concerns ProgramCATDs

11103-WBN-06	40500-WBN-03	SWEC-BFN-32-03	15100-WBN-03	23702-WBN-06
10000-NPS-03	80104-WBN-01	SWEC-WBN-41-002	19201-NPS-01	23801-WBN-08
10300-WBN-02	80409-WBN-01	10900-NPS-03	19201-SQN-02	23803-SQN-05
10603-WBN-02	10100-WBN-03	10900-WBN-05	20601-WBN-01	24000-BFN-02
10900-WBN-11	11200-NPS-01	24000-BFN-01	20601-WBN-03	24101-BFN-01
11200-NPS-02	19200-NPS-03	10300-WBN-04	20701-WBN-05	31105-WBN-01
11200-WBN-02	20000-NPS-02	10900-BFN-04	21506-WBN-01	40700-WBN-12
11200-WBN-03	40703-SQN-06	10900-WBN-01	21506-WBN-02	50400-WBN-05
30201-WBN-01	I85738-SQN-02-16	10900-WBN-03	22911-BFN-01	10900-NPS-01
40300-WBN-02	R-82-01-PSS-13	15100-WBN-02	23702-WBN-05	21301-SQN-01

OA.1.8 CDR 391/85-12: Hydrogen Collector Piping Could Be Overstressed

Corporate Commitment Tracking System, Item Number NCO85-0104-001, Relocate the Unit 2 Hydrogen Collector Piping to Eliminate the Potential for Contact With the Ice Condenser Support Beam

PER 172617

Watts Bar Nuclear Plant Unit 2 – Hydrogen Collector Piping Could Be Overstressed, WBRD-50-391/85-12 - Final Report to the NRC, dated 3/19/85 (L44850319805)

ECN 5497 coversheet (B26850725514).

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Memo from D.M. Lake (Project manager, WBN Nuclear Construction) to M.L. Rayfield (Project Engineer, WBN Engineering Project) dated August 8, 1986 (C24860808002).

NCR WBN MEB 8506 (B44850816006)

OA.1.9 Structural Welding General InspectionPERs (Problem Evaluation Reports) and SRs (Service Requests)

SR 316727

SR 317794

SR 318568

SR 318760

SR 318505

SR 317746
PER 316805
PER 318445

Procedures

Bechtel – Welding Standard Documentation of Welds WD-1 Rev. 8 25402-000-4MP-T040-S0036
Bechtel General Welding Standard GWS-Structural Rev. 4 25402-000-4MP-T040-S0021

Other

Field Change Request No. 55061-A
Drawing 48W991-1 Rev. 12

OA.1.10 Containment Cooling SP

Calculations

ALION-CAL-TVA2739-03, Rev. 4, “Watts Bar Reactor Building GSI-191 Debris Generation Calculation”
EPM-FAC-111888, Rev.4, “WBN Containment Lower Compartment Coolers Pressure Loss and Fan Evaluation”
WBNAPS2-030, Rev. 2, “Containment MONSTER Model”
WBNAPS041, Rev.2, “Long-term Post Accident Temperature Inside Containment”
WBN-OSG4-008, Rev.29, “Containment Vent System NUREG-0588 Category and Operating Times 016 and 019”
WBN-OSG4-091, Rev.13, “Maximum Containment Water Level”

Work Control Documents

EDCR 52983
EDCR 53788
EDCR 52861
EDCR 54289
WO 09-951866-010

Drawings

2-47E235-45, Rev. 0, “Environmental Data Environment – Harsh Instrument Room”

OA.1.21 Unresolved Item URI-391/2010605-05 “Evaluation of Quality Control Acceptance of Nonconforming Cable Support Installation”

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PER 296266, “NRC-Identified Hardware Nonconformance”

Procedures/Programs

MAI-3.2, Rev. 21, “Cable Pulling for Insulated Cables Rated up to 15,000 Volts”
25402-000-GPP-0000-N3000, Rev. 3, “Simplified Work Activity Planning (SWAP) System”

IEP-206, Rev. 3, "Administration of Model Inspection Plans (MIPs)"

Work Control Documents

WO 09-953531-014, EDCR/DCN 53554A - Install and Terminate cables 2V704A, 2V706A, 2V712A and 2V714A

OA.1.22 NRC BL 83-04, CDR 391/83-31: Failure of Under-Voltage Trip Function of Reactor Trip Breakers

Procedures/Programs

MI-99.001, "WBN Unit 1, RTB Inspection and Testing Procedure"

Work Control Documents

110834132, Inspection and Testing of Reactor Trip Breakers WBN-2-BKR-099-L116/1B-A; and 2B-A

110960213, Inspection and Testing of Reactor Trip Breaker WBN-2-BKR-099-L116/1C-A

Miscellaneous Documents

NCO850274001, Closure package for IEB-83-04 & CDR 391/83-31

OA.1.23 NRC BL 85-02: Under-Voltage Trip Attachment on WDB-50 Reactor Trip Breakers

Miscellaneous Documents

NCO850509005, Closure package for IEB 85-02

OA.1.24 TI 2515/64 Rev.1: Near-Term Inspection Follow-up to Generic Letter 83-28, TI 2515/91: Inspection Follow-up to Generic Letter 83-28, Item 4.1, and NRC GL 83-28: Item 4.1, Reactor Trip System Reliability (Vendor-Related Modifications)

Miscellaneous Documents

NCO850274001, Closure package for IEB-83-04 & CDR 391/83-31

NCO850509005, Closure package for IEB 85-02

TVA Procurement Contract No. 65717

LIST OF ACRONYMS

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
CAP	Corrective Action Program
CAQ	condition adverse to quality
CAQR	condition adverse to quality report
CATD	corrective action tracking document
CDR	construction deficiency report
CFR	<i>Code of Federal Regulations</i>
DRA	drawing revision authorization
ECN	engineering change notice
ECP	Employee Concerns Program
EDCR	engineering document construction release
ERCW	essential raw cooling water
GL	Generic Letter
ICRDS	Integrated Cables Raceway Design System
IMC	Inspection Manual Chapter (NRC)
IIR	Integrated Inspection Report (NRC)
IP	Inspection Procedure (NRC)
ISL	instrument sensing line
ISLS	instrument sensing line support
LCC	lower compartment cooler
LOCA	loss of coolant accident
MAI	Modification Addition Instruction
MELB	moderate energy line break
MIC	microbiologically induced corrosion
MSLB	main steam line break
MT	magnetic particle
NCV	non-cited violation
NDE	non-destructive examination
NRC	Nuclear Regulatory Commission
PER	Problem Evaluation Report
PNQAM	Project Nuclear Quality Assurance Manual
QA	quality assurance
QC	quality control
RTB	reactor trip breaker
SG	steam generator
SI	safety injection
SL	Severity Level
SP	Special Program
TI	Temporary Instruction (NRC)
TVA	Tennessee Valley Authority
URI	unresolved item
UVTA	under-voltage trip attachment
WBN	WBN Nuclear Plant
WO	work order