



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

June 27, 2013

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

**SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2013604**

Dear Mr. Skaggs:

On May 18, 2013, 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 May 23, 2013, with Mr. Ray Hruby and other members of your staff.

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

Based on the results of this inspection, the enclosed report documents four NRC-identified findings which were determined to involve violations of NRC requirements. However, because each of the findings was a Severity Level IV violation and was entered into your corrective action program, the NRC is treating each as a non-cited violation (NCV) 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 Resident Inspector at the Watts Bar Unit 2 Nuclear Plant. In addition, if you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at Watts Bar Unit 2 Nuclear Plant.

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

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

Sincerely,

/RA/

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

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

Enclosure: Inspection Report 05000391/2013604 w/Attachment

cc w/encl: (See next page)

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Letter to Michael D. Skaggs from Robert C. Haag dated June 27, 2013.

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2013604

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2013604

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: Spring City, TN 37381

Dates: April 1 – May 18, 2013

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(Sections OA.1.16, OA.1.17, OA.1.18, and OA.1.19)

Approved by:

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

EXECUTIVE SUMMARY

Watts Bar Nuclear Plant, Unit 2

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

Inspection Results

- The NRC identified a Severity Level (SL) IV non-cited violation (NCV) of Title 10, *Code of Federal Regulations*, Part 50 (10 CFR 50), Appendix B, Criterion III, "Design Control," for failure to ensure that changing design considerations were translated to work instructions such that construction activities do not alter the plant design in support of Unit 1's continued safe operations. (Section C.1.1)
- The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," for failure to assure purchased material (upper lateral supports for steam generators 1 and 2) conformed to the procurement documents. (Section C.1.3)
- The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for failure to obtain necessary engineering evaluations prior to cold pulling activities as required by applicant procedures. (Section C.1.5)
- The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," with two examples, for failure to follow procedures. Specifically, two work orders were identified using Quality Level (QL) III materials in a QL I/II application as required per project procedures and specifications. (Section OA.1.5)
- The inspectors concluded that concerns pertaining to open items, including Generic Letters (GLs), Bulletins (BLs), historical violations, construction deficiency reports (CDRs), Temporary Instructions (TIs), Supplemental Safety Evaluation Report (SSER) Appendix HH item, and Three Mile Island (TMI) Action Items (AIs) had been appropriately addressed for WBN Unit 2. These items are closed.
- Other areas inspected were adequate with no findings identified. These areas included quality assurance; piping; mechanical systems and components; electrical systems and components; fire protection; pre-operational testing activities; various NRC inspection procedures; CDRs; TIs; TMI AIs, and refurbishment activities.

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REPORT DETAILS

Summary of Plant Status

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

I. QUALITY ASSURANCE PROGRAM

Q.1 Quality Assurance (QA) Oversight Activities

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

a. Inspection Scope

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

The inspectors also reviewed actions associated with PER 533342 which addressed Confirmatory Order NRC-2012-0171, issued for enforcement action EA-12-021 (Agencywide Documents Access and Management System [ADAMS] Accession Number [No.] ML12173A020). The Order involved a violation of Title 10 of the *Code of Federal Regulations* (CFR) [10 CFR] 50.9 for completeness and accuracy of information. The inspectors' review is discussed in Section OA.1.2 of this report. Additionally, the inspectors reviewed applicant disposition and actions associated with PER 666068, Limitorque 5 ft-lb Motor Redesign.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The issues identified in the PERs reviewed were adequately identified, addressed, and resolved.

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1 Construction Activities

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

a. Inspection Scope

The inspectors independently assessed applicant controls, associated with Unit 2 construction work activities, to prevent adverse impact on Unit 1 operational safety. The inspectors attended routine Unit 1/Unit 2 interface meetings to assess the exchange and sharing of information between the two site organizations. Periodic construction and planning meetings were observed, at least once per week, 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 select 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 select construction activities to verify that potential impacts on the operating unit had been identified and adequately characterized with appropriate management strategies planned for implementation. Furthermore, the inspectors performed independent walkdowns of select construction work locations to verify that controls to protect the operating unit provided an adequate level of protection and had been properly implemented.

Specific work activities observed included work associated with:

- Work Order (WO) 112800212, Seal water heat exchanger (HX) realignment of component cooling water piping System 062/070 FBOS-2-70-F-9-13 at 2-HTX-062-0066
- WO 112800284, residual heat removal (RHR) 2B HX disconnect and reconnect component cooling water piping, pipe spool 70-CC-392 Weld
- WO 110932752, Modify Pipe Supports WBN-2-HGR-063-AB, specifically 063-2SIS-R232

Specific work activities that the applicant had screened out as not affecting Unit 1 included, but were not limited to, those discussed throughout this report.

b. Observations and Findings

The following severity level (SL) IV non-cited violation (NCV) was identified:

Introduction: The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," for failure to ensure that changing design considerations were translated to work instructions such that construction activities do not alter the plant design in support of Unit 1's continued safe operations.

Description: On May 6, 2013, inspectors, making field observations associated with pump-to-pipe alignment for the 2B containment spray pump, reviewed the traveler WO package (WO 110932752) in the possession of craft personnel in the field. Discussions with craft involved in the work and work approval documents indicated no Unit 1 effect; however, a drawing revision authorization (DRA) within the traveler package contained a note stating the piping support was required in support of the Unit 1 auxiliary building

secondary containment enclosure (ABSCE) boundary. When the craft was questioned as to whether or not the support was required for the ABSCE boundary, it was identified that the support was not “tagged” as an ABSCE support, which was verified by the inspector.

Upon further review of documents not maintained at the job site, field change request (FCR) 58052A, issued June 9, 2011, identified the support as required for the Unit 1 ABSCE boundary to maintain pipe integrity through all design basis events. Maintaining the system integrity serves to prevent possible breach of the boundary through the vented refueling water storage tank (RWST) which could render the auxiliary building gas treatment system (ABGTS) inoperable, placing Unit 1 in a six hour shutdown technical specification requirement. The support had not previously been identified as an ABSCE support when the subject WO was initially planned. Between June 9, 2011 and the time of inspection, the support had been in varying states of disassembly, including completely removed. The FCR requirements were not translated to the work authorizing documents, though certain documents which were also affected by the design change had been incorporated. The error led to numerous instances of work being planned then performed on the subject support without appropriate compensatory measures (e.g. use of temporary supports) commensurate with the work scope.

The inspectors determined that the failure to translate the design basis to work instructions, specifically, ensuring that modifications to the plant’s ABSCE boundary components were incorporated into all affected WOs, was a performance deficiency. This performance deficiency was considered more than minor in accordance with Inspection Manual Chapter (IMC) 2517 because it represented an improper or uncontrolled work practice that, if left uncorrected, could adversely impact quality or safety involving a safety-related structure, system, or component (SSC). The inspectors determined this finding to be of very low safety significance in accordance with Section 6.5 of the NRC Enforcement Policy. Specifically, the applicant failed to establish, maintain, or implement adequate controls over construction processes that are important to safety; however, this finding did not represent a breakdown in the applicant’s QA program for construction related to a single work activity, or one with multiple significant examples. The inspectors reviewed this finding against cross-cutting area components as described in IMC 0310. The failure of the applicant to appropriately plan work activities by incorporating job site conditions and incorporating the need for planned contingencies, compensatory actions, and abort criteria reflected the planning aspect of the Work Control component within the Human Performance area [H.3(a)].

Enforcement: 10 CFR 50, Appendix B, Criterion III, “Design Control,” requires, in part, that design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design. Those measures shall assure that applicable regulatory requirements and the design basis for those SSCs are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to the above, the applicant failed to ensure that alterations to design bases were conveyed to all work instructions which might rely upon those bases to preclude affecting the operating unit. Specifically, the applicant failed to ensure that a field change which expanded the prior ABSCE boundary was conveyed to all work instructions which might affect the new boundary. Because this was a SL IV violation and the issue was entered into the applicant’s corrective action program as PER 724028, this violation is being treated as an NCV, consistent with Section 2.3.2 of the

NRC Enforcement Policy. This violation is identified as NCV 05000391/2013604-01, "Failure to translate field change request design requirements to affected work implementing instructions."

c. Conclusions

With the exception of the inspector-identified NCV 05000391/2013604-01 noted above, adequate management oversight and controls were in place for observed construction activities that could potentially impact the operating unit, and an adequate level of protection had been implemented.

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

a. Inspection Scope

The inspectors observed the batching and placement of the commercial grade dedicated concrete material under the existing RWST apron. The inspectors reviewed the reinforcing steel drawings and observed the quality control (QC) inspections for the installation of the rebar to verify that the reinforcing steel was installed in accordance with the applicable drawings and applicant procedure Modification/Addition Instruction (MAI) 5.11, Installation of Reinforcing Steel and Embedded Items, Rev. 3. The inspectors reviewed the approved mix design and associated FCRs to verify the mix was adequate and approved in accordance with specification, G-2, General Engineering Specification for Plain and Reinforced Concrete, Rev. 8. The inspectors reviewed the purchase order, procurement engineering packages, and observed the batch plant operations to verify that measures were established to assure that the purchased material conformed to the purchase documents. The inspectors reviewed the National Ready Mixed Concrete Association (NRMCA) certification, walked down the batch plant facility, observed QC inspections of the concrete trucks, and reviewed the batch plant calibration records. This was performed to verify that the batch plant was in compliance with its NRMCA certification, scales and meters were calibrated, water quality requirements were met, mixing time and temperature requirements were met, slump tests were completed, and the concrete materials were traceable and protected.

The inspectors observed the placement of the concrete, reviewed the WO, and interviewed three engineers to verify the placement planning had been completed, the concrete truck was suitable and in acceptable condition, the batch ticket record had been reviewed and approved, and placement dimensions were verified. In addition, the inspectors reviewed the qualification records for the QC personnel and observed field tests to verify inspection and testing requirements were established and implemented in accordance with MAI -5.10, Concrete Placement, Surface Preparation, Placing, Finishing, Curing, And Testing, Rev. 5. The inspectors reviewed test methods to verify they were conducted for temperature control, weight, flowability, and strength in accordance with American Society for Testing and Materials (ASTM) C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field, and ASTM C138, Standard Test Method for Density, Yield, and Air Content of Concrete. To verify that curing requirements and test acceptance criteria were met, the inspectors reviewed the materials, duration of the curing method, and the strength test results.

The following samples were inspected:

- IP 46053 Section 02.03.a.1 – one sample
- IP 46053 Section 02.03.d – one sample
- IP 46053 Section 02.03.e – one sample
- IP 46053 Section 02.03.f – one sample
- IP 46053 Section 02.03.g – one sample
- IP 46053 Section 02.03.h – one sample
- IP 46053 Section 02.03.i – one sample

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspected activities and procedure implementation, associated with the installation of the concrete around the RWST apron, was performed in accordance with the procedures, specifications, and applicable codes.

C.1.3 Structural Steel and Supports - Work Observation and Construction Refurbishment Process (IPs 48053 and 50073)

a. Inspection Scope

The inspectors reviewed Westinghouse design specification 425A86, Rev. 2; drawing 10065E09, Rev.1; and PCI Energy Services procedure PI-904441-01T, Rev.0, to determine whether the engineering documents for the steam generator (SG) upper lateral support tang plates were in compliance with American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel (B&PV) Code Section III, Subsection NF, 1977 edition requirements. The inspectors reviewed certificates of compliance (CoC) 904441-01, Rev.1; 904441-02 for welding material; and the SG upper lateral support tang plates to determine whether the material was in compliance with the design specification, drawings, and ASME B&PV Code Section III, Subsection NF, 1977 edition. Specifically, the inspector reviewed material type and grade, physical and chemical requirements, impact test requirements, and nondestructive testing requirements on the CoCs.

The inspectors reviewed welding procedure specifications, associated procedure qualification records, and welder qualification records for the fabrication of the SG upper lateral support tang plates to determine whether the requirements of ASME B&PV Code Section III, Subsection NF, 1977 edition were met. The inspectors reviewed weld travelers for the fabrication of tang plates on SG 1 to determine whether hold points were signed off, pre-heat and interpass temperature limits were within requirements, and heat input requirements were met. The inspectors examined the shielding gas for welding of the SG tang plates to determine whether the gas was in compliance with welding procedure specifications.

The following samples were inspected:

- IP 48053 Section 02.02 – one sample
- IP 48053 Section 02.03.b – one sample
- IP 48053 Section 02.03.c – one sample

Documents reviewed are listed in the attachment.

b. Observations and Findings

During the construction inspection of the upper lateral supports on SGs 1 and 2 to determine whether the supports were constructed in accordance with design specifications, the inspectors identified the following SL IV NCV:

Introduction: The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion VII, “Control of Purchased Material, Equipment, and Services,” for failure to assure purchased material conformed to the procurement documents.

Description: In April 2013, the inspectors reviewed documentation for the upper lateral supports for SGs 1 and 2. The construction and fabrication of the upper lateral supports was being performed by PCI Energy Services. This review included Westinghouse design specification 425A86, drawings, certified material test reports, welding procedures, and fabrication procedures. Design specification 425A86, Rev.2, Section 3.6 states, in part, “component supports shall be fabricated in accordance with...ASME Section III, Subsection NF, 1977 edition.” ASME Section III, Subsection NF, 1977 edition, paragraph NF-2211, states, in part: “if ferritic steel material is subjected to heat treatment during construction of a component, the material used for the impact test specimens shall be heat treated in the same manner as the component.”

During the inspectors’ review of the certified material test report for the tang plates, it was identified that the impact test specimen did not receive the same heat treatment as the components were going to receive in the field, as required by ASME Section III, Subsection NF, 1977 edition. The applicant initiated service request 715564 and PCI Energy Services initiated non-conformance report (NCR) 13-008 in response to the inspectors’ observations.

The description section of NCR 13-008 states that the tang plate material was not purchased or supplied to ASME Section III, Subsection NF-2211, 1977 edition requirements. PCI Energy Services took corrective actions to send spare material to the testing laboratory to use in impact test with the proper heat treatment. The heat treated material tested met the impact requirements specified in the design specification and was documented in the certified material test report customer purchase order 92110-51.

The inspectors determined that the failure to assure purchased material conformed to the procurement documents, specifically mechanical testing requirements for material not being met, was a performance deficiency. This performance deficiency was considered more than minor in accordance with IMC 2517 because it represented an inadequate quality oversight function that, if left uncorrected, could adversely affect the quality of the construction of a safety-related SSC. The inspectors determined this finding to be of very low safety significance in accordance with Section 6.5 of the NRC Enforcement Policy because the applicant failed to establish, maintain, or implement

adequate controls over construction processes that are important to safety. However, this finding did not represent a breakdown in the applicant's QA program for construction related to a single work activity. No cross-cutting aspect was identified.

Enforcement: 10 CFR 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," requires, in part, that measures shall be established to assure that purchased material, whether purchased directly or through contractors and subcontractors, conforms to the procurement documents.

Contrary to the above, in April 2013, the applicant failed to assure purchased material for tang plates used for construction of the upper lateral supports for SGs 1 and 2 conformed to the procurement documents. Specifically, the applicant failed to assure ASME Section III, Subsection NF-2211, 1977 edition requirements for material mechanical testing were met as required by design specification 425A86. Because this was a SL IV violation and the issue was entered into the applicant's corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. This violation is identified as NCV 05000391/2013604-02, "Failure to assure procured material conformed to the procurement documents."

c. Conclusions

The inspectors identified NCV 05000391/2013604-02 where the applicant failed to assure procured material conformed to the procurement documents. As noted in the violation write-up above, corrective actions have been taken to demonstrate the material used for the construction of the upper lateral supports for SGs 1 and 2 met the impact test requirements of design specification 425A86. The other documents reviewed and construction activities observed by the inspectors met design specifications, drawings, and ASME B&PV Code Section III, Subsection NF, 1977 edition. The SG upper lateral support fabrication was not complete as of the close of the current report period, and may be subjected to additional inspection.

C.1.4 Reactor Coolant Pressure Boundary Piping - Work Observation and Construction Refurbishment (IPs 49053 and 37002)

a. Inspection Scope

The inspectors reviewed work and inspections performed as documented in WO 114423331 for the reactor coolant system (system 068) pressurizer, performed field observations and interviewed responsible craft, supervision, engineering, and management personnel to confirm that all relevant activities had been documented in site records and that non-conformances were dispositioned as appropriate. The inspectors entered the pressurizer and observed material and housekeeping conditions to ensure that the applicant's dispositions were appropriate. The inspectors were briefed by responsible applicant personnel and contractors as to the path forward in light of those dispositions. Additionally, the inspectors confirmed that pressurizer internal construction reflected attributes noted on design drawings. The inspectors verified the qualification of QC inspectors associated with the work. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. The inspectors had questioned the acceptability of soluble purge dam material (e.g. rice paper) observed on a previous entry, which was inserted in piping connections to the top of the pressurizer vessel. The basis for the questioning was information provided in NRC Information Notices (IN) 81-07, 83-13, and 93-63. The applicant elected to remove the paper and the inspectors observed the results of the licensee's efforts, including a demonstration of the solubility of the materials retrieved.

c. Conclusions

The inspected activities and procedure implementation associated with pressurizer internal cleaning and inspection was performed in accordance with the procedures, specifications, and applicable codes.

C.1.5 Piping – Work Observation and Construction Refurbishment Process (IPs 49063 and 37002)

a. Inspection Scope

The inspectors observed piping refurbishment realignment activities and reviewed work orders, weld travelers, and flanged connection data sheets for the lower containment 2C-A and 2B-B cooling coil piping, RHR 2B HX piping, and the seal water HX piping, to verify that the piping was installed in accordance with applicant procedure 25404-000-GPP-0000-N3503, Piping Installation, Rev. 5; MAI-4.2B, Pipe Installation, Rev. 10; and MAI-4.2A, Piping/Tubing Supports, Rev. 18. The inspectors reviewed ongoing work associated with installation of lower containment cooler cooling coils to verify the work was being performed in accordance with WO 112772781. The inspectors observed the work activities to verify that cleanliness controls were in place, cutting, fitting, and welding were completed in accordance with Bechtel general welding standards, approved drawings were available and in use, and appropriate QC reviews were completed for the welding procedures and welder qualifications. The inspectors interviewed three welders, three field engineers, and two QC personnel to verify personnel were following approved procedures and that personnel engaged in the welding of the piping were qualified.

The following samples were inspected:

- IP 49063 Section 02.01 – two samples
- IP 49063 Section 02.02 – two samples
- IP 49063 Section 02.03 – two samples

Documents reviewed are listed in the attachment.

b. Observations and Findings

Introduction: The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for failure to obtain necessary engineering evaluations prior to cold pulling activities as required by applicant procedures.

Description: The inspectors reviewed ongoing work associated with the installation of lower containment cooler cooling coils as described in WO 112772781. In the course of the inspectors' review, it was determined that pipe had been deflected with mechanical advantage afforded by a four-inch webbed ratchet-strap, though the work associated with this pull was undocumented within the subject work package. The field staff could not produce an engineering evaluation which established limits to which pulling could be accomplished without affecting mechanical properties of the rigidly supported associated piping. Further review revealed that the applicant delineates cold pull allowances in paragraph 4.2.3 of specification G-94, Piping Installation, Modification and Maintenance, Rev. 2, and in paragraph 6.3.4.g of procedure MAI-4.2B, Pipe Installation, Rev. 10. The specification and procedure allow cold pulling provided that: 1) it is specifically called for in site engineering design documents (e.g., cold spring); or 2) site engineering approval is obtained prior to aligning misfit errors at the closure connection. The guidance also specifies that rigid supports, which can prevent correcting misfits, shall be removed or partially installed until all necessary adjustments are made. The inspectors observed that all associated supports were intact.

The inspectors determined that the failure to follow MAI-4.2B, specifically, ensuring that an engineering evaluation clearly defines structural limits to cold pulling activities, was a performance deficiency. This performance deficiency was considered more than minor in accordance with IMC 2517 because it represented an improper or uncontrolled work practice that, if left uncorrected, could adversely affect the quality of the construction of a safety-related SSC. This issue was captured through the licensee's corrective actions to PER 726022. The inspectors determined this finding to be of very low safety significance in accordance with Section 6.5 of the NRC Enforcement Policy because the applicant failed to establish, maintain, or implement adequate controls over construction processes that are important to safety; however, this finding did not represent a breakdown in the applicant's QA program for construction related to a single work activity. The inspectors reviewed this finding against cross-cutting area components as described in IMC 0310. The failure of the applicant to effectively communicate expectations regarding procedural compliance such that personnel follow procedures reflected the procedural aspect of the Work Practices component within the Human Performance area [H.4(b)].

Enforcement: 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be accomplished in accordance with appropriate instructions, procedures, and drawings which shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

Contrary to the above, the applicant failed to follow applicable procedural requirements in performing installation activities associated with safety-related replacement lower containment coolers. Specifically, the applicant failed to complete an engineering evaluation which established limits for necessary cold-pulling activities to facilitate replacement cooler installations to ensure existing piping system yield limits would not be exceeded. Because this was a SL IV violation and the issue was entered into the applicant's corrective action program as PER 726022, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. This violation is identified as NCV 05000391/2013604-03, "Failure to assure engineering evaluations were performed in support of cold-pulling activities."

c. Conclusions

With the exception of the inspector-identified NCV 05000391/2013604-03 noted above, adequate management oversight and controls were in place for observed construction activities associated with piping installation and refurbishment.

C.1.6 Electric Cable - Record Review (IP 51065)

a. Inspection Scope

The inspectors reviewed WOs 114394562 and 114394571 associated with engineering design change request EDCR 53537 and FCR 60910, as they pertain to electrical cable work for the sample HX header outlet flow control valve (2-FCV-070-0183-A). The inspectors reviewed cable installation and pullback data sheets against drawings and the applicant's integrated cable & raceway design system (ICRDS) summaries. The inspector's data review included associated cable/wire lift and re-land, termination, in-line splice, and heat shrink installation. The inspectors' review also included verification that installation activities were in accordance with specifications and requirements, that required inspections were documented and dispositioned as required, and that materials used were as specified. The inspectors performed field verifications of visible attributes of the cable route to ensure that the identification system was adequate and properly applied, that the installation matched associated documentation, and that required protective measures were provided and maintained after installation. Conduit data sheets and bulk conduit re-route work (WO 114432794) were also reviewed and field observations made to verify that work was completed in accordance with project specifications and design standards.

The following sample was inspected:

- IP 51065 Section 02.02.c – one sample

b. Observations and Findings

No findings were identified.

c. Conclusions

The applicant's documentation of cable work was adequate to support Unit 2 construction activities.

C.1.7 Environmental Protection – Initial and Periodic Inspection (IP 80210)

a. Inspection Scope

The inspectors performed a periodic inspection of the environmental activities associated with WBN Unit 2. The inspection consisted of a meeting with representatives of the various organizations responsible for the implementation of the environmental program at Unit 2, walkdowns of various structures and use areas, and documentation review.

The organizations represented during the meeting included TVA corporate, TVA's Watts Bar Units 1 and 2, and Bechtel. The inspectors discussed the requirements imposed by the National Pollution Discharge Elimination System (NPDES) permits for Unit 1 covered the activities on Unit 2. The inspectors performed a documentation review of the Tennessee NPDES permits which were the inspection basis documents. The review encompassed the annual non-radiological environmental operation reports for the years 2011 and 2012 and various process and procedure documents that constituted the environmental program.

The inspectors performed walkdowns of various site areas both inside and outside the protected area. These walkdowns included the areas associated with fuel oil and chemical handling inside the protected area and areas associated with wastewater treatment and holdup such as yard ponds. Waste oil and asbestos areas in the owner controlled areas were also inspected.

The inspectors walked down the site for potential groundwater issues and for closure of inspection items that had been identified during previous inspections for TI 2515/173 ground water initiative. The following samples were inspected:

- IP 80210 Section 02.02.a – one sample
- IP 80210 Section 02.02.b – three samples

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. The detailed written directives and procedures adequately documented the environmental program requirements. The program had clearly identified roles and responsibilities. There was sufficient documented audit and assessment activity to establish that the supporting laboratories were appropriately responsive to the customers' needs. The construction site used the same condition reporting system as the operating unit with some differences in implementation to account for differences in the processes, organization, and plant status. The QA plans provided appropriate surveillance of the environmental program, and PERs in this area indicated an appropriate sensitivity to environmental requirements such as markings for waste oil, asbestos, and general waste containers.

c. Conclusions

The inspectors concluded that the environmental programs required for Unit 2 construction activities were properly implemented.

C.1.8 Electric Cable – Records Review (IP 51065)

a. Inspection Scope

The inspectors reviewed cable testing records for a medium voltage cable outside containment and low voltage cables inside containment to confirm that required tests were performed, approved technical procedures were followed, test equipment was operated by qualified personnel, equipment calibration was current, and that test data

results were properly documented. The records reviewed were taken from individual completed work order forms MAI-3.3 cable termination data sheets, which included: cable/wire identification, mark number, from-to locations, required tests with expected minimum test readings, test voltages, termination inspection activities with quality control personnel review initials and dates, and test results including test equipment number, calibration due date, and continuity checks. The inspectors reviewed the testing results for the following cables:

- 2PP575A (WNB-70 – 8000V)
- 2V704A/2V705A (WFC-52 – 600V)
- 2V706A/2V707A (WGH-52 – 600V)
- 2V712A/2V713A (WFC-52 – 600V)
- 2V714A/2V715A (WGH-52 – 600V)
- 2V3090A/2V3091A (WCA-53 – 600V)

The inspectors reviewed MAI-3.3, Cable Terminating, Splicing, and Testing for Cables Rated Up to 15,000 Volts, Rev. 30, Appendix H to identify required testing by cable type.

The following samples were inspected:

- IP 51065 Section 02.02.d - 6 samples (One Medium Voltage Cable and Five Low Voltage Cables)

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that cable testing records for the sample of low voltage cables inside containment and a medium voltage cable were adequate.

P.1 Pre-Operational Activities

P.1.1 (Discussed) Preoperational Testing Quality Assurance (IP 35301)

a. Inspection Scope

Background: The objective of this inspection procedure was to confirm the appropriate QA program requirements were applied to the conduct of the preoperational test program and related activities in accordance with commitments and regulatory requirements. Requirements for the preoperational test program are contained in the Final Safety Analysis Report (FSAR) Chapter 14; TVA Nuclear Quality Assurance (NQA) Plan, TVA-NQA-PLN89-A; Regulatory Guide 1.68, Initial Test Programs for Water Cooled Nuclear Power Plants, Rev. 2; American National Standards Institute (ANSI) 18.7-1976, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants; ANSI N45.2.4-1972, Quality Assurance Requirements for the

Installation, Inspection and Testing of Instrumentation and Electrical Equipment; and ANSI N45.2.8-1975, Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants. Portions of this inspection procedure were performed and documented in NRC Integrated Inspection Report 05000391/2011603 (ADAMS Accession No. ML111370702), Section P.1.1 and 05000391/2013603 (ADAMS Accession No. ML13134A239), Section P.1.1. This inspection specifically focused on the management of the QA program that would be in place during the conduct of preoperational testing.

Inspection Activities: IP 35301, Section 02.01, Management of the QA Program and Quality Verification, subpart 'a.2' requires verification by direct questioning of 50 percent of the key personnel utilized in the onsite QA organization to verify they understand their basic responsibilities. The inspectors interviewed the four key TVA personnel that will be involved in the implementation of the QA program for pre-operational testing, representing 100 percent of the key personnel in the QA organization for Watts Bar 2. These interviews were conducted to determine if these key personnel understood their basic responsibilities associated with the implementation of the QA program.

This satisfied the required inspection for IP 35301, Section 02.01.a.2.

b. Observations and Findings

No findings were identified.

c. Conclusion

Based on this inspection and two previous inspections of IP 35301, the inspectors determined that the applicant has established plans to implement QA programmatic controls over preoperational testing.

P.1.2 (Discussed) Preoperational Test Program Implementation Verification (IP 71302)

a. Inspection Scope

Background: The objective of this inspection procedure is to assure that the applicant is effectively discharging its responsibilities over the pre-operational test program. This will be an ongoing inspection throughout the preoperational testing phase.

Inspection Activities: This inspection specifically focused on the applicant's pre-operational test schedule (IP 71302, Section 02.03.c). The inspectors reviewed the pre-operational test schedule specifically focusing on the scheduled turnover of safety systems from construction to the startup test group to verify the schedule was being maintained current. The inspectors conducted interviews and discussions with scheduling personnel and the startup manager to gain an understanding of changes in the schedule for safety system turnover and the impact on pre-operational testing.

b. Observations and Findings

No findings were identified.

c. Conclusion

The applicant has been maintaining the pre-operational testing schedule current with routinely scheduled updates.

III. OPERATIONAL READINESS ACTIVITIES

F.1 Fire Protection

F.1.1 Fire Protection (IP 64051)

a. Inspection Scope

The inspectors observed a construction activity using ignition sources to determine whether fire prevention procedure requirements were met to include the handling and use of flammable materials and the use of combustible materials relative to locations of flammable ignition sources. Specifically, the inspectors observed hot work activities related to:

- WO 114423285, Steam Generator No.1 Upper Lateral Supports
- WO 114423315, Steam Generator No.2 Upper Lateral Supports

The following samples were inspected:

- IP 64051 Section 02.08 – two samples

b. Observations and Findings

No findings were identified.

c. Conclusions

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

IV. OTHER ACTIVITIES

OA.1.1 (Closed) Construction Deficiency Report (CDR) 391/83-45, Routing of Radioactive and Nonradioactive System Instrument Lines (IP 35007)

a. Inspection Scope

Background: The subject deficiency was initially reported to the NRC on July 29, 1983, in accordance with 10 CFR 50.55(e) as NCR W-130-P. The NRC documented the deficiency as CDR 50-391/83-45 for Unit 2. A revised final report was submitted on October 25, 1991, and supplemental information was submitted on May 7, 1993. TVA identified this deficiency in PER WBPPER910051.

The construction deficiency involved the connection of non-radioactive instrument vent and drain lines to the radioactive waste closed drain system. The routing of all instrument panel drain lines to the closed drain system was determined typical throughout the plant and presented the potential for radioactive material to enter a non-radioactive system.

TVA took corrective actions to disconnect instrument drain lines which were originally connected to the closed drain system, but were not associated with a radiation hazard. Subsequently, engineering change notices were issued to reconnect containment spray system (system 72) and spent fuel pit cooling system (system 78) vent/drain lines to the closed drain system. All system 78 instrument panel drains and high-point vent lines were required for Unit 1 operation and were connected to the closed drain system.

During a field walkdown of Unit 2 system 72 instrument panels, it was discovered that there were high-point vent lines and drain lines not reconnected to the closed drain system.

Therefore, Unit 2 is taking the following actions:

- Panel drain lines and high point vent valve lines will be routed to the closed drain system as specified in N3E-934, Instrument and Instrument Line Installation and Inspection, Section 3.2.13.
- Completion of engineering document construction releases (EDCRs) 52446, 53619, 53629, and 53644 to ensure system 72 instrument panel drains and high-point vent lines are connected to the closed drain system.
- Instrument valves with instrument panel drains and high-point vent lines connected to the closed drain system will be tagged appropriately by operations per Technical Instruction TI-12.14.

Inspection Activities: The inspectors reviewed procedure N3E-934, Rev. 8, to determine whether the procedure specified that system 72 instrument drain and high-point vent lines be connected to the closed drain system. The inspectors reviewed WOs associated with EDCRs 52446, 53619, 53629, and 53644 to determine whether system 72 instrument lines were installed in accordance with procedure N3E-934, Rev. 8. The inspectors walked down system 72 instrument panels 2-PNL-276-L015, 2-PNL-276-L016, and 2-PNL-276-L287 to verify system 72 instrument drain lines and high-point vent lines were connected to the closed drain system. The inspectors reviewed WO 113993569 to determine whether the scope of the WO included installation of system 72 drain lines and high-point vent lines to the closed drain system. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

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

the original construction deficiency. Based on these proposed actions, CDR 50-391/83-45 is closed; however, future inspection of completed work may be performed at the NRC's discretion.

OA.1.2 (Discussed) Confirmatory Order NRC-2012-0171, Completeness and Accuracy of Information (IP 92702)

a. Inspection Scope

Background: In July 2012, the NRC issued a Confirmatory Order (ADAMS Accession No. ML12173A020) as the result of an agreement reached during an alternative dispute resolution (ADR) mediation session conducted on May 21, 2012, regarding falsification at Watts Bar Unit 2. In early 2012, the NRC's Office of Investigations completed an investigation regarding activities at the Watts Bar Nuclear Plant. Based on the evidence developed during the investigation, the NRC staff concluded that, on or about August 2010, an electrician and foreman employed by a subcontractor at Watts Bar Unit 2 deliberately falsified WO packages for primary containment penetrations and caused the applicant, TVA, to be in apparent violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," and 10 CFR 50.9, "Completeness and Accuracy of Information."

At the ADR, TVA provided corrective actions and enhancements taken shortly after its identification of the incident in August 2010. In addition, TVA agreed to a number of corrective actions to preclude recurrence of the violation.

Inspection Activities: The inspectors reviewed and verified that actions to preclude recurrence were implemented. The actions are numbered by section as contained in Section V of the Confirmatory Order (ADAMS Accession No. ML12173A020).

Action	Inspector Activities
V.3.a	The inspectors reviewed a joint communication from TVA Chief Nuclear Officer and Executive Vice President and TVA Senior Vice President of Nuclear Generation Development and Construction issued June 19, 2012; discussing expectations for assuring work activities are performed and documented in a complete and accurate manner.
V.3.b	The inspectors reviewed and confirmed posters and communications, including marquee messages on electronic display monitors, were placed throughout buildings and trailers associated with Unit 2 completion activities which reinforced 10 CFR 50.9, complete and accurate information, willful violations, and their consequences.

V.3.c	<p>The inspectors reviewed the following procedures which were revised to reinforce the requirements of 10 CFR 50.9 and the need to ensure complete and accurate documentation of work completion steps:</p> <ul style="list-style-type: none"> • BPP-01.1, Administration of Site Administrative Procedures for Bellefonte, Rev. 0006 • BPP-01.2, Administration of Site Technical Procedures for Bellefonte, Rev 0001 • NPG-SPP-01.2, Administration of Site Technical Procedures, Rev. 0006 <p>Inspectors also reviewed updates to contracts between TVA and the following entities to verify that the contracts contained language about the requirement to comply with TVA's Procedure Use and Adherence procedure:</p> <ul style="list-style-type: none"> • Bechtel Power Corporation • Batlett Holdings, Inc. • BCP Technical Services • Day and Zimmerman NPS • Engineered Solutions Inc. • Hartford Steam and Boiler Inspection and Insurance Company of Connecticut • URS Energy and Construction
V.3.d	<p>The inspectors observed 10 CFR 50.9 training sessions as documented in inspection reports 05000391/2012608 (ADAMS Accession No. ML12319A368) and 05000391/2012609 (ADAMS Accession No. ML12356A073). The inspectors also reviewed the training waiver for a number of employees who were unable to or did not attend the training sessions prior to December 21, 2012. TVA has since provided training to most of those employees with only a small number of employees remaining.</p>
V.3.e	<p>The inspectors discussed TVA's plans with senior management to provide refresher 10 CFR 50.9 training (both manager/supervisor as well as craft level) to employees, including contractor and subcontractor employees, at all nuclear construction (Watts Bar Unit 2 and Bellefonte) locations every two years through 2016. This is considered a future action that may be inspected at a later time.</p>
V.3.f	<p>The inspectors reviewed plant access training procedure PAT000, Rev. 20, to verify that requirements for completeness and accuracy of information (10CFR50.9) were discussed within the procedure. In addition, the inspectors had observed a craft classroom session on general employee training where the instructor covered 10CFR50.9, as discussed in inspection report 05000391/2013612 (ADAMS Accession No. ML13088A066)</p>
V.3.g	<p>The inspectors reviewed the Watts Bar Unit 2 2012 survey questions and results for adverse trends.</p>
V.3.h	<p>The results of the effectiveness review of actions taken and actions planned; including those taken in response to Employee Concerns Program (ECP) checks are considered future actions that may be inspected at a later time.</p>
V.3.i	<p>The letter from TVA to the NRC discussing the basis for concluding that the Order has been satisfied is considered a future action that may be inspected at a later time.</p>

b. Observations and Findings

No findings were identified. No adverse trends were identified.

c. Conclusions

The actions specified in the Confirmatory Order for Watts Bar Unit 2 were implemented with the exception of those noted above (Actions V.3.e, V.3.h, and V.3.i). Remaining actions will be inspected during future inspections once they have been completed.

OA.1.3 (Closed) Generic Letter (GL) 88-17, Loss of Decay Heat Removal; Temporary Instruction (TI) 2515/101, Loss of Decay Heat Removal 10 CFR 50.54(f); TI 2515/103, Loss of Decay Heat Removal 10 CFR 50.54(f) – Programmed Enhancements (Long Term) Review; TI 2515/113, Reliable Decay Heat Removal During Outages (IP 92701)

a. Inspection Scope

Background: Generic Letter (GL) 88-17 was issued following several industry events that highlighted the sensitivity of the loss of decay heat removal during shutdown operations. The report of the Diablo Canyon event of April 10, 1987, NUREG-1269, identified that operating a plant with a reduced reactor coolant system (RCS) inventory was a particularly sensitive condition. The NRC issued TI 2515/101 and TI 2515/103 to ensure that the expeditious actions and long-term programmed enhancements recommended in the GL were addressed by licensees. TI 2515/113 emphasized the need to manage risk during shutdown operations to provide reliable decay heat removal.

For Unit 1, TVA committed to the NRC to design and install hardware modifications before the WBN Unit 1 fuel load to address the requirements of GL 88-17. Specifically, TVA committed to provide the following to be displayed on the plant computer or centrally located display in the control room:

1. Reactor Vessel Level
 - a. Wide Range Level Indication
 - b. Narrow Range Level Indication
 - c. Backup Level Indication – utilizing a sight glass (local indication only)
2. Reactor Vessel Temperature
 - a. Two core exit thermocouples (CET)
3. RHR System Performance Parameters
 - a. RHR pump discharge flow
 - b. RHR pump discharge pressure
 - c. RHR pump motor current (backup)

The NRC documented in inspection report (IR) 50-390/95-74 and IR 50-391/95-74 (ADAMS Accession No. ML072610794) that appropriate actions were taken to address the concerns of GL 88-17 for Unit 1 and closed TI 2515/101 and TI 2515/103. Similarly, TI 2515/113 was closed in IR 50-390/96-11 and IR 50-391/96-11 (ADAMS Accession No. ML072610653).

Inspection Activities: Based on the information provided in the background section, the objective of this inspection was to gather and evaluate sufficient information to make a determination as to whether TVA had adequately addressed GL 88-17 for WBN Unit 2. Specifically, the inspectors reviewed commitment closure document NCO080008041 which outlined the method for completion of GL 88-17 actions. The inspectors reviewed Unit 2 construction design activities for compliance with GL 88-17 and NRC requirements. The inspection focused on a review of various documents to verify the methodology the applicant has initiated to satisfy the commitment to display the appropriate indications for Reactor Vessel Level, Reactor Vessel Temperature, and RHR System Performance Parameters. The inspectors reviewed EDCRs 53756, 52363, 52378, 52321, 52351, 53618, 53629, 52322 and PIC 58575. The inspectors reviewed applicable work orders, setpoint documents, and instrument loop data. Field verification was performed for various work orders that had been closed.

Additionally, several procedures were reviewed to determine if administrative controls were implemented to address conditions such as:

- Normal and abnormal operation of RHR
- Containment control and closure
- Controls for avoiding perturbations while in a reduced inventory
- Controls during RCS draining operations
- Additional means to add inventory during reduced inventory conditions
- Controls on support equipment operation
- Shutdown risk management

In cases where procedures specific to Unit 2 were not issued yet, the inspector reviewed the corresponding Unit 1 procedure with the understanding that Unit 2 procedures are converted from Unit 1 and would remain the same relative to aspects of this GL. Differences between the Unit 1 completion and Unit 2 resolution were identified by the applicant and reviewed by the inspectors. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. The inspectors observed that all of the required indications were designed to be displayed in the same or similar fashion for Unit 2 as on Unit 1. On Unit 2, the CET indications for Reactor Vessel Temperature are designed to be received from the WINCISE in-core instrument thimble assembly. Unit 1 CETs are in a fixed in position at the upper core plate. In either case, the data from the CET is continuously collected and transmitted to display on safety-related control room monitors and RCS temperature signals are transmitted to the plant computer. Other slight differences are a result of the applicant taking advantage of improved equipment through obsolescence of original equipment. The proposed equipment installation satisfies the intent of GL 88-17.

c. Conclusions

Based on a review of the applicant's engineering complete closure package and the aforementioned inspection activities, the inspectors concluded that the applicant's efforts were consistent with those implemented for Unit 1 and sufficient to satisfy the intent of

GL 88-17. Therefore GL 88-17, TI 2515/101, TI 2515/103, and TI 2515/113 are considered closed.

OA.1.4 (Discussed) CDR 391/83-48: Relocating Sensing Lines on Upper Containment Cooler (IP 92701)

a. Inspection Scope

Background: The deficiency was initially reported to the NRC on August 10, 1983, as NCR WBN NEB 8321 in accordance with 10 CFR 50.55(e). The issue was documented as CDR 390/83-50 for Unit 1 and CDR 391/83-48 for Unit 2.

The CDR initially concerned a preoperational test deficiency (PT-162) and documented certain system switches. Subsequently, as documented in a revision to NCR 8321, it was identified that ventilation (system 30) sensing line flow switches were not installed in accordance with TVA mounting drawing 47A900-58. These sensing lines had been extended into the airflow duct at various angles, thereby giving erroneous pressure readings. In addition, the sensing lines for the fuel handling area (FHA) exhaust, the general exhaust, and the upper containment coolers had been improperly located in the discharge side of the fans. The root cause of the deficiency was identified as insufficient review and/or review procedures to correctly identify the inadequacy of the detail drawing 47A900-58. This drawing did not clearly show where, within the duct, the field – routed sensing lines were to terminate. The improperly located flow switches were initially not shown on TVA drawings. Later revisions showed the ports located on the discharge side of the fans, whereas, they should have been located on the intake side to match the static pressure range switch. The root cause was again identified as improper review.

Unit 1 Corrective Actions:

- Incorrectly positioned sensing lines were cut off at the duct wall.
- Pressure readings were taken to determine proper set points and subsequently revised.
- Detail drawings were revised to clarify the proper installation of the sensing lines.
- Sensing lines were relocated to the suction side of the fans on the FHA exhaust, upper containment, and the general exhaust system coolers.

The NRC reviewed the corrective actions implemented, the revised TVA final report, supporting documentation and had discussions with TVA personnel. This issue was closed for Unit 1 in IR 50-390/84-53 and 50-391/84-42 (ADAMS Accession No. ML072570621).

Unit 2 Corrective Actions:

TVA issued procedure NPG-SPP-067, Instrument Setpoint, Scaling, and Calibration Program Procedure, which established administrative controls and provided methods and requirements for the process of controlling setpoints and associated instrumentation. It also included the controls for establishing setpoints, implementation of setpoints, and maintaining of setpoints and associated instrumentation.

EDCR 53599 was issued to relocate sensing lines on reactor building upper containment coolers in accordance with specification N3E-934, DRAs 016, 017, 018 & 019.

EDCR 53599 and DRAs 039 & 040 were issued to revise drawing 47A900-58D & 58E for the installation of flow switches.

Remaining Unit 2 Corrective Actions:

- Implement WOs to reinstall new sensors in accordance with EDCR 5399 and DRAs 2-SENL-030-0095, 0097, 0099, 0100i and drawing 47A900-58D and 58E.

Inspection Activities: The inspectors reviewed the following engineering documents that provide the necessary corrective actions to correct the deficiency. The inspectors also discussed the corrective actions with TVA staff, reviewed the Master Equipment List for necessary changes that identified changes in sensor design, and reviewed procurement documentation that identified that new sensors delivered did not have qualified water-proof housings. New sensors have been reordered with proper housings.

- Engineering Change Notice 4112
- Field Change Request 20016
- Field Change Request 20030
- Engineering Change Notice 5971
- Engineering Change Requests 53788 and 53599
- TVA Procedure NPG-SPP-067

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

New and revised engineering documents provide reasonable assurance that the planned corrective actions are considered complete. Additional inspection activities are required prior to closure of CDR 50-391/83-48.

OA.1.5 (Closed) Inspection of HVAC Duct and Supports CAP (TI 2512/025, IP 50100)

a. Inspection Scope

Background: The heating, ventilating, and air conditioning (HVAC) corrective action program (CAP) was developed after TVA determined adverse conditions involving duct and duct supports were programmatically characterized as having:

- An incomplete design basis.
- Inadequate design documents.
- As-built configurations not in conformance with existing design documents.
- Inadequate or incomplete inspection documentation and incomplete instructions.

For Unit 1, TVA resolved these issues through the following tasks:

- Completing the design basis by reviewing and revising the design criteria.
- Issuing supporting calculations and updating the FSAR to be consistent with the upgraded design criteria.
- Updating design output documents to be consistent with the completed design basis.
- Revising construction, maintenance, and QA procedures to incorporate design output documents.
- Developing bounding critical cases of existing installations and evaluating their adequacy.
- Performing unique evaluations or modifying installations when they could not be qualified by the critical case evaluations.

The Unit 2 program used the Unit 1 approach and also addressed TVA's past corrective action tracking documents.

The 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 special programs (SPs). The staff concluded there was reasonable assurance that, when implemented as described, the HVAC CAP will appropriately resolve the adverse conditions for Unit 2.

Inspection Activities: Previous results, documented in inspection reports 05000391/2010604 (ADAMS Accession No. ML103060240), Section OA.1.7, and 05000391/2011608 (ADAMS Accession No. ML11311A082), Section OA.1.12, concluded that walk down packages were performed in accordance with the applicable procedures, design calculations were updated to address previous concerns, and unmodified duct and duct supports met design requirements. Inspection results documented in inspection report 05000391/2012603 (ADAMS Accession No. ML12123A156), Section OA.1.10, credited the HVAC CAP with field inspection of four modified duct supports and 10 segments of modified duct. At the conclusion of the inspection it was identified that additional samples of modified duct and duct supports were required prior to closure of the HVAC CAP.

For this inspection, activities focused on gathering additional samples of HVAC CAP related modifications. As part of the inspection activities, inspectors performed field inspections of 11 closed WOs to verify the information documented in the WOs matched field conditions. The selected WOs for both HVAC duct and support modifications included:

- 110800665,
- 111542590,
- 09-953655-000,
- 10-951214-001,
- 11-0800490,
- 110739571,
- 110800611,
- 111281253,
- 111281393,

- 111281448,
- and 111171415

In total, an additional 24 supports and 14 duct modifications were credited towards the HVAC CAP. IP 50100, Heating, Ventilating, and Air Conditioning Systems, will also be credited for samples related to work observation, Section 02.04.c, for review of completed installations of duct and duct supports against project specifications and installation drawings for proper location, configuration, identification, and damage.

- IP 50100 Section 02.04.c – two samples

Inspectors also interviewed craft performing in-process modifications on HVAC CAP related WOs. Work being performed at the time of the interviews included HVAC duct and support modifications. Interviews were conducted to determine if the craft were aware and knowledgeable of the installation requirements.

Finally, inspectors reviewed a sample of HVAC CAP related corrective action reports and QA surveillances to determine if actions related to conditions adverse to quality were being properly identified, entered into the corrective actions program, and adequately corrected. QA surveillances were reviewed to ensure the HVAC CAP commitment was being implemented and if any reoccurring issues were identified. Documents reviewed are listed in the attachment.

b. Observations and Findings

The inspectors identified the following NCV:

Introduction: The NRC identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” with two examples, for failure to follow procedure. Specifically, two WOs were identified using Quality Level (QL) III materials in a QL I/II application as required per project procedures and specifications.

Description: The inspectors reviewed closed WOs 09-953655-000 and 10-951214-001 for modifications to HVAC supports. Both WOs had received the necessary QC inspections and reviews required for closure. During NRC review the inspectors identified the following:

- Per MAI 4.3 “HVAC Duct Systems,” and TVA Engineering Specification SRN-N3C-942-4, “Structural Requirements for HVAC Ducts and Duct Supports,” ASTM 307 bolts and ASTM A563 nuts shall be QL level I or II. During the review, inspectors identified QL III bolting materials for WOs 09-953655-000 and 10-951214-001 were installed in 13 HVAC supports as documented in the Attachment B, “Material Traceability and Transfer Record.”

The inspectors determined that the use of QL III material in a QL I/II application was a performance deficiency. The inspectors concluded that the performance deficiency was more than minor in accordance with IMC 2517 because they represented an improper or uncontrolled work practice that could impact the quality or safety of involved safety-related SSCs. The finding was determined to be of very low safety significance in accordance with Section 6.5 of the NRC Enforcement Policy because it does not

represent a breakdown in the QA process. The applicant issued PER 708450 to address the identified conditions.

The finding has a cross-cutting aspect in the resources component of the human performance cross-cutting area, as defined in IMC 0310, "Components Within The Cross-Cutting Areas," because the applicant failed to ensure that personnel, equipment, procedures, and other resources are available and adequate to assure nuclear safety, specifically that the work packages were accurate, [H.2(c)].

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

Contrary to the above, the applicant failed to install QL I/II bolting materials as required per MAI - 4.3 "HVAC Duct Systems," Section 6.2.7.A and TVA Engineering Specification SRN-N3C-942-4, "Structural Requirements for HVAC Ducts and Duct Supports," Section 3.2.

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 05000391/2013604-04: "Failure to Use Appropriate QL materials."

c. Conclusions

The inspected activities associated with NCV 05000391/2013604-04 discussed above were not performed in accordance with applicant procedures and NRC regulations. Based on a review of the applicant's engineering complete closure package and the aforementioned inspection activities, overall program implementation of the HVAC CAP was determined to be adequate and TI 2512/025 is considered closed.

OA.1.6 (Closed) CDR 391/86-52: Deficiencies with HVAC Duct Seismic Design Criteria (TI 2512/025 and IP 50100)

a. Inspection Scope

Background: Deficiencies with the HVAC duct seismic design criteria were originally reported to the NRC on May 21, 1986, for Unit 2. During design review, two basic deficiencies were identified with the HVAC duct seismic designs.

The identified issues were as follows:

- The theoretical frequencies determined by the design criteria equations for square and rectangular ducts were inconsistent with test results obtained after the design criteria's original issuance. Specifically, testing showed frequencies to be significantly lower than predicted by the design criteria equations which could result in higher spectral accelerations for the seismic design of supports.

- Ducts with free-end overhangs past the last support in a run were outside the scope of the criteria's design assumptions.

To address the historic design deficiencies for Unit 2, TVA implemented corrective actions similar to the Unit 1 HVAC CAP. As part of those corrective actions, design criteria were updated and applied to all applicable Unit 2 HVAC duct and duct supports.

Inspection Activities: In order to close this CDR for Unit 2, inspectors performed a series of inspections of the HVAC CAP program. Specifically, inspectors performed a review of design criteria and installation requirements for unmodified supports, modified supports and a review of quality related records to ensure that duct and duct supports were evaluated to ensure adequacy. Results were documented in inspection reports 05000391/2010604 (ADAMS Accession No. ML103060240), Section OA.1.7, 05000391/2011608 (ADAMS Accession No. ML11311A082), Section OA.1.12, 05000391/2012603 (ADAMS Accession No. ML12123A156), Section OA.1.10, and Section OA.1.5 of this inspection report. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on a review of the applicant's engineering complete closure package and the aforementioned inspection activities, the inspectors determined that the applicant resolved the original construction deficiency for Unit 2. This item, CDR 391/86-52, is closed for Unit 2.

OA.1.7 (Closed) CDR 391/91-22: Deficiencies with HVAC Duct Supports (TI 2512/025; IP 50100)

a. Inspection Scope

Background: The issue of deficient HVAC duct supports for Unit 2 was originally reported to the NRC on December 5, 1991. This CDR was written to address numerous issues identified from the HVAC walk-downs performed earlier for Unit 1.

In general, issues that were identified included construction discrepancies between the design records and installed configurations, and between installed configurations and inspection documentation. Initial reviews concluded that these types of discrepancies were to be evaluated for widespread occurrence throughout the HVAC duct support population.

Examples of the discrepancies identified for some of the HVAC supports included:

- Excessive member lengths
- Excessive rivet spacing for duct-to-support connections
- Attachment of a conduit support to a duct support without supporting documentation
- Some support elements not installed as detailed by the drawings

- Excessive baseplate gaps
- Bent rods
- Loose nuts
- Edge distance of anchors on baseplates not as detailed on design documents
- Incorrect support identifications

To address the historic construction deficiencies for Unit 2, TVA implemented corrective actions similar to the Unit 1 HVAC CAP. As part of those corrective actions, it was determined that the existing installations should be identified, bounded by critical characteristics, evaluated for their adequacy, and modified as necessary. To document and identify existing conditions related to HVAC duct and duct supports, TVA implemented a walk-down program. These walk-downs were then entered into the engineering and evaluation process which addressed historic construction deficiencies.

Inspection Activities: In order to close this CDR for Unit 2, inspectors performed a series of inspections of the HVAC CAP program. Specifically, inspectors performed a field review of unmodified supports, modified supports and a review of quality related records to ensure that duct and duct supports were evaluated to ensure adequacy. Results were documented in inspection reports 05000391/2010604 (ADAMS Accession No. ML103060240), Section OA.1.7, 05000391/2011608 (ADAMS Accession No. ML11311A082), Section OA.1.12, 05000391/2012603 (ADAMS Accession No. ML12123A156), Section OA.1.10, and Section OA.1.5 of this inspection report. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on a review of the applicant's engineering complete closure package and the aforementioned inspection activities, the inspectors determined that the applicant resolved the original construction deficiency for Unit 2. This item, CDR 391/91-22, is closed for Unit 2.

OA.1.8 (Closed) NCV 05000391/2012603-05: Failure to Follow Instructions,(TI 2512/025 and IP 50100)

a. Inspection Scope

Background: During the HVAC CAP inspection, documented in inspection report 05000391/2012603 (ADAMS Accession No. ML12123A156), Section OA.1.10, inspectors identified two instances where the applicant failed to ensure that appropriate quality level materials were installed. Per MAI 4.3 – "HVAC Duct Systems," Section 6.2.7.B, riveted connections in a load bearing condition shall use QL Level I or II rivets. Contrary to the requirements of the MAI 4.3, section 6.2.7.B, inspectors identified two supports, support Nos. 123-1690 and 123-1787, where QL III rivets were installed in a load bearing condition.

Inspection Activities: The inspectors reviewed the applicant's corrective actions documented in PERs 554858, 527134, and 524352 to determine if the applicant had established sufficient corrective actions to address the concern. Specifically, inspectors reviewed reportability screening, the engineering evaluation and disposition, test results for commercial grade dedication of QL III rivets, apparent cause evaluation, and recent training records.

Inspectors also reviewed training material, which was given to all sheet metal craft, along with signature logs. The emphasis of the training was to:

- Emphasize the importance of using the correct quality level material,
- Proper documentation of materials,
- Load-bearing vs. non-load-bearing applications with respect to blind rivet applications,
- Baseplate gap requirements,
- Proper documentation of work completed log,
- Ensuring craft maintained attention to detail, and
- Relevant ASTM standards.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. Based on the review of the results from the commercial grade dedication of the QL III rivets, inspectors determined that the installed rivets met project specifications.

c. Conclusions

The inspectors determined that the issues associated with NCV 05000391/2012603-05 were adequately addressed in the applicant's corrective action program. Based on the inspection of these items, NCV 2012603-05, Failure to Follow Instructions, is closed.

OA.1.9 (Closed) CDR 391/87-07: Unqualified Reactor Coolant Pump (RCP) Motor Coatings (IP 35007)

a. Inspection Scope

Background: CDR 391/87-07 was developed to resolve the concern with the adequacy of the RCP coatings. The coating system used by Westinghouse on RCP motors for both units was not qualified by testing in accordance with ANSI N5.9 and ANSI N101.2. Reviews of testing performed by Westinghouse on the coating application gave inconclusive test results in 1986. Tests performed in 1984 indicated that the system would fail from delamination under a Loss of Coolant Accident (LOCA) condition. Corrective actions based on the original RCP motors, called for the pump motors to be reworked to replace the coating.

For Unit 1, the applicant decided to install a wire screen catch system instead of the recoating. IR 50-390/95-45 (ADAMS Accession No. ML072680894) noted that TVA introduced a calculation to demonstrate acceptable level of debris.

For Unit 2, different corrective actions were developed. The RCP motors were removed and remanufactured by Westinghouse. As part of the corrective actions, the Unit 2 RCP motors were recoated with Quality Level 1 coatings. The application was applied by Westinghouse in accordance with TVA General Specification Procedure G-55.

Inspection Activities: As previously discussed in report 05000391/2012610 (ADAMS Accession No. ML13035A201), Section OA.1.1, the inspectors reviewed TVA's final closure package associated with the RCP coatings. The inspectors verified that performed activities were in accordance with TVA General Engineering Specification G-55 and industry standards ANSI N5.9, ANSI N101.2, ASTM D1475, and ASTM D562. Specifically, the inspectors verified that temperature, irradiation, and dry film thickness testing was performed in accordance with TVA's engineering specifications and procedures. In addition, the inspectors reviewed the appropriate traceability documents of the coating materials to a vendor/supplier which had an established 10 CFR 50 Appendix B QA program.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on a review of the applicant's final closure package and the aforementioned inspection activities, the inspectors concluded that the scope and effectiveness of the corrective actions were in compliance with applicable requirements, and were adequate to address this CDR. Based on these actions, CDR 391/87-07 is closed.

OA.1.10 (Closed) TMI Action Item I.D.2: Plant Safety Parameter Display Console (IP 92701)

a. Inspection Scope

Background: As a result of the accident at TMI-2, the NRC created a number of action items designed to improve a plant's ability to minimize accident occurrence and accident consequences. These TMI action items were initially outlined in NUREG-0660, NRC Action Plan Developed as a Result of the TMI-2 Accident, (ADAMS Accession No. ML072470524) and later clarified in NUREG-0737, Clarification of TMI Action Plan Requirements, (ADAMS Accession No. ML102560051).

TMI Action Item I.D.2 was created to ensure that each applicant and licensee install a safety parameter display system (SPDS) that would display to operating personnel a minimum set of parameters which would define the safety of the plant. Subsequently, Watts Bar Unit 1 installed the required equipment and it was discussed in NUREG-0847, Safety Evaluation Report (SER) Related to the Operation of Watts Bar Nuclear Plant, Units 1 and 2, Supplement 15 (ADAMS Accession No. ML072060488). This SER identified that the Watts Bar Unit 1 SPDS has satisfied or will satisfy all of the SPDS requirements of Supplement 1 to NUREG-0737. IR 50390/95-74 (ADAMS Accession No. ML072610794) verified the installation and 50390/97-07 (ADAMS Accession No. ML072750103) verified the operation of the Unit 1 SPDS.

Inspection Activities: Based on the information provided in the background section, the objective of this inspection was to gather and evaluate sufficient information to make a determination as to whether TVA had adequately addressed TMI Action Item I.D.2 for WBN Unit 2. The inspection focused on a review of the installation of the WBN Unit 2 integrated computer system (ICS), of which SPDS is a function, which was designed, procured, constructed, and installed through EDCR 52322. The inspectors also reviewed the safety-related portions of the installation of the main control room (MCR) workstation installation, utilized to display SPDS, through EDCR 52454. Completed WOs, field installation, drawing changes, Emergency Operating Instructions (EOIs) and calculations were also reviewed to ensure the proposed work activities were planned and appropriately executed. Differences between the Unit 1 completion and Unit 2 resolution were identified by the applicant and reviewed by the inspectors. Primarily, these differences are a result of the applicant taking advantage of improved equipment through obsolescence of original equipment. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified. The proposed equipment installation meets NRC regulatory requirements and satisfies the intent of the TMI Action Item regarding SPDS.

c. Conclusions

The inspectors reviewed various completed actions associated with TMI Action Item I.D.2 to verify the adequacy of the applicant's actions. Based on a review of the applicant's engineering complete closure package and the aforementioned inspection activities, the inspectors concluded that the applicant's efforts were sufficient to satisfy the intent of the respective TMI Action Item. TMI Action Item I.D.2 is considered closed.

OA.1.11 (Closed) CDR 391/81-07: Steel Containment Penetration Assembly (IP 92701)

a. Inspection Scope:

Background: The inspectors had previously inspected this item in Section OA.1.5 of integrated inspection report (IIR) 05000391/2012607 (ADAMS Accession No. ML12276A028). Detailed information regarding the background and previous inspection activities are captured in this IIR.

Remaining Unit 2 Actions:

While not all field work is completed, engineering actions to resolve the issue have been completed and the remaining modifications are being tracked by PER 172772. This commitment will be closed by the applicant after the completion of EDCRs 52430, 52431, 52435, 52437, 52438, 52439, and 52457.

Inspection Activities: The inspectors reviewed the applicant's completed WOs, proposed work instructions, proposed drawing changes, and installed supports. Documents reviewed are listed in the Attachment.

b. Observations and Findings:

No findings were identified.

c. Conclusions:

Based on a review of the applicant's engineering complete closure package and the aforementioned inspection activities, the inspectors determined that the remaining work activities are contained within a controlled program and CDR 50-391/81-07 is closed.

OA.1.12 (Closed) CDR 391/89-02: Deficiency in the Design of the Emergency Gas Treatment System (IP 92701)

a. Inspection Scope:

Background: The inspectors had previously inspected this item in Section OA.1.7 of IIR 05000391/2012607 (ADAMS Accession No. ML12276A028). Detailed information regarding the background and previous inspection activities are captured in this IIR.

Remaining Unit 2 Actions:

While not all field work is completed, Engineering actions to resolve the issue have been completed and the remaining modifications are being tracked by PER 144062. This commitment will be closed by the applicant after the completion of design change notice (DCN) 52641.

Inspection Activities: The inspectors reviewed the applicant's completed WOs, proposed work instructions, proposed drawing changes, and installed equipment. Documents reviewed are listed in the Attachment.

b. Observations and Findings:

No findings were identified.

c. Conclusions:

Based on a review of the applicant's engineering complete closure package and the aforementioned inspection activities, the inspectors determined that the remaining work activities are contained within a controlled program and CDR 50-391/89-02 is closed.

OA.1.13 (Closed) NCV 05000391/2010603-07, Failure to Protect Safety-Related Welds, Piping, and Components During Construction Activities (IP 92702)

a. Inspection Scope

Background: The inspectors identified a SL IV NCV of 10 CFR 50, Appendix B, Criterion XIII, "Handling, Storage, and Shipping," in that, the applicant failed to control the storage and preservation of safety-related material (welds, piping, and components) to prevent damage from nearby construction activities. Specifically, the inspectors identified multiple locations of weld and paint spatter, arc strikes, and mechanical

damage on safety-related welds, piping, and components. This NCV was documented in IIR 05000391/2010603 (ADAMS Accession No. ML102170465), Section C.1.9.

Inspection Activities: The inspectors reviewed records associated with the NCV as documented in PER 236720. The inspectors reviewed the applicant's plans to verify repair of the identified deficiencies would be performed in accordance with procedure 25402-000-GPP-0000-N3702, Arc Strike Removal/Base Metal Repair or Piping/Components and Structural/Miscellaneous Steel, and procedure 25402-000-GPP-0000-7204, ASME Section III Material and Component Surface Assessment and Remediation. The inspectors reviewed the actions taken for a safety stand-down, which occurred approximately 2 months after the NRC identified and documented NCV 05000391/2010603-07, for a Fire Emergency in the WBN Unit 2 Reactor Building raceway as a result of welding activities. The stand-down actions emphasized the proper preparation of the work area including protection of adjacent equipment. The inspectors reviewed WO 113290972 issued to provide instructions and documentation for the repair of arc strikes on ASME Section III piping and components for the reactor coolant system (system 068). This WO provides instructions to repair surface irregularities (such as arc strikes, gouges, weld spatter, etc.) on system 068 ASME Section III piping and components. This work order will be an ongoing open document for the inclusion of arc strike PERs for system 068. The completion and closure of the WO will be performed just prior to system turnover or as deemed by project management. Additionally, the inspectors have seen marked increases in the applicant's actions to protect adjacent equipment during work activities which could cause damage.

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspectors determined that the issues associated with NCV 05000391/2010603-07 were adequately addressed and effectively tracked in the applicant's corrective action program. Based on a review of the applicant's final closure package and the aforementioned inspection activities, NCV 05000391/2010603-07, Failure to Protect Safety-Related Welds, Piping, and Components During Construction Activities, is closed.

**OA.1.14 (Discussed) Mechanical Equipment Qualification (MEQ) Special Program (SP)
(TI 2512/038, IP 50075)**

a. Inspection Scope

Background: The MEQ SP was created to meet the requirements of 10 CFR Part 50, Appendix A, General Design Criterion 4. This criterion requires, in part, that structures, systems, and components important to safety be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents.

For both Unit 1 and Unit 2, the applicant evaluated the non-metallic parts of safety-related equipment in harsh environments and produced a controlled MEQ binder to establish and maintain the qualification status of equipment in the plant.

Inspection Activities: The inspectors interviewed the applicant's responsible staff to discuss the status of the program and understand the work that had been completed to date. The inspectors reviewed a sample of MEQ change supplements to verify that field change requests affecting the mechanical components were tracked for inclusion in the MEQ binder.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

For the sample reviewed, the mechanical components were adequately addressed in the MEQ change supplements for harsh environments. Further inspection is required to review preventative maintenance plans and verify that the as-constructed condition of components are reflected in the MEQ binder.

OA.1.15 (Closed) Bulletin (BL) 88-05, BL 88-05 Supplement 1 and BL 88-05 Supplement 2, Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey (IP 92717)

a. Inspection Scope

Background: BL 88-05 and its two supplements identified that material suppliers, Piping Supplies, Incorporated and West Jersey Manufacturing Company used falsified certified material test reports (CMTR) for ASME Code components supplied to the nuclear industry. In addition, there was no evidence that the manufacturers or their subcontractors performed the testing required by ASME Section III to upgrade the commercially produced steel for the falsified CMTRs. The Bulletin requested that licensees "1) take actions to assure that materials comply with ASME Code and design specification requirements or are suitable for their intended serve, or 2) replace such materials."

Inspection Activities: The inspectors reviewed the corrective actions taken by the applicant to verify that the actions appropriately addressed the content of BL 88-05 and its supplements and were consistent with the corrective actions taken for Watts Bar Unit 1. Specifically, the inspectors witnessed hardness testing, as documented in IIR 05000391/2012602 (ADAMS Accession No. ML12087A324), Section OA.1.2, and IIR 05000391/2012609 (ADAMS Accession No. ML12356A073), Section OA.1.1. The inspectors reviewed chemical analyses of the material to verify that the chemical limits for SA 105 material were met. The inspectors reviewed PER 234500 that tracked the seven flanges that failed hardness testing, and a WO that detailed the plan to replace two of the seven flanges (WO 114092374) to verify that the planned corrective actions addressed BL 88-05 and its supplements. Three additional WOs were planned to

address replacement of the remaining flanges. The inspectors conducted field walkdowns of a sample of the affected flanges. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The applicant completed the hardness testing and the planned replacement of seven affected flanges was being tracked in PER 234500 and WOs. Based on a review of the applicant's engineering complete closure package, the completed and planned corrective actions, and the aforementioned inspection activities, BL 88-05, BL 88-05 Supplement 1 and BL 88-05 Supplement 2 are closed.

OA.1.16 (Discussed) CDR 391/84-25: Failure to Provide Fire Detectors in Rooms Containing Redundant Safe Shutdown Circuits (IP 35007)

a. Inspection Scope

Background: The deficiency was initially reported to the NRC on May 11, 1984, as NCR WBN MEB 8415 in accordance with 10 CFR 50.55(e). The issue was documented as CDR 390/84-27 for Unit 1 and CDR 391/84-25 for Unit 2.

The CDR concerned the requirement for fire suppression and detection systems in the post-accident sampling rooms by 10 CFR 50, Appendix R, Section III.G.2 due to the presence of redundant safe shutdown circuits. The circuits, which are associated with three of the four steam generator main steam header pressure transmitter channels, are routed in conduits through the rooms and are separated by one-hour rated fire barriers installed around the conduits. Pre-action sprinkler systems have been provided in the post-accident sampling rooms (previously the fuel transfer valve rooms) on the auxiliary building elevation 729.0 ft. The smoke detectors that actuated the sprinkler systems were incorrectly located in the ventilation and purge air rooms on the auxiliary building elevation 737.0 ft.

The concern was that, if the nonconforming condition was not corrected, a fire in the post-accident sampling rooms would not be detected, nor would the sprinkler system be manually actuated in a timely manner. This could result in fire damage to redundant safe shutdown equipment that could adversely affect plant safety.

The applicant implemented Engineering Change Notice (ECN) 4872 to add cross-zoned smoke detectors in both post-accident sampling rooms on the auxiliary building elevation 729.0 ft. to activate the existing pre-action sprinkler systems. The smoke detectors installed in the ventilation and purge air rooms on the auxiliary building elevation 737.0 ft. were connected to the same detection zone as the other smoke detectors in that area, as described in the final CDR report submitted to the NRC on June 8, 1984.

The NRC closed CDR 390/84-27 for Unit 1 in IR 50-390/85-09 (ADAMS Accession No. ML082190704), noting that cross-zoned smoke detectors had been added in the post-accident sampling room to activate the existing pre-action sprinkler system. The

inspectors also noted, for Unit 1, that the smoke detectors installed in the ventilation and purge air rooms on the auxiliary building elevation 737.0 ft. were connected to the same detection zone as the other smoke detectors in that area.

For Unit 2, the following ionization-type smoke detectors (Pyrotronics Model DI-3) were installed in the Unit 2 post-accident sampling room: 0-XS-13-0301A, 0-XS-13-0301B, 0-XS-13-0301D, 0-XS-13-0301E, 0-XS-13-0301F, and 0-XS-13-0301G. TVA monitored the detectors for Unit 2 in accordance with the code of record for the Watts Bar fire detection system in National Fire Protection Association (NFPA) 72E, Automatic Fire Detectors – 1974. The requirement for periodic tests is contained in NFPA 72E, Section 7-3.1.5, which states: “Smoke detectors shall be tested semiannually in accordance with the manufacturer’s instructions.” Unit 2 electrically disabled the smoke detectors and initiated fire protection impairment permit Number C10-0205 on March 26, 2010, in the Unit 2 post-accident sampling room (zones 126 and 127) in support of Unit 2 construction activities in the area. WO 10-815605-000 implemented the impairment wiring modifications to disable the detectors on March 27, 2010.

Remaining Unit 2 Actions:

- Remove fire protection impairment permit number C10-0205 for the following smoke detectors in the Unit 2 post-accident sampling room: 0-XS-13-0301A, 0-XS-13-0301B, 0-XS-13-0301D, 0-XS-13-0301E, 0-XS-13-0301F, and 0-XS-13-0301G.
- Successfully perform testing of zones 126 and 127 as operating requirements zones in accordance with procedure 0-FOR-13-625, 6 Month Fire Detection Test – Panel L625. This successful performance shall include the zone tests and cross-zone tests for these two zones.

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

- Reviewed PER 172705 to verify the corrective actions were implemented for Unit 2 post-accident sampling room fire detection system.
- Reviewed engineering closure documentation for CDR 391/84-25, dated February 10, 2012, to verify the adequacy of the corrective actions.
- Reviewed ECN 4872 to add cross-zoned smoke detectors in both post-accident sampling rooms on the auxiliary building elevation 729.0 ft. to verify the adequacy of the design.
- Performed a field walkdown of the Unit 2 post-accident sampling room to visually verify the location of the new smoke detectors.
- Reviewed NFPA 72E code-required periodic testing records (procedure 0-FOR-13-625). In addition, the inspectors reviewed WO 09-818154-000 to implement procedure 0-FOR-13-625, 6 Month Fire Detection Test – Panel L625, completed on January 2, 2010, to verify when the smoke detectors in the Unit 2 post-accident sampling room were last tested.
- Reviewed outstanding fire protection impairment permit number C10-0205, March 26, 2010 to verify the detectors were removed from service to support construction activities in accordance with NPG-SPP-18.4.6, Control of Fire Protection Impairments, Rev. 2.

b. Observations and Findings

No findings were identified. The inspectors noted that the detectors were not activated or being monitored due to the construction activities. The current condition and the fire protection impairment meet the requirements of the fire protection program. Restoration of the impairment is planned after completion of construction in the area (impairment first extension is currently approved until October 31, 2015). Once the impairment has been restored, the NFPA 72E code-required periodic testing of the smoke detectors in the Unit 2 post-accident sampling room can be resumed.

c. Conclusions

The corrective actions in place are adequate. Additional inspection activities are still recommended prior to closure of CDR 50-391/84-25. Specifically, the inspectors plan to review the successful testing of detection zones 126 and 127 as operating requirements zones in accordance with procedure 0-FOR-13-625.

OA.1.17 (Discussed) CDR 391/84-32: Inadequate Separation of Redundant Cables Near Floor Openings (IP 35007)

a. Inspection Scope

Background: The deficiency was initially reported to the NRC on July 20, 1984, as NCR WBN MEB 8430 in accordance with 10 CFR 50.55(e). The issue was documented as CDR 390/84-36 for Unit 1 and CDR 391/84-32 for Unit 2.

The CDR concerned the auxiliary building floor openings that were not provided with adequate protection features to meet 10 CFR 50, Appendix R, Section III.G.2, separation and fire protection requirements for redundant safe shutdown components. The specific areas of concern in the auxiliary building were: 1) open stairwells 5 and 6 connecting auxiliary building elevations 692.0 ft., 713.0 ft., and 737.0 ft. at columns A4-A5/S-T and A11-A12/S-T; 2) the 10 ft. by 12 ft. steel equipment hatch (normally closed) in the hoist way between auxiliary building elevations 757.0 ft. and 772.0 ft. at columns A12-A13/S-T; and 3) three unprotected ventilation duct penetrations through the two hour-rated reinforced concrete floor between auxiliary building elevations 692.0 ft., 713.0 ft., and 737.0 ft.

The concern was that, if the nonconforming condition was not corrected, a single exposure fire from an affected redundant cable or an intervening combustible in one area could produce effects that could adversely affect another redundant cable of a safe shutdown system in another area. This could adversely affect the ability to achieve and maintain safe shutdown of the plant.

In a letter from TVA to the NRC, dated September 19, 1984, the applicant stated: "TVA will install water curtains designed in accordance with NFPA Standard 13-1983, Section 4-4.8.2, around the affected stairwell and hatch openings. Fire dampers rated at 1-1/2 hours will be installed in the affected duct penetrations." The applicant also noted: "All Unit 1 redesign and construction modifications will be accomplished per ECN 5087."

To address the corrective actions for both Unit 1 and Unit 2, the applicant installed fire dampers in the auxiliary building in the following locations: 1-ISD-31-3995 (elevation

713.0 ft. at column A6/S), 1-ISD-31-3996 (elevation 737.0 ft. at column A5/S), and 2-ISD-31-3988 (elevation 713.0 ft. at column A10/S). Also, the applicant installed water curtains in the following locations: 1) open stairwell 3 connecting auxiliary building elevations 692.0 ft., 713.0 ft., and 737.0 ft. at column A8/U-V; 2) the 8 ft. by 16 ft. equipment hatch openings located below elevations 713.0 ft., 737.0 ft., and 757.0 ft. at column A8/U-W; 3) the 10 ft. by 12 ft. steel equipment hatch (normally closed) in the hoist way between auxiliary building elevations 757.0 ft. and 772.0 ft. at columns A12-A3/S-T, and 4) at the auxiliary building elevator door openings located below elevations 713.0 ft., 737.0 ft., and 757.0 ft. at column A8/T. All of the water curtains are listed in the Fire Protection Report, Part VII – Deviations and Evaluations, Section 2.6.3.1.

For Unit 1 the NRC closed CDR 390/84-36 in IR 50-390/85-09 (ADAMS Accession No. ML082190704), noting that the applicant's final report was dated September 19, 1984, with the supplemental report dated February 6, 1985. During the time period from February 19-22, 1985, the inspectors reviewed the installation of the auxiliary building water curtains and three new fire dampers: 1-ISD-31-3995 (elevation 713.0 ft. at column A6/S), 1-ISD-31-3996 (elevation 737.0 ft. at column A5/S), and 2-ISD-31-3988 (elevation 713.0 ft. at column A10/S).

Remaining Unit 2 Actions:

- Implement the corrective actions associated with PER 726637 to clarify the applicable code for water curtain installations identified by NCR WBN MEB 8430 and verify the as-built condition meets the approved NFPA code of record.

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

- Reviewed PER 172597 to verify the corrective actions were implemented for Unit 2 (auxiliary building water curtains and fire dampers). These items were previously installed for Unit 1 in areas that were common to Unit 2.
- Reviewed engineering closure documentation for CDR 391/84-32, dated March 29, 2012, to verify the adequacy of the corrective actions.
- Reviewed ECN 4872 which added water curtains and fire dampers in the auxiliary building to verify the adequacy of the design.
- Reviewed the design details and the purchase requests for the three new fire dampers: 1-ISD-31-3995 (elevation 713.0 ft. at column A6/S), 1-ISD-31-3996 (elevation 737.0 ft. at column A5/S), 2-ISD-31-3988 (elevation 713.0 ft. at column A10/S) and purchase requests W-5164 and 84K71-834574. The inspectors reviewed the design requirements and purchase orders to verify that the dampers were ordered with the proper three hour fire rating, the fire dampers were supplied UL Labeled 3 hour rated, and were designed for installation in a vertical air flow configuration.
- Performed a field walkdown of the all the water curtains in the auxiliary building to visually verify the location and installation was in accordance with NFPA 13, 1975.
- Reviewed photographs of the current installation of fire dampers 2-ISD-31-3988, 1-ISD-31-3995, and 1-ISD-31-3996 to confirm from the photos that the fire dampers were installed in accordance with the manufacturer's instructions in the correct orientation within the plane of the fire barrier (rated floor) and to confirm

the dampers were installed with the designed fusible links with a 285 degrees F rating.

- Reviewed the sprinkler hydraulic calculation which included analysis of the water curtains: EPM-RJW-042992, Design Flow and Pressure for the Auxiliary Building HPFP Sprinkler System, Rev. 3, to verify that the water curtains were installed in accordance with the applicable NFPA 13 code edition.
- Reviewed procedure 0-FOR-26-3, 18 Month Inspection of Fire Protection Sprinkler Systems in Accessible Safety-Related Areas, Rev. 6, which performs the periodic inspection of the water curtain sprinklers to verify that the sprinklers were being periodically inspected and maintained in accordance with the approved procedure.
- Reviewed procedure 0-FOR-304-3, Fire Damper (Internal) Visual Inspection – Auxiliary, Control and Diesel Generator Buildings, Rev. 16, which applies to the new fire dampers to verify the applicant has a surveillance program in place to periodically inspect the fire dampers every five years. Fire dampers 2-ISD-31-3988 and 1-ISD-31-3995 were inspected on August 6, 2012, and fire damper 1-ISD-31-3996 was inspected on June 23, 2008.

b. Observations and Findings

No findings were identified. The inspectors identified that the applicant had potentially altered their resolution methodology to some of the historical issues. The applicant has issued PERs 726637 and 730980.

c. Conclusions

The corrective actions in place are adequate. Additional inspection activities are still required prior to closure of CDR 50-391/84-32. Specifically, the inspectors plan to review the resolution of PER 726637 and PER 730980.

OA.1.18 (Closed) CDR 391/83-21: Discrepancies in support detail (IPs 35007 and 50090)

a. Inspection Scope

Background: The deficiency was initially reported to the NRC on April 27, 1983, as NCR WBN SWP 8315 in accordance with 10 CFR 50.55(e). The issue was documented as CDR 390/83-22 for Unit 1 and CDR 391/83-21 for Unit 2.

The CDR concerned the deficiencies between component materials as shown on support drawings and disagreements between the loads used on support design drawings and the loads used on the WBN alternate analysis criteria CEB 76-5. The deficiency affected the seismic analysis of the safety-related sections of the fire protection pipe supports.

The applicant reanalyzed and corrected the piping and support analysis evaluated by the alternate analysis program. All effected supports were evaluated and qualified to the current design requirements, and required modifications were made under ECNs 3213 and 4858 for Unit 1. The inspectors determined that CDR 390/83-22 was adequately resolved for Unit 1 as documented in IR 50-390/84-52 (ADAMS Accession No. ML082390465).

The applicant implemented the Hanger Analysis and Update Program (HAAUP) CAP which committed in part to evaluate a number of identified issues for Category I and I(L) piping and pipe supports and to implement a comprehensive completion plan to adequately resolve these issues which included safety-related sections of the fire protection piping and supports. The objectives of the HAAUP CAP were to assure that pipe and pipe supports were structurally adequate, complied with design criteria, and the design criteria complied with licensing requirements. The Watts Bar Unit 1 HAAUP CAP was completed and documented in a final report issued on October 27, 1995 (ADAMS Accession No. ML 072890425). Because of the similarities between Units 1 and 2, most of the design commitments for both Units 1 and 2 were addressed in the Unit 1 final report. The HAAUP CAP for Unit 2 was established in December 2007. TVA's regulatory framework letter to NRC dated January 29, 2008, outlined TVA's plans for the implementation of the Unit 2 HAAUP CAP which stated that the Unit 1 approach would be used. NRC had previously approved the Unit 1 approach in NUREG-1232, Supplemental Safety Evaluation Report (SSER) 6 dated April 1991 and SSER 8 dated January 1992. Since 2008, the NRC had inspected, reviewed, and documented several aspects of the HAAUP CAP through open items inspections and inspection of IP 50090, Pipe Support and Restrain Systems, for pipe supports and IP 46071, Concrete Expansion anchors, for anchor bolts. The results of these inspections have been documented in several inspection reports, including IR 05000391/2012608 (ADAMS Accession No. ML12319A368) which provided a status for the HAAUP CAP inspections for Unit 2.

For Unit 2 the applicant initiated PER 172786 and walked down safety-related fire protection piping and supports to collect as-built data using procedure WDP-PD-2, Walkdown Procedure for Piping and Pipe Supports. The piping and supports were analyzed considering the as-built piping and support data as part of the HAAUP CAP using the TPIPE and FAPPs ME 150 analysis programs and design criteria WB-DC-40-31.9, Criteria for Design of Piping Support and Supplement Steel in Category I Structures. The alternate analysis using criteria CEB 75-6 was not used for Unit 2 construction.

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

- Reviewed PER 172786 to verify the corrective actions were implemented;
- Reviewed a sample of as-built walkdown packages and engineering piping and support analysis to verify the analysis were completed in accordance with WB-DC-40-31.9;
- Performed a walkdown and inspected three as-built safety-related fire protection pipe supports to verify that the pipe supports were installed in accordance with the drawings and were in agreement as to the supports location and function;
- Reviewed three fixed pipe support records to verify the following:
 - Type and classification of the pipe support complied with the drawings;
 - Location and critical clearances met the specifications and were verified by QC;
 - Completed welds complied with the drawings and specifications.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that actions inspected were performed by the applicant in accordance with their procedures and regulatory requirements. Based on a review of the applicant's final closure package, the inspectors concluded that the approach for the safety-related fire protection piping supports was in agreement with the corrective actions for the HAAUP CAP to include the remaining pipe supports to be installed under EDCR 52512. As a result, CDR 391/83-21 is closed.

OA.1.19 (Closed) CDR 391/84-18: Cable Insulation Fails Fire Protection Test (IP 35007)

a. Inspection Scope

Background: The deficiency was initially reported to the NRC on April 5, 1984, as NCR WBN EEB 8408 in accordance with 10 CFR 50.55(e). The issue was documented as CDR 390/84-18 for Unit 1 and CDR 391/84-18 for Unit 2.

The CDR concerned the applicant's response to requirements of 10 CFR 50, Appendix R, which specified a one-hour, wrap-type fire barrier, manufactured by the 3M Company, for cable trays, conduits, and junction boxes. The 3M fire barrier material had received Underwriters Laboratories (UL) certification. However, the certification had a stipulation that the user (TVA) must ensure that the cable being protected by the fire barrier would perform its function while being exposed to the elevated temperatures measured inside the fire barrier during the UL qualification test. TVA performed oven testing of electrical cables at TVA's Central Laboratories. The testing showed that polyethylene-insulated cable (TVA types PN, PJ, PNJ, and PJJ manufactured by various vendors) would not perform its required design function when subjected to the temperature observed during testing of the fire barrier at the UL conditions.

The concern was that some of the cables involved in the deficiency could be used in safe shutdown circuits. Failure of the cables could cause degradation of an essential system or loss of redundant safety shutdown equipment. This could adversely affect the ability to achieve and maintain a safe plant shutdown and, subsequently, could adversely affect the safe operation of the plant.

For Unit 1, in response to the test, the cable types (PN, PJ, PNJ, and PJJ) were disconnected from the circuits at the nearest possible point to the fire barrier and either pulled out or abandoned in the conduits. These cables were replaced with qualified cables or rerouted such that the use of a fire barrier was not required. The applicant verified there were no cables of this type in junction boxes and a 10 CFR 50, Appendix R, evaluation was completed and identified the need for additional barriers requiring rerouting or replacing of the PJJ type cables. The inspectors determined that CDR 390/84-18 was adequately resolved for Unit 1 as documented in IR 50-390/85-09 (ADAMS Accession No. ML082190704).

For Unit 2 the applicant initiated PER 172603, completed calculation EDQ00099920090012, Unit 1 and 2 Appendix R Safe Shutdown Analysis, which

includes the baseline Appendix R separation analysis for WBN Units 1 and 2 to establish safe shutdown compliance strategies in accordance with 10CFR50 Appendix R for the required fire zones. This calculation identifies cables in fire zones that need to be fire wrapped. EDCR 55523 was issued that installs electrical fire barrier systems (ERFBS) per the requirements specified in General Engineering Specification (G-98), Installation Modification and Maintenance of Electrical Raceway Fire Barrier Systems, Rev. 6. As part of the EDCR, a review was performed based on the contract and mark number information obtained from calculation EDQ00299920090011, WBN Unit 2- List of 10 CFR 50.49 Components and Cables, and ICRDS to identify any cables inside raceways being fire wrapped that were of type PJJ, PN, PJ, or PNJ mark number. None were identified. The applicant revised design criteria document WB-DC-30-5, Power, Control, and Signal Cables, For Use in Category I structures Unit 1/Unit 2), to include design criteria that addressed the conditions for use of cable types (PN, PJ, PNJ, and PJJ) to ensure no polyethylene insulated cables (Type PJJ, PN, PJ, PNJ) are wrapped and in use for safe shutdown.

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

- Reviewed PER 172603 to verify the corrective actions were implemented;
- Reviewed a sample of protected raceway cable DRAs associated with EDCR 55523 to verify that the protected cables were properly identified per the dual unit fire protection report part VI, calculation EDQ00099920090012, Rev. 0, calculation EDQ00299920090011, Rev. 2, and that cable types (PN, PJ, PNJ, and PJJ) were not being credited for the plant safe shutdown nor planned for construction installation in wrapped cable raceways;
- Reviewed a sample of the ICRDS data associated with EDCR 55523 to verify that measures were in place to control the as-built documentation of the protected cables selected for fire area 14 and that cable types (PN, PJ, PNJ, and PJJ) were not being credited for the plant safe shutdown nor planned for construction installation in wrapped cable raceways;
- Reviewed design criteria document WB-DC-30-5, Rev. 22, to verify the design criteria addressed the conditions for use of cable types (PN, PJ, PNJ, and PJJ).

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on a review of the applicant's final closure package, the inspectors determined that actions inspected and the engineering controls implemented by the applicant were completed in accordance with their procedures and regulatory requirements. As a result, CDR 391/84-18 is closed.

OA.1.20 (Closed) CDR 391/85-57: Category 1 and 1(L) Instrument Bolting Requirements (IP 92701)

a. Inspection Scope

Background: Category 1 and 1L Instruments had been installed and documented without any specifications as to bolt type or bolt tightness being supplied on the 47W600 series drawings. In 1985, TVA documented a condition adverse to quality (CAQ) on NCR 6397, associated with Unit 1. The NCR identified four specific items of concern regarding installation of Seismic Class 1 and 1(L) instrumentation components. The four concerns identified were as follows:

- A deficiency identified on a loose bolt attaching a mounting bracket of an instrument to the mounting plate.
- Use of round head machine screws instead of bolts were used to attach the instruments to the mounting plates.
- The inspection procedure used by QC inspectors, Watts Bar Nuclear Plant- Quality Control Procedure WBNP-QCP-3.06-7, Electrical and Instrument Equipment Installation, Standard Tests, Inspections and Documentation, did not require the inspector to inspect for bolt type or bolt tightness.
- Installation drawings series 47W600, intended to provide the mounting instruction details to craft personnel, did not include direction on the type of bolting to be used when attaching instruments to mounting plates.

The deficiencies noted above were tracked as open items for Unit 1 in CDR 50-390/85-61 and CDR 50-391/85-57 for Unit 2.

Following issuance of NCR 6397, Rev. 0 on October 22, 1985, ECN 5957 was issued on December 30, 1985, to prevent recurrence and to define fastener specifications on the 47W600 drawings series. The Engineering Specification N3E-934 and MAI-4.4B were also upgraded to provide guidelines for mounting of instruments, instrument lines and instrument panels, including bolting details. These actions were taken for both Unit 1 and Unit 2.

For Unit 1, walk-through / walk-down inspections of Category 1 (safety-related) and Category 1L (quality-related) instruments were performed as part of the Equipment Seismic Qualification (ESQ) CAP in accordance with the instruction provided in TI 2512/036. Engineering reviews and calculations were performed on walk-down results and corrective actions were taken to address identified deficiencies. CDR 50-390/85-61, was closed in IR 50-390/95-45 and 50-391/95-45 (ADAMS Accession No. ML072680894).

Inspection Activities: The Inspectors performed the following inspection activities for Unit 2, in order to determine if upgraded requirements of the specification, N3E-934, were being applied to directions provided to the craft installation personnel for use during field construction.

The following documents were reviewed:

- The applicant's closure report including the associated corrective action document, PER 143707.

- WBN Plant, Site Specific Engineering Specification, N3E-934 for Instrument Line Installation and Inspection, Rev. 8, including the revision log detailing the changes that occurred since 1990.
- MAI-4.4B, Instrument and Instrument Panel Installation, Rev. 6.
- Drawing 53643-014, associated with FCR 57398-A and Instrument Panel 2-L-329, Rev. 0.
- Drawing 2-47W600-159, Electrical Instruments and Controls, Panel 2-L-329, Rev. 1.
- WO 09-954326-000.

A field walk down was conducted for completed instrument panel number 2-L-329 shown on drawing 2-47W600-159 including its anchorage to the concrete floor to verify compliance with the above.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors reviewed the applicant's actions contained in the engineering complete closure package addressing Category 1 and 1(L) instrument bolting requirements and found them to provide reasonable assurance that the current specifications prescribed adequate instrumentation mounting and inspection instructions. Based on the above inspection and observations, CDR 391/85-57 is considered closed.

OA.1.21 (Closed) CDR 391/86-53: Inspection of Category 1 and 1(L) Locally Mounted Instrument Bolting (IP 92701)

a. Inspection Scope

Background: In 1986, TVA documented a CAQ on NCR W411-P, Unit 1, and WBN 6590, for Unit 2. The NCR's identified concerns regarding installation of Seismic Class 1 and 1L instrumentation components. The concerns identified were as follows:

- A deficiency was identified that locally mounted instruments in seismic category 1 structures were installed without performing all required inspections required by the following specifications:
 - G-32, General Construction Installation Specification.
 - Site Quality Control Procedure, QCP-1.14, Inspection and Testing of Bolt Anchors set in Hardened Concrete and Control of Attachments to Embedded Features.
 - QCP-1.42-2, Bolt and Gap Inspections for Bolt Anchor Assemblies.
 - QCP-4.13-VCT Final Visual Weld Examinations.

The deficiencies noted above were tracked as open items for Unit 1 in CDR 50-390/86-56 and CDR 50-391/86-53 for Unit 2.

Following issuance of NCR 411-P, a walk-down of Seismic Category 1 instruments was performed as part of a Unit 1 ESQ CAP. Walk-downs of Category 1 instruments were

performed as part of the Unit 1 Integrated Interaction Program, as documented in WB calculation 50052-C2-118. Specification N3E-934, Instrument Line Installation and Inspection, and MAI-4.4B, Instrument and Instrument Panel Installation, were issued. These specifications and instructions provided guidance for mounting of instruments, instrument lines, and instrument panels including bolting details. ECN 6047 was issued against the WB 47W600 drawing series in order to show mounting plate details using self-drilling anchor bolt assemblies and reference applicable general construction specifications for bolting, such as the G-32 specification for anchor bolts set in hardened concrete. CDR 50-390/86-56, was closed in IR 50-390/95-55 and 391/95-55 (ADAMS Accession No. ML072610724).

Inspection Activities: The Inspectors performed inspection activities for Unit 2, in order to determine if upgraded requirements of the specification, N3E-934, were being applied to directions provided to the craft installation personnel for use during field construction.

The following documents were reviewed:

- The applicant's closure report including the associated corrective action document, PER 143560.
- WBN Plant, Site Specific Engineering Specification, N3E-934 for Instrument Line Installation and Inspection, Rev. 8, including the revision log detailing the changes that occurred since 1990.
- MAI-4.4B, Instrument and Instrument Panel Installation, Rev. 6.
- Drawing 53643-014, associated with FCR 57398-A and Instrument Panel 2-L-329, Rev. 0.
- Drawing 2-47W600-159, Electrical Instruments and Controls, Panel 2-L-329, Rev. 1.
- WO 09-954326-000.

A field walk down was conducted for completed instrument panel number 2-L-329 shown on drawing 2-47W600-159 including its anchorage to the concrete floor to verify compliance with the above.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors reviewed the applicant's action contained in the engineering complete closure package addressing Category 1 and 1(L) locally mounted instrument bolting and found them to provide reasonable assurance that the current specifications prescribed adequate instrumentation mounting and inspection instructions. Based on the above inspection and observations, CDR 391/86-53 is considered closed.

OA.1.22 (Closed) Ground Water Protection Initiative (GPI) TI 2515/173, Review of the Implementation of the Industry Ground Water Protection Voluntary Initiative (IP 92701)

a. Inspection Scope

The inspectors reviewed the outstanding items that were identified in previous inspections that were performed to assess the implementation of the NEI 07-07, Industry Ground Water Protection Initiative – Final Guidance Document, Ground Water Protection Voluntary Initiative under TI 2515/173 and the follow-up that was performed using IP 71124.06, Radioactive Gaseous and Liquid Effluent Treatment, Section 02.06.a, GPI Implementation.

The outstanding items consisted of the following items from Watts Bar Inspection Report 05000390/2012004 (ADAMS Accession No. ML12305A496), Section 2RS6, Radioactive Gaseous and Liquid Effluent Treatment:

- Detailed reviews of liquid releases and potential reporting requirements for abnormal releases from the Turbine Building System Sump (TBSS) vent to an onsite location as a result of a degraded check valve were reviewed and discussed to evaluate licensee actions.
- The inspectors noted that the licensee's interpretation of the guidance in NEI 07-07 is inconsistent with the NRC's interpretation in that the licensee's procedure stipulating that reporting will occur when the activity in the leakage or spill is greater than the Offsite Dose Calculation Manual (ODCM) required minimum sensitivity. The NRC interpretation is that any statistically valid positive activity result should be reported even if the sensitivity of the counting instrumentation is much higher than the minimum required.

The inspectors walked down the system established to capture any effluent from the vacuum breaker, provide a sampling mechanism, and return the water via the storm drain system for monitored discharge. The inspectors discussed with cognizant applicant personnel the reporting criteria, the enhancements being made in the radwaste processing systems, the current groundwater analysis results, and expected changes that would result from a planned increase in tritium production. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. The inspectors determined that the outstanding items found in previous site inspections had been addressed. The inspectors determined that the applicant was taking appropriate measures to monitor and manage tritium on the site and was in compliance with regard to TI 2515/173 and NEI 07-07.

c. Conclusions

The inspectors concluded that Watts Bar Site, consisting of both Units 1 and 2, are fully compliant with the inspection requirements in TI 2515/173. The inspectors concluded that TI 2515/173 is closed for Watts Bar Unit 2.

OA.1.23 (Discussed) Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (TI 2512/037)

a. Inspection Scope

Background: In 1989, the WBN Performance Plan identified a SP to establish a controlled master fuse list. The SP provided corrective actions to address three primary issues; specifically, (1) Class 1E safety-related fuses had not been adequately identified and controlled; (2) Bussmann KAZ actuators had been improperly used to provide circuit protection; and (3) requirements for redundant overcurrent protection of electrical penetration assemblies had not been adequately addressed by design.

The previous inspection of this SP on Unit 2 was documented in inspection report 05000391/2012608 (ADAMS Accession No. ML12319A368), Section OA.1.8. That report documented acceptable results for a sample of 10 fuses in one plant system.

Inspection Activities: The inspectors interviewed responsible engineers, reviewed records of completed work, and conducted direct observations of a sample of five safety-related fuses in plant systems 214 (Control & Auxiliary Vent Power System) and 232 (Reactor Vent Power System). Records of the fuse installations as recorded on TVA fuse verification form SMP-6.0 were reviewed and compared to engineering specifications to confirm that fuse requirements had been correctly translated into work control records. Direct observations of the actual fuse installations were conducted to verify installations were consistent with the work records. Responsible engineers were interviewed and requested to access the MAXIMO information system (i.e. the master fuse list) to demonstrate that as-installed data about fuses was consistent with the specifications in MAXIMO. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. To date, the applicant had finalized the installations of 15 safety-related fuses in three systems in accordance with the special program for the master fuse list. Each of the installations, three of which provided protection to electrical penetrations, have now been verified in NRC inspections. No inspection samples have yet been obtained for replacements of KAZ actuators.

c. Conclusion

The inspectors determined that requirements for fuses and KAZ actuators have been adequately specified by engineering. The process for installing and verifying as-installed configurations remained in progress with no findings yet identified. Further inspections will be required to monitor the implementation of the master fuse list special program and to verify the replacement of KAZ actuators.

OA.1.24 (Closed) Cable Issues CAP Sub-Issue: Use of As-Installed Cable Lengths and Correlation of as-installed cable lengths to values entered into calculations/analyses (TI 2512/016 and SSER Appendix HH Item #2)

a. Inspection Scope

Background: The NRC's review of the applicant's cable issues CAP determined that action was necessary to assure as-installed cable lengths were used in electrical calculations. The applicant was required to revise their commitments for Unit 2 to specify that the cable lengths used in the ICRDS and the associated calculations and analyses would be based on the current plant configuration. This item was documented as an open action in Section 4.2 of the safety evaluation report dated August 31, 2009 (ADAMS Accession No. ML092151155) and in Appendix HH of the report (ADAMS Accession No. ML11165A099).

Previous inspections of this sub-program of the cable issues CAP have been documented in reports 05000391/2011605 (ADAMS Accession No. ML112201418), Section OA.1.7, and 05000391/2012603 (ADAMS Accession No. ML12123A156), Sections OA.1.8 and OA.1.9. Those inspections determined that as-installed values for cable lengths were being obtained and recorded into ICRDS, and that further inspection was needed to verify values were accurately migrated into cable sizing calculations.

Inspection Activities: The inspectors examined two electrical calculations, interviewed responsible design engineers, and reviewed cable data recorded in ICRDS for a sample of nine cables. The inspection review of calculations for voltages, short circuit currents, and loading for power cables and control circuits in System 67, Essential Raw Cooling Water System, was performed to confirm that documented cable lengths were consistent with the as-installed values recorded in ICRDS. Power cables evaluated in this inspection included 2V704A, 2V705A, 2V712A, 2V713A, and 480V RMOV Board 2A2-A incoming feeder cable 2PL4938A. Control cables evaluated in this inspection included 2V706A, 2V707A, V718A, and 2V719A. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. The inspectors determined that the applicant had completed final verifications of cable lengths used in cable calculations for 231 cables out of the 4075 cables needing to be addressed. Inspection samples to date have examined a total of 25 cables in System 67.

c. Conclusion

Based upon the actions implemented to address the cable length sub-issue of the cable issues CAP, the inspectors determined that as-installed values for cable lengths were being incorporated into electrical calculations. The inspectors determined that sufficient samples have been obtained and TI 2512/016 (CAP subissue: Cable Lengths) is closed for Unit 2. Also, sufficient inspections, associated with correlation of as-installed cable lengths to values entered into calculations/analyses, have been performed and SSER Appendix HH Item #2 is closed for Unit 2.

OA.1.25 (Discussed) CDR 391/86-21: Non-Quality Assurance Data Used in Calculations for Cable Tray and Conduit Loading (IP 35007)

a. Inspection Scope

Background: In December 1987, the applicant determined that undocumented sources had been used to obtain values for the cable weights and dimensions entered into calculations for cable tray loads and cross-sectional area fill. As a result, the input values for the calculations could not be verified. The applicant's evaluation of the deficiency identified instances where design criteria for cable fill were violated, including cases where additional cables had been routed on full cable trays resulting in unevaluated overfilled conditions. In addition, NRC Notice of Violation (NOV) 50-390/87-11-02, documented in IR 050-390/87-11 (ADAMS Accession No. ML082420096), identified a failure to assure that cable loading calculations considered all of the spare cables residing in raceways. In May 2012, the applicant established corrective action tracking for the Unit 2 disposition of this issue in PER 144974.

The previous inspection of this issue on Unit 2 was documented in IIR 05000391/2012605 (ADAMS Accession No. ML12220A536), Section OA.1.4. That inspection did not identify any findings, but determined that further inspection would be needed.

Inspection Activities: The inspectors reviewed EDCRs, work orders, corrective action closure reports, and interviewed responsible engineering and licensing personnel. The following tasks were performed:

- Implementing WOs to reconstruct ICRDS data for the 28 locations identified in limited scope walkdown document (LSWD) 542 were reviewed to determine the status of rework and to confirm the work orders addressed the specified discrepancies.
- Five EDCRs issued to modify cable supports were reviewed to determine the status of implementation.
- DCN 53334 issued to correct breakages in ampacity calculations and a sample of the associated WOs were reviewed to determine the status and adequacy of actions taken.
- Closure report packages for five related commitments were reviewed to determine the status. These commitments included: (1) a corrective action plan sub-issue on verification and validation of ICRDS; (2) a corrective action plan issue on the adequacy of cable trays and cable tray supports; (3) a 1986 unresolved NRC inspection item on conduit overfill; (4) an NRC safety evaluation report issue on as-installed cable lengths; and (5) a 1987 construction deficiency report on conduits and conduit supports. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that activities were in progress to address the committed PER actions. Further inspections will be required to evaluate the adequacy of implementation of this item.

OA.1.26 (Discussed) TMI Action Item II.F.1.2.A: Noble Gas Monitors (IP 35007)

a. Inspection Scope

Background: As part of the response to the TMI accident, the NRC issued NUREG-737, Clarification of TMI Action Plan Requirements. Section II.F.1.2.A established a requirement to install noble gas monitors that have the capability to detect and measure concentrations of noble gas fission products in plant gaseous effluents during and following an accident.

The most recent inspection of this item was documented in IIR 05000391/2010603 (ADAMS Accession No. ML102170465), Section OA.1.13. That inspection determined that none of the committed equipment had been installed except that one component, a Shield Building vent monitor, which was already installed for Unit 2, and had been placed into service to meet a commitment for Unit 1 fuel load.

Inspection Activities: The inspectors reviewed the applicant's closure report package documentation, EDCRs 52340 and 52342, and completed WOs in order to determine whether specified configurations were consistent with the commitment and whether system components were installed as specified. Responsible engineers were interviewed and direct observations of installed equipment were conducted to verify as-installed configurations were consistent with specifications and to assess quality of work. The equipment inspections examined routing, slope, and formation of sample piping, adequacy of piping and conduit supports, mounting of equipment items, protection against foreign material intrusion, and status of mechanical and electrical connections. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. The inspectors determined that the EDCRs had been issued and provided sufficient details of requirements for accomplishing installations in the plant. WO 111089110 had been completed to install the equipment and piping for the skid-mounted condenser vacuum exhaust low range noble gas monitoring system (2-RE-90-119). WO 111089143 had been completed to mount the high and medium range on-line noble gas monitors for the condenser vacuum exhaust. No electrical power or signal cables had been installed. In addition, no work had been performed to install the system ratemeter in the main control room or the four noble gas monitors for the main steam line atmospheric relief valves (2-RE-90-421, 422, 423, and 424).

c. Conclusions

The inspectors determined that activities were in progress to address the committed TMI actions. Further inspections will be required to evaluate the adequacy of implementation of system components and operational controls.

OA.1.27 (Discussed) TMI Action Item II.F.1.2.C: Containment High Range Monitoring (IP 35007)

a. Inspection Scope

Background: As part of the response to the TMI accident, the NRC issued NUREG-737, Clarification of TMI Action Plan Requirements. Section II.F.1.2.C established a requirement to install high range monitoring instrumentation with the capability to detect and measure the radiation level within containment during and following an accident.

The most recent inspection of this item was documented in IIR 05000391/2010603 (ADAMS Accession No. ML102170465), Section OA.1.13. That inspection determined that none of the committed equipment had been installed.

Inspection Activities: The inspectors reviewed the applicant's closure report package documentation, including engineering package EDCR 52338 to determine whether specified configurations were consistent with the commitment. Interviews were conducted with responsible engineering personnel to determine progress toward implementation of design requirements. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified. The inspectors determined that the EDCR had been issued and provided sufficient details of requirements for accomplishing installations in the plant for upper containment monitors 2-RE-90-271 and 272, and lower containment monitors 2-RE-90-273 and 274. No work had been performed to install any of the system equipment. Interviews with applicant's engineers identified that actions were still pending to: (1) prepare and issue work orders for EDCR 52338; (2) implement the work orders and all of the associated documents; and (3) independently confirm that the high range monitors were installed.

c. Conclusions

The inspectors determined that activities were in progress to address the committed TMI actions. Further inspections will be required to evaluate the adequacy of implementation of system components and operational controls.

OA.1.28 (Discussed) Cable Issues CAP Sub-Issue: Cable Issues CAP Sub-Issue: Cable Proximity to Hot Pipes (TI 2512/016, CDR 391/90-03, IP 35007, IP 51053, IP 51055)

a. Inspection Scope

Background: This sub-issue for the Cable Issue CAP and CDR 90-03 was developed in response to NRC Information Notice 86-49, which highlighted the potential for cable damage resulting from close proximity to hot pipes. In IIR 05000391/2012603 (ADAMS Accession No. ML12123A156), Section OA.1.8, the inspectors determined that the applicant's program to evaluate and identify cables in relation to their proximity to hot pipes was adequate.

Inspection Activities: The inspectors interviewed responsible personnel and reviewed calculation EDQ 00299920120001, Rev. 1, and EDCR 59055, Rev. A, to identify those conduits that were evaluated and determined to not meet the requirements of specification G-40, Installation, Modification and Maintenance of Electrical Conduit Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting and Miscellaneous Systems, Rev. 17 and needed to be relocated. As a result, the inspectors selected and reviewed WOs 113498069, 113503516, 113496419, and 113496512 to verify that the documented conduit relocation was performed in accordance with approved drawings, calculations, and installed in the specified location. The WOs were reviewed to verify required inspections were performed by qualified personnel and documented accordingly. The inspectors performed a field walk-down of conduits designated as 2M4213A, 2PM5671E, 2VC4400B, and 2VC2932A to verify their relocation was an acceptable distance away from corresponding hot pipes. The measured distance of the relocated conduits from the hot pipes was observed to ensure compliance with EDCR 59055. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspectors determined that for the selected sample, the relocation of conduits in proximity to hot pipes was adequate. Further inspection will be required to observe additional implementation of the applicant's corrective actions that include insulating the hot pipes in proximity to cables.

OA.1.29 (Discussed) Electrical Issues CAP – Sub-issue: Cable Separation and Electrical Isolation (TI 2512/020 and IP 51063)

a. Inspection Scope

Background: The bases for the cable separation requirements for WBN are Institute of Electrical and Electronics Engineers (IEEE) 279-1971, IEEE 308-1971 and Regulatory Guide (RG) 1.6. Employees' concerns identified isolated cases of redundant closed raceways with less than the minimum required 1-inch separation. This sub-issue was subdivided into the following parts:

- Separation between Redundant Divisions of Class 1E Raceways.
- Internal Panel Separation between Redundant Divisions of Class 1E Cables.
- Coil-to-Contact and Contact-to-Contact Isolation between Class 1E and Non-Class 1E Circuits.

Inspection Activities: The inspectors reviewed WB-DC-30-4, Rev. 23, EX-WB-DC-30-4-34, Rev. 1, 25402-000-GPP-0000-N3302, Rev. 7, 25402-000-GPP-0000-N3303, Rev. 4 and MAI-3.1, Rev. 25, to assess the applicant's actions to resolve this Electrical Issues CAP Sub-Issue and to verify that the applicant was in compliance with all related commitments and NRC requirements. The inspectors reviewed the following WO packages in order to assess their quality and adequacy and to ensure that physical separation requirements were specified:

- WO 113280782

- WO 113536484
- WO 113714322
- WO 114387278

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

Field observations of completed work are recommended to demonstrate that physical separation and electrical isolation requirements have been met. Therefore, the inspectors concluded that this Sub-Issue will remain open.

OA.1.30 (Closed) Cable Issues CAP-Sub-issue: Computerized Cable Routing System Verification and Validation and Cable Configuration Control and CDR 391/87-12: Cable Configuration Control (TI 2512/016, CDR 391/87-12, IP 35007)

a. Inspection Scope

Background: Computerized Cable Routing System (CCRS) verification was used to document information regarding cable routing. The information included cable route in trays and conduits, cable type, cable weight, cable splice, circuit function, and separation. Concerns regarding the adequacy of CCRS were expressed and documented in various conditions adverse to quality reports, employee concerns, and NRC inspections. There was no assurance the records of raceway contents agreed with the actual installation. As a result, CCRS at Watts Bar Nuclear (WBN) has been replaced by the ICRDS software. Cable and raceway data for both Units 1 and 2 have been transferred into ICRDS. Previous inspection efforts on this CAP were conducted and documented in IIRs 05000391/2012604 (ADAMS Accession No. ML12167A212) Section OA.1.6, 05000391/2011607 (ADAMS Accession No. ML112730197) Section C.1.8, and 05000391/2011605 (ADAMS Accession No. ML112201418) Section OA.1.7.

Inspection Activities: The inspectors reviewed calculation EDQ 00299920090014, Rev. 0 (sheet no.6 through no.19), to ensure that the methodology used by the applicant to confirm that the plant configuration matched ICRDS records was in compliance with NRC commitments for verification and validation of environmental qualification (EQ) and 10 CFR 50 Appendix R cables. Additionally, the inspectors reviewed three completed WOs (113450923, 113451632, and 113465815) to verify the adequacy of procedures used and actual work performed to validate that ICRDS data accurately reflects the current plant configuration. The inspectors noted that the applicant validated cable routing data by signal tracing and visual tracing. The inspectors performed field observations of cables (2PV370G and 2PL4675B) that were visually traced to verify that their physical routings matched ICRDS data. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

Based on a review of the applicant's engineering complete closure package and the aforementioned inspection activities, the inspectors determined that the methodology used by the applicant to verify and validate that ICRDS records of EQ and Appendix R cables were accurately reflecting the current plant configuration. Therefore, this CAP Sub-issue (CCRS) and CDR 391/87-12 are considered closed.

V. MANAGEMENT MEETINGS

V.1 Exit Meeting Summary

An exit meeting was conducted on May 23, 2013, to present inspection results to Mr. Ray Hruby and other members of your staff. The inspectors identified that any proprietary information that had been received during the inspection had been returned or properly disposed of, and none would be identified in the inspection report. The applicant acknowledged the findings and observations and provided no dissenting comments.

SUPPLEMENTAL INFORMATION

PERSONS CONTACTED

Applicant personnel

J. Adams, TVA - Unit 2 Radiation Protection Manager
J. Adair, TVA - Engineering
G. Arent, TVA - Licensing
A. Bangalore, Bechtel - Electrical Design
H. Baldner, TVA -Licensing
D. Beckley, Bechtel - Electrical Design
R. Beecken,TVA - Site Manager Completion
S. Bogus, Bechtel - Field Engineer
D. Booker, TVA - EP&C Environmental Principle Program Manager, - Tennessee
R. Buron, TVA - Quality Assurance
D. Charlton, TVA - Licensing
J. Cockrell, TVA - Licensing
C. Collison, Bechtel - Field Engineer
W, Crouch, TVA - Engineer
B. Deen, Bechtel - Environmental Qualification Engineer
B. Gillham, TVA - Licensing
D. Gross, Bechtel - Field Engineer
A. Hart, Bechtel - Lead Field Engineer (Electrical)
R. Hruby, TVA - General Manager
H. Kilgore, TVA - Operations
K. Kumar, Bechtel - Mechanical Design
J. Lawson, Bechtel - Field Engineer
L. Levy, Bechtel - Field Engineer
J. Martin, Bechtel - Quality Manager
M. McGrath, TVA - Licensing
D. McNeil, TVA - Project Manager Construction
J. Mitchell, Bechtel - Project Field Procurement Manager
D. Myers, TVA - Quality Assurance Program Manager
J. O'Dell, TVA - Regulatory Compliance
K. Peterman, Bechtel - Mechanical Design
J. Phillips, TVA - Environmental Scientist
T. Raley, Bechtel - Engineering Manager
B. Reagan, Bechtel - Electrical Design
R. Rogers, TVA - Systems Completion
G. Scott, TVA - Licensing
H. Stevens, Bechtel - Senior Civil Engineer
J. Temple, Bechtel - Instrument Design
A. Terril, Bechtel - Instrument Design
T. Wallace, TVA - Unit 2 Operations
M. Weid, Bechtel - Field Engineer
N. Welch, TVA - Startup Manager
E. Woods, TVA - Chemistry and Environmental – (Groundwater)
O. J. Zeringue, TVA - General Manager Engineering and Construction WBN Unit 2

INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction and Pre-Construction Activities
IP 35301	Preoperational Testing Quality Assurance
IP 37002	Construction Refurbishment Process - Watts Bar Unit 2
IP 46053	Structural Concrete Work Observation
IP 48053	Structural Steel and Supports Work Observation
IP 49053	Reactor Coolant Pressure Boundary Piping - Work Observation
IP 49063	Piping - Work Observation
IP 50073	Mechanical Components - Work Observation
IP 50075	Safety Related Components - Records Review
IP 50090	Pipe Support and Restrain Systems
IP 50100	Heating, Ventilating, and Air Conditioning Systems
IP 51053	Electrical Components and Systems - Work Observation
IP 51055	Electrical Components and Systems - Record Review
IP 51063	Electric Cable - Work Observation
IP 51065	Electrical Cable – Records Review
IP 64051	Procedures - Fire Prevention/Protection
IP 71302	Preoperational Test Program Implementation Verification
IP 80210	Environmental Protection - Initial and Periodic Inspections
IP 92701	Followup
IP 92702	Followup on Corrective Actions for Violations and Deviations
IP 92717	IE Bulletins for Information and IE Information Notice Followup
TI 2512/016	Inspection of Watts Bar Nuclear Plant Cable Issues Corrective Action Program Plan
TI 2512/020	Inspection of Watts Bar Nuclear Plant Electrical Issues Corrective Action Program Plan
TI 2512/025	Inspection of Watts Bar Nuclear Plant HVAC Duct and Supports Corrective Action Program Plan
TI 2512/037	Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program
TI 2512/038	Inspection of Watts Bar Nuclear Plant Mechanical Equipment Qualification Special Program
TI 2515/101	Loss of Decay Heat Removal 10 CFR 50.54(f);
TI 2515/103	Loss of Decay Heat Removal 10 CFR 50.54(f) – Programmed Enhancements (Long Term) Review
TI 2515/113	Reliable Decay Heat Removal During Outages
TI 2515/173	Ground Water Protection Initiative

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Open

None

Opened and Closed

05000391/2013604-01	NCV	Failure to translate field change request design requirements to affected work implementing instructions. (Section C.1.1)
05000391/2013604-02	NCV	Failure to assure procured material conformed to the procurement documents. (Section C.1.3)
05000391/2013604-03	NCV	Failure to assure engineering evaluations were performed in support of cold-pulling activities. (Section C.1.5)
05000391/2013604-04	NCV	Failure to Use Appropriate QL materials. (Section OA.1.5)

Closed

391/83-45	CDR	Routing of Radioactive and Nonradioactive System Instrument Lines (Section OA.1.1)
88-17	GL	Loss of Decay Heat Removal (Section OA.1.3)
2515/101	TI	Loss of Decay Heat Removal 10 CFR 50.54(f); (Section OA.1.3)
2515/103	TI	Loss of Decay Heat Removal 10 CFR 50.54(f) - Programmed Enhancements (Long Term) Review (Section OA.1.3)
2515/113	TI	Reliable Decay Heat Removal During Outages (Section OA.1.3)
2512/025	TI	Inspection of HVAC Duct and Supports CAP (Sections OA.1.5, OA.1.6, OA.1.7, and OA.1.8)
391/86-52	CDR	Deficiencies with HVAC Duct Seismic Design Criteria (Section OA.1.6)
391/91-22	CDR	Deficiencies with HVAC Duct Supports (Section OA.1.7)
05000391/2012603-05	NCV	Failure to Follow Instructions (Section OA.1.8)

391/87-07	CDR	Unqualified RCP Motor Coatings (Section OA.1.9)
TMI I.D.2	AI	TMI Action Item I.D.2: Plant Safety Parameter Display Console (Section OA.1.10)
391/81-07	CDR	Steel Containment Penetration Assembly (Section OA.1.11)
391/89-02	CDR	Deficiency in the Design of the Emergency Gas Treatment System (Section OA.1.12)
2010603-07	NCV	Failure to Protect Safety-Related Welds, Piping, and Components During Construction Activities (Section OA.1.13)
88-05, 88-05, S1 88-05, S2	BL	Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey and West Jersey Manufacturing Company at Williamstown, New Jersey (Section OA.1.15)
391/83-21	CDR	Discrepancies in support detail (Section OA.1.18)
391/84-18	CDR	Cable Insulation Fails Fire Protection Test (Section OA.1.19)
391/85-57	CDR	Category 1 and 1(L) Instrument Bolting Requirements (Section OA.1.20)
391/86-53	CDR	Inspection of Category 1 and 1(L) Locally Mounted Instrument Bolting (Section OA.1.21)
2515/173	TI	Ground Water Protection Initiative (Section OA.1.22)
2512/016	TI	Cable Issues CAP Sub-Issue: Use of As-Installed Cable Lengths (Section OA.1.24)
Item 2	SSER (Appendix HH)	Correlation of as-installed cable lengths to values entered into calculations/analyses (Sections OA.1.24)
2512/016	TI	Electrical Cable Issues CAP-Sub-issue: Computerized Cable Routing System (Section OA.1.30)
391/87-12	CDR	Verification and Validation and Cable Configuration Control (Section OA.1.30)

Discussed

35301	IP	Preoperational Testing Quality Assurance (Section P.1.1)
71302	IP	Preoperational Test Program Implementation Verification (Section P.1.2)
NRC-2012-0171	Confirmatory Order	Completeness and Accuracy of Information (Section OA.1.2)
391/83-48	CDR	Relocating Sensing Lines on Upper Containment Cooler (Section OA.1.4)
2512/038	TI	Mechanical Equipment Qualification Special Program (Section OA.1.14)
391/84-25	CDR	Failure to Provide Fire Detectors in Rooms Containing Redundant Safe Shutdown Circuits (Section OA.1.16)
391/84-32	CDR	Inadequate Separation of Redundant Cables Near Floor Openings (Section OA.1.17)
2512/037	TI	Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (Section OA.1.23)
391/86-21	CDR	Non-Quality Assurance Data Used in Calculations for Cable Tray and Conduit Loading (Section OA.1.25)
TMI II.F.1.2.A	AI	Noble Gas Monitors (Section OA.1.26)
TMI II.F.1.2.C	AI	Containment High Range Monitoring (Section OA1.27)
391/90-03	CDR	Cable Proximity to Hot Pipes (Section OA.1.28)
2512/020	TI	Electrical Issues CAP – Sub-issue: Cable Separation and Electrical Isolation (Section OA.1.29)

LIST OF DOCUMENTS REVIEWED

I. QUALITY ASSURANCE (QA) OVERSIGHT ACTIVITIES

Q.1.1 Identification and Resolution of Construction Problems

Calculations

T93090514004, Design Basis Review thrust/torque calculation, and valve actuator capability for valve 2-FCV-70-133, 4/3/2013

T93090429006, Design Basis Review thrust/torque calculation, and valve actuator capability for valve 2-FCV-70-089, 2/20/2013

PERs

PER 447756: System 30A Room Cooler Failures and Fixes

371841, ASME Nonconformance Sys. 070 FBOS: 2-070-FB-F-2017 WO 09-952146-003. Drill bit fell into system

460342, ASME Design Basis and Configuration Control has not been maintained

471182, ASME III Piping on WO 08-953058-003 Modified Using Redlined DRA

458396, In Process Receipt Activity: Manufacturing Defect found in ASME Valve

465055, Wedge bolts under torqued

484516, Sargent & Lundy support calculation does not agree with DRA 52462-047

426444, Paper PER: Hanger has base metal damage and poor quality welds

413577, Flexibility of CCS HX 2-072-HTX-2B not modeled in the TPIPE

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1.2 Structural Concrete – Work Observation

Work Order

WO 112474177 Backfill with Flowable Fill, and install Concrete Pedestal, and Pour concrete Encasement for RWST wall excavation

Miscellaneous

432769 Concrete Level II Certification, 11/27/12

439991 Concrete Level II Certification, 6/15/12

FMR-DY00-00043, Concrete Ready Mix, 2/7/2013

BPC-SME-12-002 Technical Services Subcontract, QC Services, Amendment, 12/13/2012

FCR 60421-A and Associated Advanced Authorizations for rebar placement, engineering exceptions, and mix design pre-trial test results, AA-13 through AA-18, 3/21/2013

Batch Plant Batch Ticket 160167, 4/12/2013

PO 494554, 25402-011-V1A-DY00-00013-001 and 00014-001, Admixture Certification, 1/14/2013

PO 494554, 25402-011-V1A-DY00-00018-001, Portland Cement Certification, 1/22/2013

PO 495554, 25402-011-V1A-DY00-00017-001, DELVO Stabilizer Certification, 1/29/2013

PO 494554, 25402-011-V1A-DY00-00016-001, Air Entraining Mixture Certification, 1/29/2013

PO 494554, 25402-011-V1A-DY00-00020-001, PolyHeed 1025 Certification, 1/29/2013

PO 494554, 25402-011-V1A-DY00-00019-001, Stone ASTM C-33 Certification, 1/29/2013

PO 494554, 25402-011-V1A-DY00-00021-001, Cement batching scale calibration, 3/7/2013

PO 494554, 25402-011-V1A-DY00-00022-001, Agregate batching scale calibration, 3/7/2013

PO 494554, 25402-011-V1A-DY00-00023-001, Scale Test record, 3/7/2013

PO 494554, 25402-011-V1A-DY00-00024-001, Water Meter calibration, 4/4/2013

National Ready Mixed Concrete Association Certification for Kingston Plant No. 005046,
6/23/12
National Ready Mixed Concrete Association Certification, Fleet Inspection –Truck Mixer for
Kingston Plant, 2/25/2013
250402-011-V1A-SY01-00101-001 SME SY-01, 7 and 28 Day Certified Materials Test Report,
5/10/2013

C.1.3 Structural Steel and Supports - Work Observation and Construction Refurbishment Process

Work Orders

WO 114423285, Steam Generator No.1 Upper Lateral Supports
WO 114423315, Steam Generator No.2 Upper Lateral Supports

Engineering Documents

Westinghouse Design Specification 425A86, Fabrication Requirements for SG Upper Lateral Support Tangs & Pins, Rev.2
Drawing 10065E09, Watts Bar Unit 2 Steam Generator Upper Lateral Tang Plates Loop 1 & Loop 2, Rev.1
PCI Procedure PI-904441-01T, Watts Bar Unit 2, SG Loop #1, Tang Plate “T” Removal and Installation, Rev.0

Certificates of Compliance

904441-01, Weld Filler Material ER70S-6, Rev.1
904441-02, Tang Plates, SA-572 Grade 50, Rev.0

Welding Documents

WPS 1 SA-GMAW-P I HT, Rev.0
WPS 1 MC-GMAW-P HT-I, Rev.0
PQR 885, Rev.0

Corrective Action Documents

PER 715564, Upper Lateral Support Material Not Tested in Accordance with Requirements, 4/22/2013
PCI NCR 13-008, Material not purchased or supplied to ASME Section III, Subsection NF, 1977 edition, 4/19/2013

C.1.4 Reactor Coolant Pressure Boundary Piping – Work Observation and Construction Refurbishment Process

Miscellaneous

IN 81-007, Potential Problems With Water-Soluble Purge Dam Materials Used During Inert Gas Welding
IN 85-013, Consequences of Using Soluble Dams
IN 93-063, Improper Use of Soluble Weld Purge Dam Material

C.1.5 Piping – Work Observation and Construction Refurbishment Process

Work Orders

WO 112772781, Install lower containment cooler cooling coils, 2C-A
WO 112772768, Install lower containment cooler cooling coils, 2B-B
WO 112800284, RHR 2B HX disconnect and reconnect component cooling water piping, pipe spool 70-CC-392 Weld

WO 112800212, Seal Water HX re-alignment of component cooling water piping System
062/070 FBOS-2-70-F-9-13 at 2-HTX-062-0066

Data Sheets

2-067-FB-F-345, N3503 Data Sheets, 3/1/2013
 2-067-FB-F-346, N3503 Data Sheets, 3/1/2013
 2-067-FB-F-343, N3503 Data Sheets, 3/1/2013
 2-067-FB-F-369, N3503 Data Sheets, 2/26/2013
 2-067-FB-F-366, N3503 Data Sheets, 1/13/2013
 2-067-FB-F-366, N3503 Data Sheets, 2/26/2013
 2-067-FB-F-367, N3503 Data Sheets, 2/26/2013
 2-067-FB-F-368, N3503 Data Sheets, 1/31/2013
 2-067-FB-F-368, N3503 Data Sheets, 2/25/2013
 2-070-F-31-12, MAI 2.B Data Sheets, 5/1/2013
 42R, MAI-4.2A Temporary Support Data Sheet, 5/1/2013
 70-1CC-V488, MAI-4.2A Temporary Support Data Sheet, 5/1/2013
 2-70-F-9-13, N3503 Data Sheets, 5/9/2013
 47A464-3-132, MAI-4.2A Temporary Support Data Sheet, 5/6/2013
 70-1CC-V631, MAI-4.2A Temporary Support Data Sheet, 5/6/2013

Calculations

T93091110002, Summary of Piping Analysis Problem No. N3-67-90R

Weld Traveler

Weld No. 2-067-T623-66-C1R0, 2/28/2013
 Weld No. 2-067-T623-70-C1R0, 2/28/2013
 Weld No. 2-067-T623-71-C1R0, 2/28/2013
 Weld No. 2-067-T623-72-C1R0, 2/28/2013
 Weld No. 2-070A-D126-07-C0-R0, 4/26/2013
 Weld No. 2-072B-D046-07-C2-R5, 10/1/2010

NDE Records

MT-310, Weld No. 2-070A-D126-07-C0-R0, 5/1/2013
 RT-31, Weld No. 2-072B-D046-07-C2-R5, 7/10/2010
 UT-295, Weld No. 2-072B-D046-07-C2-R5, 4/19/2013

M&TE

E46566, Torque Wrench, 2/20/2014
 E45540, Torque Wrench, 2/21/14
 E47068, Torque Wrench, 6/28/2013

Drawings

FSK-M-5198, Weld Map Containment spray header, Rev. 0
 FSK-M-4631, Weld Map, Containment Spray Header nozzles, Rev. 0
 FSK-M-4626, Weld Map, Containment Spray Header nozzles, Rev. 0
 FSK-M-4625, Weld Map, Containment Spray Header nozzles, Rev. 0
 FSK-M-2582, Weld Map, Containment Spray Repair Weld No. 2072BD04607, Rev. 3
 47W437-4, System 072 Containment Spray, Rev. 2
 2-47W432-206, System 074 RHR Piping Stress Problem No. N3-74-11A, Rev. 0
 2-47W432-204B, System 072 Containment Spray Piping Stress Problem No. N3-72-06A, Rev. 0
 2-47W432-205, System 074 RHR Piping Stress Problem No. N3-74-15, Rev. 0
 2-47W432-204A, System 072 Containment Spray Piping Stress Problem No. N3-72-03A, Rev. 1
 DRA 53590-126, System 074 RHR Piping Stress Problem No. N3-74-11A, Rev. 0

DRA 53344-138, System 074 RHR Piping Stress Problem No. N3-74-11A, Rev. 0
 DRA 54851-127, System 072 Containment Spray Piping Stress Problem No. N3-72-06A, Rev. 0
 DRA 53590-127, System 074 RHR Piping Stress Problem No. N3-74-10A, Rev. 0
 DRA 53590-105, System 072 Containment Spray Piping Stress Problem No. N3-72-03A, Rev. 0
 DRA 54851-128, System 072 Containment Spray Piping Stress Problem No. N3-72-03A, Rev. 0
 47W437-5, 1" Spray Nozzles 10" Containment Spray Header 2A, Rev. 3
 47W437-4, 1" Spray Nozzles 8" Containment Spray Header, Rev. 12

C.1.7 Environmental Protection – Initial and Periodic Inspection (IP 80210)

Procedures and Records

0-PI-ENV-1.0, Air Permit Compliance, Rev. 7
 0-PI-ENV-3.1, NPDES Plant Effluents, Revision 0034
 0-PI-ENV-3.4, Biotoxicity Sampling, Rev. 7
 0-PI-ENV-3.7, Inspection of Yard Holding Pond Dam, Rev. 0
 0-PI-ENV-3.8, NPDES Passive Mix Zone Survey, Rev. 0
 0-PI-ENV-5.2, Inspection of Hazardous Waste, PCB, Special Waste, Universal Waste, and Used Oil Storage Areas, Rev. 5
 0-PI-ENV-14.1, Environmental Reports and Regulatory Submittals, Rev. 4
 0-PI-ENV-14.2, Identification and Interpretation of Intake Warning Indicators, Rev. 3
 0-PI-ENV-14.3, Monthly Inspection for Environmental Compliance, Rev. 3
 CHDP-2, Conduct of Chemistry, Rev. 3
 Environmental Compliance Manual, Chapter 3.0 (ECM-3), National Pollutant Discharge Elimination System (NPDES) Program, Rev.16
 ECM-4, Erosion/Storm Water Pollution Prevention Controls, Rev. 34
 ECM-5, Handling, Storage, and Disposal of Used Oil And Hazardous Waste, Rev. 20
 ECM-8, Integrated Pollution Prevention Plan, Rev. 30
 ECM-13, National Pollutant Discharge Elimination System (NPDES) Permit Application and New Permit Implementation, Rev. 2
 NPG-SPP-05.13, Environmental Review Process for NEPA Compliance, Rev. 1
 R&TA SOP-5.7, Environmental Management System – Regulatory Compliance, Rev. 1
 TVA-SPP-05.10, Environmental Compliance Management System (ECMS), Rev. 1
 State of Tennessee NPDES Permit TN0020168, August 1, 2011 to June 29, 2016
 State of Tennessee Compliance Evaluation Inspection, October 3, 2011

C.1.8 Electrical Cable – Records Review

Miscellaneous

Specification G-38, Installation, Modification and Maintenance of Insulated Cable Rated Up To 15,000 Volts, Rev. 21
 MAI-3.3, Cable Terminating, Splicing, and Testing for Cables Rated Up to 15,000 Volts, Rev. 30
 WO 110949056, Megger Testing and Continuity Testing for 2V704A/2V705A
 WO 110956294, Megger Testing and Continuity Testing for 2V706A/2V707A
 WO 110954699, Megger Testing and Continuity Testing for 2V712A/2V713A
 WO 110958243, Megger Testing and Continuity Testing for 2V714A/2V715A
 WO 110958243, Megger Testing and Continuity Testing for 2V3090A/2V3091A
 WO 111854032, Medium Voltage Test Record for Cable 2PP575A

IV. OTHER ACTIVITIES

OA.1.1 Construction Deficiency Report (CDR) 391/83-45, Routing of Radioactive and Nonradioactive System Instrument Lines

Work Orders

WO 110734868, System 72 Sensing Lines and Vent Valve Installation
 WO 110734896, System 72 Sensing Lines and Vent Valve Installation
 WO 110952572, System 72 Sensing Lines Installation
 WO 113993569, System 72 Sensing Lines Cleaning and Installation

Engineering Documents

N3E-934, Instrument and Instrument Line Installation and Inspection, Rev.8
 TI-12.14, Replacement and Upgrade of Plant Component Identification Tagging and Labeling, Rev.5
 EDCR 52446, Install/Verify Installation of Instrument Panels and associated Instrument Lines, Rev.A
 EDCR 53619, Install and Inspect Instrument Lines and Instrument Installation, Rev.A
 EDCR 53629, Install and Inspect Instrument Lines and Instrument Installation, Rev.A
 EDCR 53644, Install and Inspect Instrument Lines and Instrument Installation, Rev.A

Corrective Action Documents

NGDC PP-19 for PER 145036, Engineering Complete Package for CDR 391/83-45

OA.1.3 Generic Letter 88-17, Loss of Decay Heat Removal; Temporary Instruction (TI) 2515/101, Loss of Decay Heat Removal 10 CFR 50.54(f); TI 2515/103, Loss of Decay Heat Removal 10 CFR 50.54(f) – Programmed Enhancements (Long Term) Review; TI 2515/113, Reliable Decay Heat Removal During Outages

Miscellaneous

EDCR 53756, Instrumentation in the Reactor Building, Rev. A
 EDCR 52363, Install labels and wire components on Unit 2 Panel 2-M-6 like Unit 1 Panel 1-M-6, Rev. A
 EDCR 52378, Replace existing obsolete electronic modules, Rev. A
 EDCR 52321, Install the Westinghouse IN-Core Information, Surveillance, and Engineering (WINCISE) System, Rev. A
 EDCR 52351, Install Common Q System, Rev. B
 EDCR 53618, Install and Inspect Instrument Lines and Instrument Installation for Local Panels 2-L-12, 2-L-5, 2-L-13, 2-L-22, Rev. A
 EDCR 53629, Install and Inspect Instrument Lines and Instrument Installation for Local Panels 2-L-55/A and 2-L-55/B, Rev. A
 EDCR 52322, Design, Procure, and Construct an Integrated Computer System; Rev. A
 PIC 58575, Energize U2 Recorders Found on 2-L-10, 2-M-1, 2-M-2, and 2-M-6 with U1 Power Strip, Rev. A

Procedures

NGDC-PP-32, Watts Bar Nuclear Plant Unit 2 Development and Issue of Operating and Technical Instructions, Rev. 1
 1-MI-68.001, Disassembly and Reassembly of the Unit 1 Reactor Pressure Vessel, Rev. 1
 MI-271.010, Removal and Replacement of Equipment Access Hatch, Doors, Bridge, Track, and Shield Wall, Rev. 21
 TI-68.002, Containment Penetrations and Closure Control, Rev. 21
 AOI-14, Loss of RHR Shutdown Cooling, Rev. 37

NPG-SPP-07.2, Outage Management, Rev. 3
 NPG-SPP-07.2.11, Shutdown Risk Management, Rev. 2
 SOI-74.01, Residual Heat Removal System, Rev. 61
 GO-10, Reactor Coolant System Drain and Fill Operations, Rev. 47
 GO-7, Refueling Operations, Rev. 36

Setpoint and Scaling Documents

2-L-68-399A, Rev. 0, dated 04/2011
 2-L-68-399B, Rev. 0, dated 04/2011
 2-F-63-91A, Rev. 1, dated 07/2011
 2-F-63-91B, Rev. 1, dated 07/2011
 2-F-63-92A, Rev. 1, dated 07/2011
 2-F-63-92B, Rev. 1, dated 07/2011

Work Orders

110719913, CCI EDCR2 53629 SYS 063 2-FT-63-91A ASME SECT III
 110756652, CCI EDCR2 53618 SYS 070 074 WBN-2-PNL-276-L013 Install Instruments
 110756656, CCI EDCR2 53618 SYS 070 2-ISIV-070-265C ASME SECT III
 09-954101-006, CRDR EDCR2 52363 Install, Label and Wire Components on Unit 2 Main Control Room
 09-954101-007, CRDR EDCR2 52363 Phase 3, Install, Label and Wire Components on Unit 2 Main Control Room
 09-954101-008, CRDR EDCR2 52363 Phase 3, Install, Label and Wire Components on Unit 2 Main Control Room

OA.1.4 (Discussed) CDR 391/83-48: Relocating Sensing Lines on Upper Containment Cooler

Engineering Documents

Engineering Change Notice 4112, Relocate Static Pressure Ports
 Engineering Change Notice 5971, Delete Flow Switches Watts Bar Units 1 and 2
 Field Change Request 20016, Revise drawings to show sensor tubing to protrude a maximum 1 inch into duct.
 Field Change Request 20030, Mounting details for sensors in Ventilation ducts.
 Engineering Change Notice 5971, Delete fan flow switches
 Engineering Design Change Request 53788, Spare in-place switches
 Engineering Change Notice 53152-A, Revise Master Equipment List in accordance with FCR 56991
 Engineering Design Change Request 53599, Install and inspect instrument lines and instrument installation flow switches

Procedures

TVA Procedure NPG-SPP-067, Instrumentation Set-point, Scaling and Calibration Program

Other

Drawing Number 2-45W760-30-8, Wiring Diagram Ventilation System Schematic, Rev. 5
 System Description SSD-N3-30RB-4002, Reactor Building Ventilation System, Rev. 23
 NRC letter dated August 01, 1984, NRC IP report No. 50-390/84-53 and 50-391/84-42
 Nonconformance Report WBN NEB 8321, Significant Condition report on installation of flow elements and switches

OA.1.5 through OA.1.8: (OA.1.5 Inspection of HVAC Duct and Supports CAP, OA.1.6 Construction Deficiency Report 391/86-52: Deficiencies with HVAC Duct Seismic Design Criteria, OA.1.7 Construction Deficiency Report 391/91-22: Deficiencies with HVAC Duct Supports, and OA.1.8 NCV 05000391/2012603-05: Failure to Follow Instructions)

Procedures, Standards and Specifications

MAI-4.3, HVAC Duct Systems, Rev. 9

SRN-N3C-942-4, Structural Requirements for HVAC Ducts and Duct Supports

G-95, Installation, Modification and Maintenance of HVAC Duct, Rev. 0, SRN 7

Duct Supports

WO# 110800665, Support ID 118-1685

WO# 110800665, Support ID 134-1703

WO# 110800665, Support ID 125-1763

WO# 111542590, Support ID 123-1690

WO# 09-953655-000, Support ID 107-1665

WO# 09-953655-000, Support ID 116-1681

WO# 09-953655-000, Support ID 116-1680

WO# 09-953655-000, Support ID 115-1679

WO# 10-951214-001, Support ID 110-1673

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WO# 10-951214-001, Support ID 108-1769

WO# 10-951214-001, Support ID 108-1666

WO# 10-951214-001, Support ID 108-1667

WO# 10-951214-001, Support ID 108-1668

WO# 10-951214-001, Support ID 108-3070

WO# 10-951214-001, Support ID 109-1669

WO# 10-951214-001, Support ID 109-1670

WO# 10-951214-001, Support ID 109-1672

WO# 11-0800490, Support ID 129-1694

WO# 11-0800490, Support ID 73-4515

WO# 110739571, Support ID 81-4510

WO# 110739571, Support ID 81-4511

WO# 110739571, Support ID 626-4514

Duct Modifications

WO# 110800611, Duct Segment 113-1784 to 112-1783

WO# 111281253, Duct Segment 113-1784 to 112-1782

WO# 111281253, Duct Segment 112-1782 to 112-1779

WO# 111281253, Duct Segment 112-1779 to end

WO# 111281393, Duct Segment 113-1677 to 112-1676

WO# 111281393, Duct Segment 112-1676 to 112-1675

WO# 111281393, Duct Segment 112-1675 to end

WO# 111281448, Duct Segment 113-1677 to 112-1781

WO# 111281448, Duct Segment 112-1781 to 112-1778

WO# 111281448, Duct Segment 112-1778 to end

WO# 111171415, Duct Segment Horseshoe to 130-1699

WO# 111171415, Duct Segment 130-1699 to 128-1693

WO# 111171415, Duct Segment 130-1699 to 75-4517

WO# 111171415, Duct Segment 128-1693 to 129-1696

WO# 09-953655-000, Duct Segment G7 to G7

Problem Evaluation Reports

PER 706152, Failure to fully implement DRA 53517-006: Bottom brace not removed as required on support 107-1665
 PER 708480, NRC Id'd: Discrepancy Between Historical As-Built Welds and Walkdown Sketch on Support 118-1685
 PER 706152, NRC Id'd: Failure to fully implement DRA 53517-006 for HVAC CAP Mods
 PER 516449, NRC Id'd: NRC Observation regarding Corrective Actions in PER 431164
 PER 524269, TVA QA oversight review of closed WO 110739327 HVAC Ductwork Flex Connectors
 PER 524352, This PER is written to address QC inspector involvement in SR 523625 (PER 524269)
 PER 527134, NRC identified concerns with HVAC work orders
 PER 554858, NRC ID'd - Review of NRC Non-Cited Violation (NCV) 2012603-05
 PER 581854, No grade listed for blind rivets in the MAXIMO item ID description
 PER 578457, Added scope to 4 work orders without revisions, two of four using QA3 materials for safety related duct
 PER 580097, PER written to address QC inspector involvement
 PER 394821, Paint shop prep of galvanized duct for system 30 CRDM duct for carbo-zinc coating damage ductwork
 PER 441372, Secondary efflorescence on shield building near system 65 vent stack
 PER 513230, MAI 5.9 and 5.2 used for LC Cooler housing upgrades
 PER 538782, HVAC support modification installed incorrectly
 PER 558196, FCR 56916 AA-09(pg. 48) was incorrectly implemented

Closure Reports/Packages:

T03-110415-002, Watts Bar Nuclear Plant, Unit 2, HVAC Duct and Duct Supports Corrective Action Program Closure Report, Dated 4/13/2011
 Open Items/Commitment Completion Form for: PERs 143670, 143923, 143985, 144048, and 144231. Partial Closure (Engineering Complete) Dated: 3/27/2012

Surveillances

25402-WBN-SR-11-2070, System 30J Pressure Testing of HVAC System
 25402-WBN-SR-12-2240, Backshift Field Activities 7/10/12 through 7/20/12
 25402-WBN-SR-12-2258, Backshift Field Activities 7/30/12 through 8/3/12

OA.1.10 TMI Action Item I.D.2: Plant Safety Parameter Display ConsoleWork Orders

WO 09-954-042-001
 WO 08-951034-012
 WO 08-951034-017
 WO 110828510

Drawings

DRA 2-45W2697-4 Rev. 0
 DRA 2-45W2697-12 Rev. 0

Miscellaneous

EDCR 52454 Rev. A
 EDCR 52322 Rev. A
 WBNOSG4188, EOP Verification Document, Rev. 25
 EOI 2-FR-0, Status Trees, Rev. 0

OA.1.11 Construction Deficiency Report 391/81-07: Steel Containment Penetration Assembly

Work Orders

WO 09-952703-000, Rev. 0

WO 09-952703-003, Rev. 1

WO 09-952703-009, Rev. 1

Drawings

DRA 2-03A465-1, Rev.902

DRA 2-03B037-1, Rev. 902

DRA 2-03A458-1, Rev.901

DRA 2-03B019-1, Rev 901

DRA 2-03B013-1, Rev 901

Miscellaneous

Piping/Tubing Support Installation Data Sheet for support 2-03B037-1, dated August 16, 2012

Pipe Support Inspection Record for support 2-03B037, dated October 19, 2009

OA.1.12 Construction Deficiency Report 391/89-02: Deficiency in the Design of the Emergency Gas Treatment System

Work Orders

WO 08-816160-007, Rev. 0

WO 08-816160-029, Rev. 0

Drawings

DRA 2-52641-57, Rev. 0

DRA 2-52641-61, Rev. 0

DRA 2-52641-105, Rev. 0

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DRA 2-52641-132, Rev. 0

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Miscellaneous

PER 120736 dated December 22, 2009

Functional evaluation for PER 120736, EGTS Logic, Rev. 0

NPG System Description WBN2-65-4001, Emergency Gas Treatment System, Rev. 01

OA.1.14 Mechanical Equipment Qualification (MEQ) Special Program (SP)

Procedure No. 25402-000-GPP-0000-N1106, Equipment Environmental Qualification, Rev. 4

Procedure No. 25402-3DP-GEM-00001, Mechanical Equipment Environmental Qualification Program, Rev. 0

Calculation No. WBNOSG4182, Functional Requirements of Mechanical Components in Systems 62, 63, 67 & 81, Rev. 23

Calculation No. WBNOSG4183, Functional Requirements of Mechanical Components in Systems 2, 3, 61, 69, 72 & 74, Rev. 16

WBN-MEQ-001, Mechanical Equipment Qualification Binder

MEQ Change Supplement for EDCR 53408, System 63

MEQ Change Supplement for EDCR 52945, System 62

MEQ Change Supplement for EDCR 53590, System 72

**OA.1.15 Bulletin (BL) 88-05, BL 88-05 Supplement 1 and BL 88-05 Supplement 2,
Nonconforming Materials Supplied by Piping Supplies, Inc. at Folsom, New Jersey
and West Jersey Manufacturing Company at Williamstown, New Jersey**

Work Order 111620338
Work Order 114092374
PER 234500

OA 1.18 CDR 391/83-21: Discrepancies in support detail

Calculations

EDMS T93100624035, Calculation of Pipe Support No. 47A060-26-27, Rev. 1
EDMS T93100622002, Calculation of Pipe Support No. 47A492-4-6, Rev. 2
EDMS T93120815007, Calculation of Pipe Support No. 47A060-26-68, Rev. 2
EDMS T93111202004, Summary of Piping Analysis Problem No. N3-26-03R, Rev. 1
EDMS T93111206006, Summary of Piping Analysis Problem No. N3-26-04R, Rev. 1

Miscellaneous

WBN-2-PD-026-1940-01, As-Built Walkdown, Stress Problem No. N3-26-03R, Pipe Support
47A060-26-27, Rev. 0
WBN-2-PD-026-1896-00, As-Built Walkdown, Stress Problem No. N3-26-04R, Pipe Support
47A492-4-6, Rev. 0
WBN-2-PD-026-1896-02, As-Built Walkdown, Stress Problem No. N3-26-04R, Pipe Support
47A4060-26-68, Rev. 0

Drawings

DRA 52512-012, Support 47A060-26-27, Rev. 0
DRA 52512-013, Support 47A060-26-27, Rev. 0
DRA 52512-005, Support 47A492-4-6, Rev. 2
DRA 52512-048, Support 47A060-26-68, Rev. 0
DRA 52512-049, Support 47A060-26-68, Rev. 2

OA.1.22 Ground Water Protection Initiative TI 2515/173

Watts Bar Annual Radiological Environmental Operating Report, May 15, 2012
Watts Bar Inspection Report 2012004, Section 2RS6

OA.1.23 Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program

Miscellaneous

SMP-6.0, Fuse Verification Form, Page 1 of 3, Fuse 2-FU-214-A110/21A, compiled 9/1/2012
SMP-6.0, Fuse Verification Form, Page 1 of 3, Fuses 2-FU-232-A014/32 and 2-FU-232-
A014/31, dated 12/18/2012
PER 494353, (NRC identified) Degraded Material Condition of Control Power Transformer)

**OA.1.24 Correlation of as-installed cable lengths to values entered into calculations/
analyses**

Miscellaneous

Calculation EDQ00099920070002, AC Auxiliary System Analysis, Rev. 27, dated 4/5/2013
Calculation EDQ00299920080003, Class 1E MCC Control Circuit Voltage Analysis and
Transformer Sizing, Rev. 5, dated 4/4/2013

OA1.25 CDR 391/86-21: Non-Quality Assurance Data Used in Calculations for Cable Tray and Conduit Loading

Miscellaneous

Closure Report for PER 144974, QA Data for Cable Weights and Outside Diameters was not used in Calculations, dated 5/2/2012

Closure Report for IP&S 002, Verify and Validate Computerized Cable Routing System CAP (Status: Engineering Complete), dated 4/9/2012

Closure Report for IP&S 003, Cable Tray and Cable Tray Supports CAP (Status: Engineering Complete), dated 3/19/2012

Closure Report for IP&S 424, Conduit and Conduit Supports CAP (Status: Engineering Complete), dated 6/11/2012 (for PER 147879), and 2/13/2012 (for PER 144966)

DCN 53334, Replace Ampacity and Voltage Drop Breakages on Train A and B 480V Shutdown Boards, Rev. A, dated 5/6/2009

PER 144974, QA Data for Cable Weights and Outside Diameters was not used in Calculations, dated 5/2/2012

WO 113450923, LSWD 542, Verification of Cable Routing and Cable Jacket Information for Unit 2 Cables that Vary from Installation Records and What is Recorded in ICRDS, issued 9/12/2012

WO 113451632, LSWD 542, System 070, Verify Cable Routing and Cable Jacket Information for Unit 2 Cable that varies from Installation Records and What is in ICRDS, issued 9/15/2012

WO 09-812367-008, DCN 53334 Install New Cable 2PL4875A, issued 9/14/2009

WO 09-812367-010, DCN 53334 Install New Cables 2PL4816A, 2PL4836A, issued 9/14/2009

WO 09-812367-016, DCN 53334 – Install New Conduit 2PLC5096A and Associated Support, and Terminate New Cables, issued 10/5/2009

WO 09-812367-049, DCN 53334 – Install New Cable 2PL4764B and Conduit 2PLC5091B, issued 1/20/2011

OA1.26 TMI Action Item II.F.1.2.A: Noble Gas Monitors

Closure Report for NUREG-0737, II.F.1.2.a, Accident Monitoring Instrumentation: Install Noble Gas Monitor, dated 2/20/2011

EDCR 52340, Modify Radiation Monitoring Loops in the Unit 2 Turbine Building for 2-RE-90-11 255, and 256, Rev. A, dated 5/18/2010

EDCR 52342, Install Radiation Monitoring Loops in the Unit 2 Auxiliary Building for 2-RE-90-421, 422, 423, and 424, Rev. A, dated 2/4/2010

WO 111089110, Install New 2-RE-090-119 and Associated Tubing/Piping, issued 7/25/2012

WO 111089143, Install New 2-RE-090-255 and 256, issued 7/18/2012

OA1.27 TMI Action Item II.F.1.2.C: Containment High Range Monitoring

Miscellaneous

Closure Report for NUREG-0737, II.F.1.2.c, Accident Monitoring Instrumentation: Install Containment High Range Monitors, dated 5/3/2012

WBN-DCD-40-24, Radiation Monitoring (Unit 1 / Unit 2), Rev. 25, dated 3/11/2013

EDCR 52338, Modify Radiation Monitoring Loops in the Unit 2 Reactor Building for 2-RE-90-271A, 272B, 273A, and 274B, Rev. A, dated 4/23/2010

OA.1.28 Cable Proximity to Hot Pipes

Miscellaneous

Closure Report for IP&S 306, Cable Proximity to Hot Pipes CAP (Status: Engineering Complete), dated 5/30/12
 Closure Report for IP&S 441, Cable Proximity to Hot Pipes (Status: Engineering Complete), dated 5/31/12 (for PER 144157)
 Calculation EDQ00299920120001, Unit 2 Hot Pipe Evaluation and Disposition, Rev. 1, dated 7/23/12
 EDCR 59055, Hot Pipe Interferences Safety Related Conduits, Rev. A, dated 2/2/12
 Specification G-40, Installation, Modification and Maintenance of Electrical Conduit Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting and Miscellaneous Systems, Rev. 17, dated 12/03/12
 WO 113498069, Rework Conduit 2M4213A to Clear Hot Pipe Violation IAW EDCR2 59055
 WO 113503516, Rework Conduit 2M5671E to Clear Hot Pipe Violation IAW EDCR2 59055
 WO 113496419, Rework Conduit 2VC4400B and Install New 2-JB-293-8790B to Clear Hot Pipe Violation IAW EDCR2 59055
 WO 113496512, Install, Reroute, &/or Verify Installation Documentation of Conduit 2VC2932A as Directed by EDCR 50955 to Avoid Interference with Hot Pipe Insulation

OA.1.29 Electrical Issues CAP – Sub-issue: Cable Separation and Electrical Isolation

Miscellaneous

Closure Report for IP&S 315, Cable Separation and Electrical Isolation CAP (Status: Engineering Complete), dated 2/2/2011
 WB-DC-30-4, Separation/Isolation, Rev. 23, dated 2/9/12
 EX-WB-DC-30-4-34, Separation/Isolation Exception, Rev. 1, dated 5/21/10
 25402-000-GPP-0000-N3302, Raceways and Accessories, Rev.7, dated 3/6/13
 25402-000-GPP-0000-N3303, Cable Installation, Rev.4, dated 4/8/13
 MAI-3.1, Installation Of Electrical Conduit Systems & Conduit Boxes, Rev. 25, dated 12/4/12
 WO113280782, Install/ Rework Conduit/Complete all Inspections and Documentation for 2PM748D
 WO113536484, Install/ Rework Conduit/Complete all Inspections and Documentation for 2VC2139A, 2VC2140A and 2VC2141A
 WO113714322, Install Sleeves and Seal the following sleeves WBN-0-SLV-304-A16546 (A/B) and WBN-0-SLV-304-A16547 (A/B)
 WO114387278, Install Conduit and Junction Box Supports

OA.1.30 Cable Issues CAP-Sub-issue: Computerized Cable Routing System Verification and Validation and Cable Configuration Control and CDR 391/87-12: Cable Configuration Control

Miscellaneous

Closure Report for IP&S 002, Verify and Validate Computerized Cable Routing System CAP (Status: Engineering Complete), dated 4/9/2012
 Closure Report for CDR 391/87-12, "Cable Configuration Control (Status: Engineering Complete), dated 4/18/12
 Calculation EDQ00299920090014, Unit 2 Class 1E and Appendix R Cables – As-Constructed ICRDS Data Verification, Rev. 0, dated 3/22/12
 WO113450923, Verification of Cable Routing (Signal Trace) and Cable Jacket Information for Unit 2 Cables That Vary from Installation Records and What is Recorded in ICRDS
 WO113451632, Verify Cable Routing (Signal Trace) and Cable Jacket Information for Unit 2 Cable 2V5740B That Varies from Installation Records and What is Recorded in ICRDS
 WO113465815, Delete/Remove from Plant Cables 2ABN4428, 2ABN4429, 2ABN4431, 2ABN4432, 2ABN4434, 2ABN4435, and 2ABN4437

LIST OF ACRONYMS

ABGTS	Auxiliary Building Gas Treatment System
ABSCE	Auxiliary Building Secondary Containment Enclosure
ADAMS	Agencywide Documents Access and Management System
ADR	Alternative Dispute Resolution
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
B&PV	Boiler & Pressure Vessel
BL	Bulletin
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CET	Core Exit Thermocouple
CCRS	Computerized Cable Routing System
CDR	Construction Deficiency Report
CFR	<i>Code of Federal Regulations</i>
CMTR	Certified Material Test Reports
CoC	Certificate of Compliance
DCN	Design Change Notice
ECN	Engineering Change Notice
EDCR	Engineering Document Construction Release
EOI	Emergency Operating Instruction
EQ	Environmental Qualification
ERFBS	Electrical Fire Barrier Systems
ESQ	Equipment Seismic Qualification
FCR	Field Change Request
FCV	Flow Control Valve
FHA	Fuel Handling Area
FSAR	Final Safety Analysis Report
GL	Generic Letter
GPI	Ground Water Protection Initiative
HAAUP	Hanger Analysis and Update Program
HVAC	Heating, Ventilation, and Air Conditioning
HX	Heat Exchanger
ICRDS	Integrated Cable & Raceway Design System
ICS	integrated computer system
IEEE	Institute of Electrical and Electronics Engineers
IMC	Inspection Manual Chapter
IN	Information Notice
IP	Inspection Procedure (NRC)
IR	Inspection Report
LOCA	Loss of Coolant Accident
LSWD	Limited Scope Walkdown Document
MAI	Modification/Addition Instruction
M&TE	Measuring and Test Equipment
MCR	Main Control Room
MEQ	Mechanical Equipment Qualification
NFPA	National Fire Protection Association
NCR	Non-Conformance Report
NCV	Non-cited Violation
NOV	Notice of Violation
NPDES	National Pollution Discharge Elimination System

NQA	Nuclear Quality Assurance
NRC	Nuclear Regulatory Commission
NRMCA	National Ready Mixed Concrete Association
NRR	Nuclear Reactor Regulation, Office of (NRC)
ODCM	Offsite Dose Calculation Manual
PER	Problem Evaluation Report
QA	Quality Assurance
QC	Quality Control
QL	Quality Level
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RG	Regulatory Guide
RHR	Residual Heat Removal
RWST	Refueling Water Storage Tank
SER	Safety Evaluation Report
SG	Steam Generator
SL	Severity Level
SMP	Startup Manual Procedure
SP	Special Program
SPDS	Safety Parameter Display System
SSC	Structure, System, Or Component
SSER	Supplemental Safety Evaluation Report
TBSS	Turbine Building System Sump
TI	Temporary Instruction
TMI AI	Three Mile Island action item
TVA	Tennessee Valley Authority
UL	Underwriters Laboratories
WBN	Watts Bar Nuclear
WO	Work Order