



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

November 4, 2011

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 05000391/2011608**

Dear Mr. Skaggs:

On October 1, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on October 12, 2011, with Mr. Gordon Arent and other members of your staff.

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

During this inspection period, your evaluations and methodologies to address issues associated with a number of Corrective Action Programs (CAPs) and Special Programs (SPs) were reviewed by the NRC staff.

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

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

Sincerely,

/RA/

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

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

Enclosure: Inspection Report 05000391/2011608 w/Attachment

cc w/encl: (See next page)

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Letter to Michael D. Skaggs from Robert C. Haag dated November 4, 2011.

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INSPECTION REPORT 05000391/2011608

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2011608

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: 1260 Nuclear Plant Rd
Spring City TN 37381

Dates: August 21 – October 1, 2011

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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 six-week period of inspections in the areas of quality assurance, identification and resolution of construction problems, construction activities, and follow-up of other activities. The inspection program for Unit 2 construction activities is described in NRC Inspection Manual Chapter 2517. Information regarding the WBN Unit 2 Construction Project and NRC inspections can be found at <http://www.nrc.gov/info-finder/reactor/wb/watts-bar.html>.

Inspection Results

- A Severity Level (SL) IV non-cited violation (NCV) of 10 Code of Federal Regulations (CFR) 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," was identified for inadequate control of purchased material. The applicant failed to assure that a seismic qualification test failure was adequately documented, evaluated, and dispositioned and failed to have documentary evidence that equipment conformed to the procurement requirements. (Section OA.1.21)
- The inspectors concluded that concerns pertaining to several Generic Letters (GLs), Bulletins (BLs), Temporary Instructions (TIs), and construction deficiency reports (CDRs) have been appropriately addressed for WBN Unit 2. These items are closed.
- Other areas inspected were adequate with no findings of significance identified. These areas included various Unit 2 Corrective Action Programs (CAPs)/Special Programs (SPs); electrical systems and components; mechanical systems and components; nuclear welding; nondestructive examination (NDE), commercial grade dedication activities; and refurbishment.

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REPORT DETAILS

Summary of Plant Status

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

I. QUALITY ASSURANCE (QA) PROGRAM

Q.1 QA Oversight Activities

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

a. Inspection Scope

During this inspection period, the inspectors continued to review problem evaluation reports (PERs), as part of TVA's corrective action program to verify that issues being identified under the corrective action program were being properly identified, addressed, and resolved by TVA. The inspectors also reviewed quality assurance (QA) surveillance reports to ensure conformance with quality requirements.

Additional documents reviewed are included in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

Q.1.2 Safety Conscious Work Environment (IP 35007)

a. Inspection Scope

The inspectors reviewed existing program requirements and recent safety-related concerns identified by the applicant's and contractor's employee concerns program (ECP). The inspectors verified that significant problems were documented under the corrective action program and were being properly identified, addressed, and resolved by TVA.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1 Construction Activities

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

a. Inspection Scope

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

Specific work activities observed included:

- Fire drill, as discussed in Section F.1.1 of this report and reported in Inspection Report 05000390/2011004
- Electrical work activities such as cable pulls, as discussed in Section C.1.3 of this report
- Control of welding equipment and pressurized gas bottles in Unit 1 areas

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

- Concrete expansion anchors as discussed in Section C.1.4 of this report

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

C.1.2 Reactor Pressure Vessel (RPV) Internals and Protection of Installed Plant Equipment during Construction Activities (IP 50053)

a. Inspection Scope

The inspectors conducted inspections of the RPV storage, preservation, housekeeping, and protection activities to determine whether requirements, work procedures, and inspection (quality control) procedures were being met. These activities are controlled by procedure 25402-000-GPP-0000-N2102, Housekeeping, Rev. 8. During the inspection period, the inspectors observed the licensee's activities in restoring the vessel from the vessel fill and drain in support of underwater ultrasonic examination (UT) of the vessel and its associated nozzles. The inspectors viewed the wipe down and equipment removal prior to vessel covering in support of overhead polar crane work and returned to review the completed cover work. Access controls were verified by the inspectors including a review of access logs documenting entry into the RPV.

The following samples were inspected:

- IP 50053 Section 02.01.c - one sample
- IP 50053 Section 02.03.b - one sample

b. Observations and Findings

No findings of significance were identified. The core barrel and internals continued to be in their storage locations in the refueling cavity protected with temporary protective material.

c. Conclusions

Adequate controls were in place to protect the RPV, core barrel, and internals during the inspection period.

C.1.3 Electrical Cable (Cable Pull) – Work Observation (IPs 51063 and 37002)

a. Inspection Scope

The inspectors assessed whether activities relative to safety-related electric cable systems were being controlled and accomplished in accordance with NRC requirements, safety analysis report commitments, and applicant procedures. This was accomplished by inspecting supervision and independent evaluation of work performance, work in progress, and completed work. The inspectors observed activities associated with work order (WO) 112367834, reflecting the partial pull of cable 2PV107B from tray node 3B2144 to 3B2170.

The inspectors verified that:

- Latest approved revisions were utilized
- Specifications were complete
- Cable tensions were within limits
- Conduit/raceway was acceptable for use
- Cable protection was adequate
- Segregation was maintained
- Cable identification was preserved
- Bending radius was maintained within limits
- Boundary conditions were specified and appropriate

- Quality control (QC) inspectors were present and performing their assigned tasks
- Installation and inspection activities were being documented during the activity

The following sample was inspected:

- IP 51063 Section 02.02.c – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that adequate measures were in place to ensure the applicant was prepared for the cable pull/push and that procedures were adequate and followed during the pull/push operations, with appropriate QC oversight.

C.1.4 Concrete Expansion Anchors (IP 46071, IP 50090, and TI 2512/023)

a. Inspection Scope

The inspectors observed applicable controls of specific processes and activities for anchor bolt installation and anchor bolt pull tests at various phases of work. Some of the attributes observed included anchor bolt hole drilling, initial installation torque, minimum spacing between bolts, slippage of nut during installation, personnel interviews, and material traceability. The work observations included:

Pipe Support Identification Number	Work Order (WO) Number	Number of Anchors Installed
2-47A432-1-57	112159930	4
63-2SISR164	112318840	4
2-47A432-1-56	112159930	4
2-47A435-2-37	112164715	4
63-2SISR232-1	110932752	8
47A437-1-24	110930095	8
2-47A406-387-9	09-952395-030	4
2-47A464-2-275	112394775	4
2-47A435-13-94	1121633021	4
2-AIRS-997-244	112333332	2
2-AIRS-997-242	112333332	2
2-03A284	111045387	8
2-47A435-12-147	112185729	2
2-47A435-13-114	112185729	2
62-2CVCR61	112468880	4
2-ISLS-997-5126	08-951354-006	2
2-47A435-12-143	112176469	4
2-ISLS-997-5285	09-954317-009	2
2-47A432-1-54	112159820	2

The following samples were inspected:

- IP 50090 Section 02.03.b – 74 samples of concrete anchor installations and 5 anchor bolt load (pull) tests for section MK3A of the reactor coolant pump spray platform (WO 08-951029-002)
- IP 46071 Section 02.02.a – 74 samples
- IP 46071 Section 02.02.b – 74 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The activities observed relating to concrete expansion anchors were adequate and completed in accordance with applicable drawings and specifications.

C.1.5 Pipe Support and Restraint Systems (IP 50090 and TI 2512/023)

a. Inspection Scope

The inspectors reviewed a sample of PERs to review the licensee/contractor system for reporting and dispositioning nonconforming materials, parts, and components associated with pipe supports and restraints. The inspectors reviewed PER 230993, Incorrect calculation references on Unit 2 design output documents, and PER 350221, Walkdown package showing incorrect dimensions, to determine the following:

- The records adequately document current status of nonconformances and deviations.
- The records are legible, complete, and indicate that reports are promptly reviewed by qualified personnel for evaluation and disposition.
- The records are routinely being processed through established channels for resolution of the immediate problem as well as for generic implications.
- The records are being properly identified, stored, and can be retrieved in a reasonable time.
- Nonconformance reports include the status of corrective action or resolution.
- Resolution of nonconformances is appropriate and demonstrates good engineering practice.

Additional documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 50090 Section 02.04.b – two samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The reviewed PERs associated with the disposition of nonconforming safety-related pipe supports and restraint systems were documented and resolved in accordance with applicant procedures and NRC regulations.

C.1.6 Electrical Components and Systems (MCC Buckets) – Work Observation (IP 51053 & TI 2512/020)

a. Inspection Scope

The inspectors observed Unit 2 construction work activities associated with electrical construction to assess overall compliance to NRC requirements and construction license commitments.

The inspectors assessed the installation practices for replacement motor control center (MCC) buckets 5E-B, 6E-B, 9B-B, 10B-B, 11F-B, 12F-B, 15A-B, 16A-B, and 16D-B. The inspectors reviewed the documentation for WO 111004050 that controls the steps for the installation of MCC buckets. The inspectors observed the MCC buckets in the staging storage warehouse to assess the attributes under which the components were stored, controlled, and handled.

In addition, the inspectors assessed the installation practices for containment spray pump motor 2B-B. This motor was refurbished by the power systems shop under contract PSS.J1-RA.GEN.03.03. The inspectors observed the staging of the motor stator and rotor to assess the attributes under which the components were stored, controlled, and handled. The inspectors also observed assembly and mounting of the stator and rotor onto the pump location.

b. Observations and Findings

No findings of significance were identified.

The inspectors observed that the MCC buckets were stored in the appropriate storage level and that the environment was clean and the temperature and humidity were controlled. Storage methods were adequate. The inspectors determined that the applicant used adequate methods to identify and correct work specification errors.

The inspectors observed that the staging of the containment spray pump motor components used adequate storage methods. The inspectors determined that the assembly of the motor stator and rotor was performed with adequate tools using the latest construction specifications and that the components were adequately identified and protected from adjacent construction activities.

c. Conclusions

The inspectors concluded that WO packages, procedures, and installation activities were adequate.

C.1.7 Electrical Cable (Terminations) – Work Observation (IP 51063)

a. Inspection Scope

The inspectors reviewed the installation and in-process terminations for cable 2V10003A connected inside control room cabinet 2 PNL 090-M12, Radiation Panel, on terminal points TP11 (black wire) and TP12 (white wire) and interviewed the QC inspector present at the installation site to determine that cables and materials used were as specified. The inspectors reviewed the WO 112604217 associated with system 30,

Ventilation Systems, as part of Engineering Design Change Request (EDCR) 2-55801A, to determine the scope of work. The inspectors observed work to determine that the crimping tool used was the unit called out in the WO that matched the cable type and lug size and was in proper working order. The inspectors observed work to ensure that the unterminated cable ends were properly protected and segregated with electrical tape.

The following sample was inspected:

- IP 51063 Sections 02.02.c - one sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that the terminations were conducted appropriately.

C.1.8 Electrical Components and Systems (Foxboro) – Work Observation (IP 51053)

a. Inspection Scope

The inspectors reviewed WOs to verify that construction activities were controlled and performed in accordance with 10 CFR 50, Appendix B, Criteria V, X and XVII. The inspectors also reviewed EDCR 52419 associated with the level transmitters to verify that design changes were incorporated in the work package. Additional documents reviewed are listed in the attachment.

The inspectors conducted direct observations of in-progress work activities related to the installation of sump level transmitters 2-LT-063-180D, 2-LT-063-180E, 2-LT-063-180F and 2-LT-063-180G and Foxboro Spec 200 panel 11A hardwire installation to determine whether the installation of the anchor bolts for the transmitters was adequate, the transmitters were protected from adjacent construction activities, M&TE (measuring and test equipment) was listed with proper calibration due dates, the work log history was clear and legible, the components were as specified in the work packages, and the component identification was properly maintained.

The inspectors interviewed craft personnel to verify appropriate qualification of persons responsible for these construction activities. In addition, the inspectors questioned craft personnel to verify that they were knowledgeable about the tools that were used in these activities.

The following samples were inspected:

- IP 51053 Section 02.02.d – five samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

No conclusions can be made at this time about the Foxboro Spec 200 panel 11A or the sump level transmitters.

C.1.9 Electrical Components and Systems (Temperature Switches) - Work Observation (IP 51053) and Electric Cable - Work Observation (IP 51063)

a. Inspection Scope

The inspectors walked down two temperature switches, 2-TS-30-5237B and 2-TS-30-5237A, in residual heat removal (RHR) pump room B to verify that the items were installed in accordance with the drawings, in the correct location and orientation, and that the associated flexible conduit had adequate bend radius. The inspectors reviewed associated completed WO 11126357 to verify that the MT&E used was calibrated. Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that the work was done in accordance with the drawings, that the associated flexible conduit had adequate bend radius, and that the components were installed in the correct location and orientation.

C.1.10 Construction Refurbishment Process – WBN Unit 2 (IP 37002 and 49063)

a. Inspection Scope

The inspectors reviewed implementation of the refurbishment program. This included reviews of the documentation for the refurbishment of active components in the essential raw cooling water system (ERCW) system, PERs associated with refurbishment, and applicant's actions associated with degradation of cold leg accumulators (CLAs).

The ERCW sampled components (approximately 40 total) included flow control valves, flow transmitters, throttle valves, temperature control valves, isolation valves, and relief valves. The inspectors chose the samples from the system flow diagrams. Then, the inspectors reviewed the tables of planned activities for these samples and the associated supporting documentation for completion of the activity, to confirm program requirements were met.

The PER reviews included confirmation of adequate documentation and completion of adequate corrective actions. The CLA inspection included field observation of the inside of CLAs # 3 and 4 including observations of cladding thickness measurements and review of design specifications. Specific documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 37002 Section 02.02.b – 5 samples

- IP 37002 Section 02.02.c – 1 sample
- IP 37002 Section 02.02.d – 1 sample
- IP 37002 Section 02.02.e – 6 samples
- IP 37002 Section 02.02.f – 5 samples
- IP 49063 Section 03.03 – 1 sample

b. Observations and Findings

No findings of significance were identified. The applicant adequately documented refurbishment of active components in the ERCW system. For the sample selected, components were clearly categorized and supporting documentation for refurbishment was confirmed. Although, initial documentation for acceptance of the CLAs lacked thoroughness, final reviews and documentation showed that the CLAs were acceptable for service. Documentation and corrective actions for the other PERs was acceptable.

c. Conclusions

The active refurbishment activities for the ERCW system met program requirements. Documentation for problems identified in selected PERs was acceptable and corrective actions appropriate to the circumstances were implemented.

C.1.11 Ultrasonic Testing Examination (IP 57080)

a. Inspection Scope

The inspectors reviewed phased array ultrasonic (PA-UT) examination procedures to determine whether they met applicable American Society of Mechanical Engineers (ASME) Code, regulatory, specification and contract requirements and that these procedures were issued and qualified in accordance with the licensee's quality assurance program. The inspectors observed selected ongoing pre-service examinations performed on ASME Section III, Class I, safety-related, reactor pressure vessel welds including safe end-to-nozzle welds and circumferential vessel welds. Specifically, non-destructive (NDE) activities observed included four PA-UT examinations on reactor vessel inlet/outlet nozzles and three PA-UT examinations performed on reactor vessel circumferential welds. The inspectors observed the examinations to determine whether they were conducted in accordance with approved procedures, and consistent with ASME Code requirements. The inspectors reviewed the examination records to determine whether they were prepared, evaluated, and maintained in accordance with applicable commitments and/or requirements and that indications discovered were dispositioned in accordance with ASME and regulatory requirements. Additional documents reviewed are listed in the attachment.

The inspectors observed the following PSI examinations:

Examination Nos.:	NDE Method	Weld # / Component #	Description	ASME Class
ID 93/94/95/96	Phased Array UT	N11-SE	Safe End-to- Nozzle	1
ID 101/102/103/104	Phased Array UT	N12-SE	Safe End-to- Nozzle	1
ID 85/86/87/88	Phased Array UT	N15-SE	Safe End-to- Nozzle	1

ID 141/142/143/144	Phased Array UT	N18-SE	Safe End-to- Nozzle	1
ID 3a-c/4a-c/5a-c/6a-c/7a-c/8a-c/ 15a-d/16a-d/17a-d/18a-d/19a-d/20a-d	Phased Array UT	W02-03	RPV Bottom Head-to-Lower Shell	1
ID 21a-i/21e-R1/ 22a-i	Phased Array UT	W03-04	RPV Lower Shell-to-Lower Middle Shell	1
ID 27a-o/28a-n	Phased Array UT	W06-07	RPV Upper Shell-to- Flange	1

The inspectors also reviewed qualification and certification records for examiners and inspection equipment along with the applicable NDE procedures for the above examination activities to determine whether they were in accordance with the requirements prescribed by ASME Section XI 2001 edition through the 2003 addenda.

The following samples were inspected:

- IP 57080 Section 02.01 – 3 samples
- IP 57080 Section 02.02 – 7 samples
- IP 57080 Section 02.03 – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the observed NDE activities and personnel met applicable ASME code requirements and other regulatory requirements.

C.1.12 Inservice Inspection Review of Program (IP 73051)

a. Inspection Scope

The inspectors conducted a review of the applicant's preservice inspection (PSI) program to ascertain whether the PSI program was in conformance with regulatory requirements and other applicant commitments.

The inspectors reviewed the applicant's QA program requirements related to PSI activities such as the control, maintenance, retention, and review of QA records. The inspectors interviewed TVA QA personnel to determine whether they reviewed PSI-related inspection plans and procedures. Additionally, the inspectors reviewed TVA documentation and records to determine whether they had established procedures to effectively oversee contractor activities concerned with PSI activities. Additional documents reviewed are listed in the attachment.

The following sample was inspected:

- IP 73055 Section 02.03 – 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the sampled portions of the applicant's PSI program were in compliance with applicable regulatory requirements and other applicant commitments.

C.1.13 Preservice Inspection Data Review and Evaluation (IP 73055)

a. Inspection Scope

The inspectors reviewed RPV PSI PA-UT records to determine whether the method, extent, and technique of the examination were in accordance with the applicant's PSI program and PA-UT procedure. The inspectors reviewed the PA-UT records to determine whether the data met the acceptance criteria outlined in the PA-UT procedure and ASME Section XI 2001 edition through 2003 addenda requirements. The inspectors also reviewed the recording, evaluation, and disposition of indications documented in the PA-UT records to determine whether the PA-UT records were in compliance with the applicable PA-UT procedure and ASME Section XI 2001 edition through 2003 addenda requirements. Additional documents reviewed are included in the attachment.

The following PA-UT records were inspected:

- Weld W02-03, RPV Bottom Head to Lower Shell, IHI Southwest Technologies Examination Record
- Weld W06-07, RPV Upper Shell to Flange, IHI Southwest Technologies Examination Record
- Weld W03-04, RPV Lower Shell to Lower Middle Shell, IHI Southwest Technologies Examination Record

The following samples were inspected:

- IP 73055 Section 02.03 – three samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The PA-UT records for the examination of the RPV vessel circumferential welds were adequately documented in accordance with the applicant's PSI program, PA-UT procedure, and ASME Section XI 2001 edition through 2003 addenda.

III. OPERATIONAL READINESS ACTIVITIES

F.1 Fire Protection

F.1.1 Fire Protection (IP 64051)

a. Inspection Scope

The inspectors observed fire operations staff personnel performing emergency light charger checks for three Appendix R dedicated light packs. The inspectors reviewed the procedure and made observations in the area of radiological controls, beam direction management, and design drawing requirements. The inspectors also observed an unannounced fire drill, as reported in Inspection Report 05000390/2011004. Finally, the inspectors performed an independent review of fire hose stations in the lower levels of the auxiliary building. Maintenance procedures were reviewed and discussions held with fire operations staff personnel regarding requirements. The inspectors observed the calibration date for the hoses, station mounting and hose configuration, labeling, accessibility, serviceability, and overall material condition. Additional documents reviewed are listed in the attachment.

The following hose stations were viewed:

- 0-ISV-26-663
- 0-ISV-26-691
- 0-ISV-26-662
- 0-ISV-26-680
- 0-ISV-26-661
- 0-ISV-26-690
- 1-ISV-26-667
- 1-ISV-26-668
- 1-ISV-26-667
- 2-ISV-26-667
- 2-ISV-26-668

The following samples were inspected:

- IP 64051 Section 02.07 – 11 samples

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

Licensee fire fighting staff is adequately maintaining equipment for the purposes of suppressing fires within the lower auxiliary building.

IV. OTHER ACTIVITIES

OA.1.1 (Discussed) Equipment Seismic Qualification Corrective Action Program (TI 2512/021, IPs 37055, 49055, 51055 and 52055)

a. Inspection Scope

The inspectors reviewed various completed actions associated with the Equipment Seismic Qualification Corrective Action Program (ESQ CAP) to evaluate the adequacy of the program. During this inspection, the inspectors reviewed several calculations, procedures, QA surveillances, and design input and output documents. These documents were reviewed to verify whether they were adequate, and that changes to these documents were properly controlled in accordance with ESQ CAP and TVA's Nuclear Quality Assurance Program. Calculation WCG-1-1419, WBN Seismic/Civil Validation Program Methodology Summary Report, Section B3 and Attachment C4, were reviewed and discussed with the applicant staff to ensure that the relevant TVA design criteria and processes, as described in these parts of the calculation, were appropriately implemented. The inspectors held multiple interviews with the applicant staff responsible for the ESQ CAP implementation. The inspectors also reviewed interdisciplinary information exchanges to verify whether load interfaces were properly considered. The purpose for these interviews was, in part, to determine whether the completed actions were performed in accordance with the Unit 2 ESQ CAP implementation plan description and to verify that the seismic evaluations associated with TVA-designed and vendor-supplied equipment were adequately performed.

The inspectors reviewed several sections of the Unit 2 ESQ CAP implementing documents to ensure, in part, that the Category I equipment was properly qualified. The inspectors reviewed several design input documents to verify that this information was appropriately used in the seismic evaluations performed by engineering personnel. The inspectors reviewed a sample of PERs to review the licensee/contractor corrective actions associated with the ESQ CAP.

Additional documents reviewed are included in the attachment.

- IP 37055 Section 02.01 - 1 sample
- IP 37055 Section 02.02 - 1 sample

b. Observations and Findings

No findings of significance were identified.

c. Conclusion

The inspectors reviewed several actions completed as part of the ESQ CAP implementation. The inspectors concluded these actions were performed in accordance with procedures and that they were documented and completed as required by their commitments and NRC requirements. Additional inspection is required for this CAP.

OA.1.2 (Discussed) Example 7 of Unresolved Item (URI) 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: A condition exists in a cable vault in the switchyard where the offsite power supply outputs from the C and D common station service transformers are routed through a common space and the cables crisscross each other. Unit 1 and Unit 2 Final Safety Analysis Reports (FSARs) indicates that the cables in the cable vault are fire

wrapped. The inspectors observed through field walkdowns that not all the cables were fire wrapped, in particular the 1B-B 6.9kV shutdown board normal and alternate main feeder cables. In addition, some of the cables in the vault were touching each other, a condition contrary to requirements from plant drawing 45W3000.

Inspection Activities: The inspectors continued to review compliance with 10 CFR 50 Appendix A - General Design Criteria 17, due to redundant offsite power supplies passing through a common cable vault. Specifically, Criteria 17 requires that electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits designed and located so as to minimize to the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions.

The inspectors reviewed WO112021342, completed on April 26, 2011 during a Unit 1 outage, to verify corrective action activities to address the absence of appropriate arc-proof fire wrapping of the unwrapped cables located inside the cable vault feeding 6.9 kV shutdown board 1B-B. The cables identified as requiring the fire wrapping were 1PP115P, 1PP116P, 1PP117P, 1PP1095R, 1PP1096R, and 1PP1097R.

b. Observations and Findings

No findings of significance were identified. The inspectors verified that these cables were properly documented to be fire wrapped.

c. Conclusions

The inspectors concluded that additional inspections are required in order to properly evaluate the adequacy of the separation for the two independent offsite power supplies and determine if General Design Criteria 17 of 10 CFR 50 Appendix A is satisfied.

OA.1.3 (Discussed) Example 8 of URI 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: Centrifugal charging pump (CCP) motor performance indicated in the time-current curve from Calculation EDQ00299920080016, Rev. 000, Appendix D, sheet 50 would accelerate the pump to full speed within 6 seconds at 100 percent of rated voltage and 9.5 seconds at 80 percent of rated voltage. The sequence step loading of the diesel generator has the safety injection pump coming on 5 seconds following the start of the CCP. The inspectors were concerned that there might be overlap in the sequenced starting of diesel generator loads.

Inspection Activities: The inspectors reviewed Revision 4 and 5 of calculation EDQ00299920080016, 6.9 KV Protection and Coordination Calculation – Unit 2, and discussed the matter with plant staff.

b. Observations and Findings

No findings of significance were identified. The calculation had been revised to add a note to the bottom of the graphic page to say that the motor starting times depicted in the graphic were not accurate and to reference the vendor-supplied motor starting curve

at Attachment 1, Page 13 A, of the calculation. The inspectors noted that the CCP pumps have been reworked by the vendor, and the applicant is reviewing the accuracy of the original starting curve.

c. Conclusions

The inspectors concluded that Example 8 of the URI remains open pending review of the applicant's conclusions and future revision of the calculation.

OA.1.4 (Discussed) Example 9 of URI 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: Diesel generator transient loading could not be confirmed for the first 60 seconds of operation following a loss of offsite power (LOOP) event and a concurrent loss of coolant accident (LOCA). The latest revision of calculation EDQ000-999-2008-0014 is scheduled to undergo further reviews to assess the following information:

- Data provided on motor starting characteristics to verify that it includes all safety injection equipment motor starting currents in the sequence indicated for the first 60 seconds of operation.
- Loads supported by the two 2000 KVA 480V shutdown boards 2B1-B & 2B2-B and the timing for these loads to be applied on the generators at any other time than time 0 seconds or instantaneously.
- Identification of the method used to determine peak transient loads and steady state loads.

Regarding diesel generator loading, TVA calculations do not provide sufficient details on LOCA and LOOP loading to allow verification that the generator capacity ratings are not exceeded. The Unit 2 FSAR includes a diesel generator continuous rating at 4400 kW, a two (2) hour rating at 4840 kW, a "cold engine" rating for the first three (3) minutes at 4785 kW, and "hot engine" rating of 5073 kW, which is more than 110 percent of nominal rating for the diesel generators. The Unit 1 FSAR has the same continuous and 2-hour ratings and larger rating values marked as "Historical Information". The technical basis for these higher ratings was provided in a 1994 letter from a diesel generator vendor endorsing a TVA calculation which derived the higher ratings from a unit conversion of the engine horsepower. The inspectors previously concluded that in order to properly evaluate the diesel generator transient loading analysis and adequacy of applicant's stated diesel generator load capability, additional inspection would be required.

Inspection Activities: The inspectors reviewed the latest revision of calculation EDQ00099920080014, Rev. 011, Diesel Generator Loading Analysis, to better understand the steady state and transient loading for the diesel generators to see that all automatically connected loads were analyzed. The inspectors reviewed the applicant's document, "Resolution of WBN Diesel Generator Capacity," to gain an understanding of the technical basis for concluding that the "cold engine" rating for the first three (3) minutes at 4785 kW, and "hot engine" rating of 5073 kW are valid capable ratings for the diesel generators. The inspectors identified a lack of information in the calculation to identify 480 volt shutdown board loads immediately following a LOCA and a LOOP. The inspectors interviewed responsible engineering staff to discuss emergency diesel

generator historical testing results for Unit 1 diesel generator 1A-A. The inspectors examined testing results graphics on tests conducted on Unit 1 diesel generators to attempt to establish a correlation between Unit 1 performance and Unit 2 anticipated performance projections.

b. Observations and Findings

No findings of significance were identified. The resolution of WBN diesel generator capacity document was not adequately clear to provide an understanding of the capabilities claimed in the document. Steady state and transient operations are not clearly defined in the calculations or any other engineering documentation provided to date. The testing procedures and test results do not provide a definitive match between calculated equipment results and actual equipment anticipated performance. Information on 480 volt shutdown board loads applied on the diesel generators are not clearly defined or quantified.

c. Conclusions

The inspectors concluded that Example 9 of the URI remains open pending review of the licensee's revisions of calculations for the emergency diesel loading analysis.

OA.1.5 (Discussed) NRC Bulletin 76-02, Relay Coil Failures – General Electric Type HFA, HGA, HKA, and HMA Relays (IP 51053)

a. Inspection Scope

The inspectors inspected the relays replaced as part of the scope for this bulletin and Bulletin 84-02, Failure of GE Type HFA Relays, In-Use in Class 1E Safety Systems. The inspectors reviewed WO 09-951357-000 to determine the scope of the evaluation for relay type HFA with unique identifier (UNID) number WBN-2-RLY-003-0128B-B for examining the lexan or nylon coils with Tefzel type coils. The inspectors performed similar reviews for WO 110935818 in regards to relay WBN-2-RLY-072-0010B-B, and WO 110935882 for relay WBN-2-RLY-072-0027B-A. The inspectors reviewed the WO to determine that 30RX relays were replaced, wiring identification labels were replaced, wiring conductor terminations used the appropriate torque, the relays were bench tested for electrical and mechanical operation, and that quality controls were applied. The inspectors reviewed PER 363755 regarding the assignment of UNIDs for panels throughout the plant and interviewed the TVA and Bechtel engineers to understand what activities had been achieved. Additional documents reviewed are listed in the attachment.

The following samples were inspected:

- IP 51053 Sections 02.02.e - three samples

b. Observations and Findings

No findings of significance were identified. Additional GE – HFA type relays require evaluations by the applicant to determine compliance with the subject bulletin. During site observations, the inspectors discovered 30RX and 30X relays that were not replaced or evaluated due to lack of UNIDs associated with these relays. The applicant identified a population of these GE – HFA type relays without UNID numbers that need

evaluation. The applicant is in the process of applying these UNID numbers to the rest of the safety-related relays to provide a tracking mechanism for the required evaluation.

c. Conclusions

The inspectors determined that the activities performed at the time of the inspection to correct relay coil failures for GE type HFA, HGA, HKA, HMA relays have been adequately implemented. At the time of the inspection there was a population of relays that had not been included in the original evaluation scope that will require further inspection to verify acceptable resolution.

OA.1.6 (Discussed) Electrical Cable Issues CAP – Sub-issue: Cable Proximity to Hot Pipes (TI 2512/016)

a. Inspection Scope

The inspectors reviewed walkdown documentation on the CAP sub-issue of conduits in close proximity to hot pipes and reviewed the applicant's limited scope walkdown form LSWD-509 to assess the effectiveness of walkdowns. This included review of breakage evaluations performed for safety-related conduits, existing condition sketches with photographs and proposed resolution sketches, and acceptance criteria provided in Specification G40, Rev. 16, Installation, Modification, and Maintenance of Electrical Conduit, Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting, and Miscellaneous Systems. The inspectors reviewed PER 144157 to determine the adequacy of tracking the resolution and design inputs for this CAP. Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified. The information gathered by the applicant during the walkdowns was adequately documented. The applicant provided appropriate proposals for resolution for many of the cases identified. The applicant performed a thorough review of pipe temperature, insulation thickness, anticipated surface temperatures, and existing distance between pipes and conduits or cables in different configurations including installations above, below, and parallel. Evaluations were adequately analyzed based on the installation parameters identified in the Specification G40 listed above.

c. Conclusions

The reviewed documentation was adequate and properly detailed. Inspection of an adequate sample of completed work remains to close this CAP sub-issue.

OA.1.7 (Discussed) Back-up Power Supply for Hydrogen Igniters (TI 2515/174 and IP 51053)

a. Inspection Scope

The inspectors reviewed Unit 2 construction activities for the overall compliance and progress of the generic safety issue (GSI-189) for hydrogen igniter back-up power supply. The inspectors verified the status of construction activities. This included the verification that NRC requirements and Safety Analysis Report (SAR) commitments

were properly translated into design documentation of instrument and electrical components and associated items for Unit 2 to ensure that designs were adequately controlled. Procurement documentation such as the purchase order details and material receiving report of the emergency power supply was reviewed to verify that the type of equipment procured was similar to Unit 1. Additional documents reviewed are listed in the attachment.

b. Observations and findings

No findings of significance were identified.

c. Conclusion

The GSI-189 commitment has not been completed for Unit 2. The inspector will require additional inspection of design, operator instructions, and procedures of the emergency power supply to adequately verify the commitments.

OA.1.8 (Discussed) Electrical Issues CAP – Sub-issue: Cable Separation and Electrical Isolation (IP 51063, TI 2512/016)

a. Inspection Scope

The inspectors evaluated the applicant's actions to resolve the Electrical Issues CAP, Sub-issue of Physical Cable Separation and Electrical Isolation. The inspectors reviewed program activities to confirm that the applicant's program complies with all commitments and NRC requirements. The inspectors reviewed the Physical Cable and Separation Closure Report (CP 5.2) in order to verify that the applicant was taking actions necessary to satisfy the requirements of the CAP. The inspectors reviewed EDCR 55125 and EDCR 55127 for the resolution of physical internal cable separation and electrical isolation breakages identified by calculation EDQ0029920090006, Rev. 0. In order to verify work efforts, the inspectors reviewed WO 111832696 and field change request (FCR) 57336-A. Additional documents reviewed are listed in the attachment.

b. Observation and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the licensee has implemented a process to address physical cable separation and electrical isolation sub-issue. However, additional inspection of work implementation will be required in order to verify adequate completion.

OA.1.9 (Discussed) Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break (MELB) Special Program (SP) (TI 2512/040)

a. Inspection Scope

The objective of this inspection was to evaluate implementation of the MELB SP. This program was established due to the fact that TVA determined that there was inadequate documentation and assurance that design requirements were met to assure MELB

criteria were met. The process consists of an iterative process of walkdowns to confirm field conditions relative to flood-related commodities (curbs, drains, doors, etc.), susceptible piping, and safe shutdown equipment locations; coupled with calculations being updated as required. The applicant also planned to review previous plant modifications for effects on MELB or the need to modify Unit 2 equipment similar to Unit 1. Appropriate modifications were to be initiated as necessary to provide protection of safe shutdown equipment.

Previous inspections were conducted and documented in NRC Integrated Inspection Reports (IIRs) 05000391/2009604, 2010602, 2011602, 2011603, and 2011607. The applicant's plans were previously shown to be equivalent or exceed those performed for Unit 1. Remaining actions included compilation of conduit walkdown results into an EDCR, sealing of conduits, and completion of calculation updates. During this inspection the inspectors reviewed conduit walkdown results (Calculation EDQ00299920100033) and the associated EDCR 57879 to confirm the conduits required to be sealed were clearly identified for construction implementation. In addition, the inspectors reviewed the closure report for the MELB SP dated September 12, 2011. This review included results of the applicant's review of modifications performed on Unit 1 for implications on Unit 2.

b. Observation and Findings

No findings of significance were identified. The conduits required to be sealed were identified in the EDCR. The Unit 1 modifications review was adequate and identified no additional modifications that needed to be performed. The closure report was thorough and clearly showed the remaining actions required to complete the program.

c. Conclusions

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

OA.1.10 (Discussed) Reactor Coolant System Dissimilar Metal Butt Welds (TI-2515/172, Rev. 1)

a. Inspection Scope

The inspectors conducted interviews, reviewed documentation, and observed field activities associated with the volumetric examinations performed for the post-mechanical stress improvement process application for four reactor pressure vessel nozzle dissimilar metal butt welds (2-N-11-SE, loop 2 cold leg; 2-N-12-SE, loop 1 cold leg; 2-N-15-SE, loop 2 hot leg; and 2-N-18-SE, loop 3 hot leg). This was performed to determine whether activities were conducted in accordance with the guidance in ERPI (Electric Power Research Institute) MRP-139, "Primary System Piping Butt Weld Inspection and Evaluation Guideline," Rev 1. The review included direct observation of the examinations, a review of personnel qualifications, a review of the procedures used, and a review of the performance and verification records. See the attachment for additional documents reviewed and specific responses to the reporting requirements for TI-2515/172.

b. Observation and Findings

No findings of significance were identified.

c. Conclusions

Based on observed activities, the licensee's program will ensure the intended safety objective of ensuring the integrity of Alloy 600 reactor coolant system butt welds scoped into MRP-139.

OA.1.11 (Discussed) Safety Related Motor Operated Valve (MOV) Testing and Surveillance (GL 89-10) and Periodic Verification of Design-Basis Capability of Safety Related MOVs (GL-96-05) (TIs 2515/109 and 2515/140)

a. Inspection Scope

The inspectors reviewed four MOV thrust and torque capability engineering calculations to determine if the actuator selections and switch settings were in compliance with applicable site specifications and design requirements. The inspectors compared the engineering calculations to the TVA Mechanical Design Standard for MOV Design Basis and Joint Owner's Group (JOG) Review Methodologies DS-M18.2.22, Rev 3, Mechanical Design Standard for Motor Operated Valve Thrust and Torque Calculations DS-M18.2.21, Rev 18. The inspectors reviewed the design control for motor and actuator sizing, torque, limit switch settings, and thermal overload protection to determine if the assumptions used by the licensee were acceptable.

The inspectors observed two static MOV diagnostic tests to determine if the limit switches and mechanical stops were properly set and if the test activities were properly controlled and handled. The inspectors used work instructions, applicable design specifications, calculations, work packages, and approved procedures to make those determinations. The inspectors reviewed training records for personnel associated with MOV testing to determine if the personnel supervising and conducting the tests were qualified in accordance with the applicant's procedures. The inspectors reviewed the applicant's method of storing and controlling motor-operated valve test system (MOVATS) data to determine if the applicant was adequately controlling the data in accordance with procedure NPG-SPP-31.2, Records Management, Rev. 2

The inspectors reviewed the list of MOVs included in the applicant's Unit 2 generic letter (GL) 89-10 program to determine if the scope was appropriate. To make this determination, the inspectors reviewed a sample of 17 excluded MOVs and all of the included MOVs to determine if their exclusion or inclusion was appropriate. Further, the inspectors reviewed system descriptions, the Unit 2 FSAR, the Unit 1 GL 89-10 program, design basis calculations, and emergency operating procedures to identify MOVs that were required to be scoped in the applicant's program per GL 89-10. The inspectors compared this list against those included in the applicant's program to determine if they were all included in the applicant's GL 89-10 program.

The inspectors reviewed thermal overload calculation EDQ00299920080004, Rev. 12, to determine if the applicant appropriately sized the thermal overload heater elements for six GL 89-10 MOVs in accordance with the Design Criteria for Low and Medium Voltage Power Systems WB-DC-30-28, Rev 20. The inspectors also reviewed the calculation to

determine if it complied with the applicable design criteria, included the correct design inputs, and used appropriate calculation methods.

The inspectors reviewed applicable MOV testing procedures to determine if the applicant incorporated operating experience, vendor notifications, and 10CFR21 notifications into the GL 89-10 program. The inspectors interviewed personnel to determine if the applicant's processing and control of MOV operating experience, vendor notifications, and 10CFR21 notifications included current information.

The inspectors reviewed ten (10) corrective action documents and four (4) QA surveillances of MOV work to determine if the applicant was entering issues into their corrective action program at an appropriate threshold, prioritized the issues appropriately, evaluated issues properly, developed corrective actions appropriate to the significance of the issues, and appropriately implemented the corrective actions.

See the attachment for additional documents reviewed and specific responses to the reporting requirements for TIs 2515/109 and 2515/140. Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on the activities reviewed, MOV testing was conducted by qualified individuals using qualified procedures, design calculations were performed in accordance with applicable specifications, and the applicant properly controlled the GL 89-10 program. Further, the applicant adequately dispositioned MOV deficiencies and maintained an appropriate operating experience program for MOVs. Based on this limited review and the remaining actions by the applicant, no additional conclusion is warranted for this inspection.

OA.1.12 (Discussed) Inspection of HVAC Duct and Supports CAP (TI 2512/025, IP 50100)

a. Inspection Scope

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

- 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 via the following four 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, and performing unique evaluations or modifying installations when they could not be qualified by the critical case evaluations

The Unit 2 program uses the Unit 1 approach and also addresses TVA's past corrective action tracking documents (CATDs):

- 11103-WBN-06 – Duct support documentation and as-constructed drawing discrepancies require further evaluation and correction
- 80214-WBN-01 – HVAC support was final inspected and documented, but inspection was performed prior to approval of design drawing. (Although support ID has a Unit 2 designation, run of duct was determined to be common during the Unit 1 CAP. Thus, it was walked through, evaluated, and qualified under Unit 1 CAP).

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

TVA letter dated September 6, 1991, "WBN – Nuclear Performance Plan," Volume 4, Revision 1, Section III.2.10, Heating, Ventilation, and Air Condition Duct and Duct Supports Corrective Action Program," proposed their approach for resolving the HVAC CAP. In a letter from R. R. Baron to the NRC dated October, 10 1995, TVA notified the NRC of the completion of the HVAC CAP on Unit 1. For the Unit 2 HVAC CAP, TVA stated in their September 26, 2008, letter to the NRC that the Unit 1 approach would be used for Unit 2.

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 SPs. The staff concluded there was reasonable assurance that, when implemented as described, the HVAC CAP will be appropriately resolved for Unit 2.

Inspection Activities: Based on results documented in IIR 05000391/2010604, inspection activities focused on additional review of programmatic aspects with an emphasis on field implementation of the HVAC CAP. Specifically, inspectors reviewed walkdown packages and design calculations for HVAC supports and ducts that were considered acceptable without additional modifications.

As part of the inspection activities, the inspectors collected critical measurements identified by the applicant's walkdown procedure for approximately 40 unmodified HVAC supports and 26 runs of HVAC duct. The inspectors compared the results for consistency with the requirements of the walkdown procedure and the applicant's walkdown packages. The inspectors also compared the walkdown packages to the corresponding design calculations to ensure that data used in the qualification of unmodified supports accurately reflected conditions found in the field.

The inspectors reviewed design calculations used in the qualification of the unmodified supports and compared them with the requirements of the Design Document Criteria, WB-DC-40-31.8, "Seismically Qualifying Round and Rectangular Duct." This was performed to ensure that the requirements of the design criteria were translated into the design calculations. Finally, the inspectors performed a review of engineering specifications for adequacy. Specific specifications included G-95, "Installation, Modification and Maintenance of HVAC Duct"; N3M-914, "Quality Assurance Requirements for Construction, Construction Testing, and Inspection of Safety-Related HVAC Systems"; and N3C-942, "Structural Requirements for HVAC Ducts and Ducts Supports."

Additional documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that TVA's implementation of the HVAC CAP plan for the documentation and qualification of unmodified supports was adequate. Additional inspections will be required to evaluate the adequacy of field implementation for modified supports.

OA.1.13 (Discussed) QA Records CAP (TI 2512/028, IPs 51055 and 51065)

a. Inspection Scope

The inspectors reviewed a sample of electrical QA records that consisted of cables, cable trays, electrical conduit, and electrical equipment. The inspectors reviewed the applicant's sample assessment of the records to verify that the records specified the correct component type and location, that the functional specifications were met, that the required QA/QC inspections were performed, and that they were complete and legible.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

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

OA.1.14 (Closed) Structural Concrete – Procedures Review (IP 46051)

a. Inspection Scope

The purpose of this IP was to determine if the Watts Bar Unit 2 structural concrete requirements in the SAR were adequately addressed in the construction specifications, drawings, and work procedures, and whether the established system of management controls was adequate. Reconstitution of this IP was determined to be unnecessary because the programs, instructions, and procedures were common during initial

construction of both units, and the Unit 1 reconstitution effort documented in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix F, "Structural Concrete," confirmed adequate reviews were completed. However, a sample of existing procedures in the area of structural concrete covered by this IP were inspected to ensure that no significant change was made since the initial construction effort, and to determine if any changes would invalidate previous reviews. A majority of the structural concrete work was completed during initial construction efforts as documented in historical Unit 1 and Unit 2 inspection reports prior to 1985.

Section 02.01 of this IP requires the completion of IP 35100, which was completed and documented in Integrated Inspection Report (IIR) 05000391/2009602, Attachment 3. Sections 02.02 and 02.03 of this procedure require a determination on whether an audit program was established to address the safety-related work and control functions in the area of structural concrete. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3, as well.

Section 02.04 requires a review of the concrete mix designs, supporting material qualifications, and testing to be used in Category I structures. Items related to this IP section were recently inspected and documented in IIRs 05000391/2009603, 05000391/2009604, 05000391/2010603, 05000391/2010604, 05000391/2010605, 05000391/2011602 and 05000391/2011603. These inspections did not identify substantial changes that would invalidate the initial construction inspection efforts. In addition, IIR 05000391/2009603 documented the review and closure of the Watts Bar Unit 2 Concrete Quality Special Program (TI 2512/033). This special program was developed to address the following three significant issues related to concrete quality:

- Some concrete mixes did not meet design compressive strength requirements
- The use of mortar was not properly controlled
- Concrete sampling frequencies did not always comply with the requirements identified in specifications

NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix F, "Structural Concrete," stated that essentially all the structural concrete had been placed by 1983 and no significant mix changes have been made since then.

Section 2.05 requires the review of construction specifications related to structural concrete activities to verify conformance with applicable technical requirements. Items related to this IP section were recently inspected and documented in IIRs 05000391/2009603, 05000391/2009604, 05000391/2010603, 05000391/2010604, 05000391/2010605, 05000391/2011602 and 05000391/2011603. These inspections did not identify substantial changes that would invalidate initial construction efforts and/or commitments. As stated in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix F, "Structural Concrete," the majority of the TVA construction specifications, associated with structural concrete, were previously inspected by NRC as they also applied for Unit 1 and no major changes had been identified. Therefore, this section is considered complete as documented in NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1," Appendix F, "Structural Concrete."

Section 02.06 of this procedure requires a review of the QC procedures. Inspection required by Section 02.06 were completed and documented in IIR 05000391/2009602, Attachment 3. This section also requires the review of the construction procedures associated with structural concrete generated from the specifications to determine adequacy. TVA procedure MAI-5.10 "Concrete Placement, Surface Preparation, Placing, Finishing, Curing, and Testing" and TVA procedure MAI-5.4 "Concrete Removal, Repair, Grouting, and Dry Packing" were inspected and reviewed during previous inspections and during this inspection period.

The following samples were inspected:

- IP 46051 Section 02.01 – Closed. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.
- IP 46051 Section 02.02 – Closed. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.
- IP 46051 Section 02.03 – Closed. These requirements were completed and documented in IIR 05000391/2009602, Attachment 3.
- IP 46051 Section 02.04 – Closed. These requirements were completed and documented in NUREG-1528, Appendix F "Structural Concrete." These items have also been inspected during recent Unit 2 construction inspections.
- IP 46051 Section 02.05 – Closed. These requirements were completed and documented in NUREG-1528, Appendix F "Structural Concrete." These items have also been inspected during recent Unit 2 construction inspections.
- IP 46051 Section 02.06 – Closed. Two samples of new project procedures inspected and documented in this inspection report.
- IP 46051 Section 02.07 – Not applicable because the systematic assessment of licensee performance (SALP) program is no longer in use.

b. Observations and Findings

No findings of significance were identified. A majority of the items have been previously inspected under Unit 1 inspection activities and during recent Unit 2 construction inspections.

c. Conclusions

The procedures and records reviewed during this and prior inspection periods, associated with structural concrete, were found to conform to the applicable regulatory requirements. This IP is considered closed; however, if major changes to the applicant's instructions and procedures are identified through observation of future work activities associated with structural concrete, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

OA.1.15 (Closed) Example 1 of URI 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: The inspectors' review of the applicable calculations on a previous inspection concluded that setpoints for the high containment sump level and the associated analytical limits were not adequately supported. The inspectors reached this conclusion because none of the calculations reviewed adequately addressed the basis

for the analytical limits, particularly the lower limit. The selected high level setpoint was based on a Westinghouse calculation without demonstrating its adequacy against the analytical limits.

Inspection Activities: The inspectors reviewed PERs 334094 and 334077 documenting the applicant's disposition of Example 1 of the URI. The inspectors reviewed the revised calculations to determine their adequacy.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that the calculations were not inadequate; however the applicant revised the calculations to add clarity. In PER 334094, calculation WBNOSG4071 - RWST and Containment RHR Sump Safety Limits, Analytical Limits and Set Points was updated in Rev. 21 to provide a technical basis for the 15 percent instrument allowable error assumed in the calculation. For PER 334077, calculation CN-CPS-09-127, Containment Sump Level Setpoint and Scaling Document (SSD) Supporting Calculation, was updated in Rev. 1 to evaluate the instrument inaccuracies between the containment sump setpoint and the established analytical limits for sump level.

c. Conclusions

The inspectors concluded that Example 1 of the URI concerning the settings of the high containment sump level is closed.

OA.1.16 (Closed) Example 2 of URI 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: The inspectors found errors in draft revisions to wiring diagram drawings 2-45W760-63-3 and 2-45W760-63-5 on a previous inspection. This problem was documented in PER 325122.

Inspection Activities: The inspectors reviewed the corrected drawings and discussed the origin of the problem with responsible engineers.

b. Observations and Findings

No findings of significance were identified. The errors were associated with draft revisions and considered work in progress. The inspectors determined that the reason for the drawing errors was imprecise directions given to technicians for previous drawing revisions.

c. Conclusions

The inspectors concluded that Example 2 of the URI concerning drawing errors is closed.

OA.1.17 (Closed) Example 3 of URI 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: Following a battery discharge, the battery chargers automatically switch to current limit mode. At Watts Bar, the charger current limit is set at 125 percent of the nameplate rating. The diesel generator loading calculations did not consider the battery charger load to be at current limit.

Inspection Activities: The inspectors reviewed the revised diesel loading calculation EDQ00099920080014, Rev. 011, Diesel Generator Loading Analysis, to confirm that the calculation postulates the battery chargers operate at 125 percent of the nameplate rating. The inspectors reviewed PERs 334082 and 375347 to verify the status and documentation of the corrective action that revised the calculations to include battery charger current limit operations when this load is applied on the EDGs.

b. Observations and Findings

No findings of significance were identified. The inspectors confirmed that the revised calculations include the loads of the battery chargers operating at current limit levels of 125 percent of nameplate rating. The inspectors determined that the increased load was a very small percentage (0.3%) of total load and therefore represented a minor violation.

c. Conclusions

The inspectors concluded that Example 3 of the URI concerning the load on EDGs from battery chargers following a battery discharge was resolved. This item is closed.

OA.1.18 (Closed) Example 4 of URI 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: Battery charger calculations did not include information on the performance capability of the new battery chargers. These calculations did not provide a match between system load at the output of the charger and the required ampacity output to achieve battery recharge time limits as committed in the FSAR.

The inspectors reviewed the updated 125V DC Vital Battery System Analysis calculation EDQ00023620070003, Rev. 012, to verify the analysis on the new battery chargers and their ability to support DC system loads in addition to charging the batteries within the committed time of 36 hours for a 4-hour discharge during a Condition I, Station Blackout (SBO), and 12 hours for a 30-minute discharge during a Loss of Coolant Accident (LOCA) and/or Loss of Offsite Power (LOOP) as described in the FSAR. The inspectors reviewed PER 375350 to verify documentation for the applicant's corrective action program to address battery charger calculation issues identified during the independent design verification program inspection.

b. Observations and Findings

No findings of significance were identified. The inspectors observed that the calculations provide the necessary evaluation of battery charger capabilities to match FSAR commitments and that the updated calculations represented clarifications.

c. Conclusions

The inspectors concluded that Example 4 of the URI concerning battery charger calculations to determine the capacity to recharge the batteries within the time limits established by the FSAR was resolved. This item is closed.

OA.1.19 (Closed) Example 5 of URI 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: The electrical power system voltage drop calculations address minimum DC voltage requirements to operate individual components, short circuit current rating, battery sizing, cable sizing, load sequencing, aging derating, temperature derating, and load profiles. Separate calculations were developed for Unit 1 and Unit 2 independently. However, those calculations had not been merged to address multi-unit load analysis assuming a postulated accident in one unit and the simultaneous capability to safely shutdown the second unit.

Inspection Activities: The inspectors reviewed 125V DC Vital Battery System Analysis calculation EDQ00023620070003, Rev. 12, documenting battery loading profiles and total amp-hour discharge for the individual battery strings to verify that the calculations for both Unit 1 and Unit 2 have been merged to address multi-unit operations. The inspectors reviewed PER 375350 to verify documentation for the applicant's corrective action program to address battery charger calculation issues identified during the independent design verification program inspection. The inspectors reviewed the explanations provided for the mismatch identified between manual calculation EDQ00023620070003 125V DC Vital Battery System Analysis and Electrical Transient Analyzer Program (ETAP) calculations. The inspectors verified that the revised calculation EDQ00023620070003 considers aging and temperature deratings in the same manner in which these were identified in the ETAP calculations.

b. Observations and Findings

No findings of significance were identified. The inspectors determined that discrepancies were a result of different calculational methods and the applicant has appropriately employed conservative measures. The revised calculation on the 125v dc vital battery system provided adequate resolution to discrepancies observed in previous revisions.

c. Conclusions

The inspectors concluded that Example 5 of the URI concerning DC distribution system voltage drop calculations and discrepancies between 125v dc vital battery system analysis calculations EDQ00023620070003 and ETAP calculations were resolved. This item is closed.

OA.1.20 (Closed) Example 6 of URI 05000391/2011606-01, Electrical Design Issues Requiring Additional Review (TI 2515/107)

a. Inspection Scope

Background: Time-current curves shown for the protective relays on the Unit 2 6600V motors used a GE Multilin digital relay curve to replicate the GE IAC and IFC electromechanical relays. The correlation between the IAC/IFC time-current curves with the Multilin curves had not been established in the calculation.

Inspection Activities: The inspectors reviewed the protective relay time-current curves used for the Unit 2 6600V motors to verify that the appropriate time-current curves for the GE IAC and IFC electromechanical relays that were employed. The inspectors reviewed ETAP Star plots and vendor relay curves verification process from calculation EDQ00299920080016, Rev. 000, Appendix D, to determine a proper match between electromechanical device published time current curves and those developed by ETAP for the different components included in the calculation. The inspectors' review included components such as 500 KVA transformer 2A-A on sheet 62, condenser circulating pump on sheet 125 (graphs on CB1214/1632), centrifugal charging pump 2A-A on sheet 50 (CB 1816), 6.9 kV RCP 2A on sheet 134 (GE IAC77), and containment spray pump 2A-A (CB 1818 GFP) on sheet 19. The inspectors reviewed the corrective action activities outlined in PER 334092 for a resolution to this URI. The inspectors reviewed the corrective action activities outlined in PER 334092 for a resolution to this URI.

b. Observations and Findings

No findings of significance were identified. In each of the different coordination and relay setting curves shown in the calculations using electromechanical protective relays, a minimum of three points were chosen to verify accuracy of the calculated coordination results with manufacturer's published curves. In every case the curves showed a match with actual manufacturer curves.

c. Conclusions

The inspectors concluded that Example 6 concerning the accuracy of time-current curves used for protective relays in calculations is resolved. This item is closed.

OA.1.21 (Closed) URI 05000391/2011603-05, Potential Inadequate Disposition and Verification of Relay Seismic Qualification Test Failure (IP 51053)

a. Inspection Scope

Background: This URI involved the qualification report QTR10T3000-06, Rev. 0, by ATC Nuclear, for adequate seismic qualification testing and commercial-grade dedication of installed Westinghouse/Cutler-Hammer control relays. During the seismic qualification process, it was reported in Notice of Anomaly (NOA) 10T3000-2 that the test specimen (00136380-1-1) failed due to detected chatter in excess of 2 milliseconds (ms). A supplier disposition deviation request was submitted to inform about the chatter and the applicant rejected the relay. A retest was requested for the relay using a faster sampling rate in the data acquisition system (DAS). According to NOA 10T3000-3, while the relay was being retested, during the second safe shutdown earthquake attempt, the original specimen lost structural integrity. The failure was dispositioned as fatigue due to over-testing. It was determined that the test specimen (00136380-1-1) would be scrapped and a new specimen (00136380-1-7) tested. Post-seismic testing datasheets of the new

specimen (00136380-1-7) were included in the report and indicated the new specimen passed the seismic test.

The qualification report section, "Qualification Program Test Anomaly," referenced the two NOAs and explained that during the retest of the first test specimen (00136380-1-1) it was determined that chatter seen during the initial testing was due to aliasing of the DAS and when the sampling rate was increased, chatter less than 2ms was observed. However, through interviews and further review, the inspectors determined that this conclusion was associated with the new specimen (00136380-1-7). There was no documentation of acceptable chatter observed in the first specimen after corrections were made to the DAS. The inspectors were concerned that the applicant had not adequately evaluated the disposition of chatter to assure that relays in this lot would function properly. The NRC inspectors evaluated the applicant's response to URI 2011603-05. Documents reviewed are listed in the attachment.

b. Observations and Findings

The inspectors identified the following violation.

Introduction: The inspectors identified a Severity Level (SL) IV non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services," for the inadequate control of purchased material. The applicant failed to assure that a seismic qualification test failure was adequately documented, evaluated, and dispositioned, and have documentary evidence that equipment conformed to the procurement requirements.

Description: The inspectors evaluated the applicant's response to URI 2011603-05. The applicant requested clarification of the seismic test results of test specimen (00136380-1-1). The vendor provided corrective action request 10T-102, dated December 21, 2010, in which they identified that the reason for the aliasing in the DAS was due to a 1kHz sample rate, which caused data acquired to not accurately represent the chatter that was occurring and led to false identification of chatter in excess of 2ms. The applicant received new information by email from the vendor that confirmed that the sampling rate of the second test specimen (00136380-1-7) was 5 kHz as opposed to the initial rate used of 1 kHz. When asked if the first test specimen (00136380-1-1) experienced any chatter during the retest, the vendor replied that "the chatter data for the re-shake of the original item was not available for review to determine the answer to the question." Subsequent information indicated that the DAS sampling rate of 5 kHz was used during the retest of the first test specimen (00136380-1-1) with no evidence of chatter in excess of 2ms. This information also indicates that there was not a technical evaluation completed that justified aliasing as the cause of the indicated chatter in excess of 2ms and as an adequate reason to invalidate the test of the first specimen.

The evaluation of the structural failure of the first test specimen (00136380-1-1) was not provided in the qualification report. In order to address questions regarding the disposition of the failure, the applicant provided pictures of the first test specimen which revealed the broken mounting bolt of the relay. The applicant was not able to clearly explain why the test results of the second test specimen (00136380-1-7) were written in the verification of disposition section of the NOA reports for the first specimen.

The inspectors determined that there was no documentary evidence to support the dispositions of the relays or that provided objective evidence that the test of the first

specimen (00136380-1-1) was invalid due to aliasing in the DAS and that the structural failure that occurred during the retest of the first test specimen was due to over-testing. The inspectors determined that the applicant failed to obtain objective evidence of quality furnished by the contractor to ensure that the relays conformed to seismic qualification requirements.

The finding was determined to be more than minor because it represents an irretrievable loss of evidentiary documentation preventing objective assessment of test results and an inadequate quality oversight function that rendered the qualification of the relays indeterminate. The finding is a SL IV violation because it was not representative of a breakdown in the QA process. The cause of this finding was related to H.4(c) work practices component of the Human Performance cross-cutting area because of the lack of the applicant to ensure supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported. The applicant initiated PER 443185 into their corrective action program with actions to provide a detailed analysis to support that aliasing caused the relay chatter in the first test specimen (00136380-1-1) and that the bolt broke due to over-testing of the same test specimen.

Enforcement: 10 CFR, Part 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, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to procurement documents. These measures shall include provisions, as appropriate, for objective evidence of quality furnished by the contractor or subcontractor and examination of products upon delivery. Documentary evidence that material and equipment conform to the procurement requirements shall be available at the nuclear power plant prior to installation or use of such material and equipment.

Contrary to the above, on December 13, 2010, measures were not adequate to ensure that the purchased services conformed to procurement documents or that documentary evidence existed to assure that equipment conformed to the procurement requirements. The applicant failed to assure that a seismic qualification test failure due to chatter in excess of 2ms was adequately evaluated and dispositioned in qualification report QTR10T3000-06, Rev. 0, associated with test specimen 00136380-1-1 prior to the installation of the relays.

Because this was a SL IV violation and because it was entered into the licensee's corrective action program, PER 443185, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000391/2011608-01, "Failure to Provide Documentary Evidence that Purchased Material Conformed to Procurement Documents."

c. Conclusions

The inspectors concluded that concerns pertaining to URI 05000391/2011603-05 associated with seismic qualification of safety-related control relay are closed. The inspectors identified one non-cited violation as NCV 05000391/2011608-01, "Failure to Provide Documentary Evidence that Purchased Material Conformed to Procurement Documents."

OA.1.22 (Closed) Electrical Components and Systems – Procedure Review (IP 51051)**a. Inspection Scope**

The purpose of this inspection procedure was to determine whether the technical requirements established for electrical components and systems at the facility have been adequately translated into applicable specifications, drawings, instructions, and procedures. The inspection procedure also called for inspectors to determine whether the applicant's QA manual established quality plans, instructions, and procedures for control and installation of safety-related electrical components and systems in a manner that was consistent with the facility safety analysis report. In addition, the inspectors were to determine if any generic problems or weaknesses existed with the functions performed by organizations to control the content and use of procedures, instructions, drawings, and specifications for electrical components and systems.

The Unit 1 reconstitution of this inspection procedure was documented in Appendix K to NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1." The reconstitution demonstrated that adequate reviews had been completed. The reconstitution result was also documented in IIR 50390/9545. However, a sample of procedures in the area of electrical components and systems was inspected since the reconstitution was completed, and the results are documented in this report.

Section 02.01 of this IP requires the completion of NRC IP 35100, which was completed and documented in the IIR 05000341/2009602, Attachments.

Sections 02.02.a and 02.02.d of this IP require the determination on whether adequate receipt and handling procedures are provided on received components to verify that these are as specified, properly identified, and include input from other groups to validate receipt inspection activities and procurement requirements. This IP section requires verification that tests have been adequately documented and controlled.

Section 02.02.b of this IP requires the determination that storage procedures maintain proper storage environments to meet classification levels and establishment of periodic verification that ensure special and storage requirements are met.

Section 02.02.c of this IP requires that work procedures be established to ensure NRC requirements and SAR commitments are properly translated for adequate control and installation, interface controls between multiple contractors, and covering any requirements for special handling, maintenance, and protection.

Section 02.02.e of this IP requires that inspection procedures are established to ensure safety-related aspects of construction are included in the scope of planned inspections, with sufficiently defined acceptance criteria and proper records of initial and follow-up inspection results.

Section 02.02.f of this IP requires that procedures are established to ensure special conditions of testing electrical components are included and described in proper detail.

Section 02.02.g of this IP requires that procedures are established to control design and field changes.

The inspectors identified additional inspections that were completed and documented in the following inspection reports.

- Section 02.02.a – IIRs 05000391/2010605, Section C.1.12 and 05000391/2009603 Section C.1.6. (3 samples)
- Section 02.02.b – IIRs 05000391/2010605, Section C.1.12 and 05000391/2009603 Section C.1.6. (3 samples)
- Section 02.02.c – IIRs 05000391/2009602 Section C.1.3, and 05000391/2009603, Section C.1.6. (2 samples)
- Section 02.02.d – IIR 05000391/2009603 Section C.1.6. (1 sample)
- Section 02.02.e – IIR 05000391/2009602 Section C.1.3. (1 sample)
- Section 02.02.f – IIR 05000391/2009604 Section C.1.9. (1 sample)
- Section 02.02.g – IIR 05000391/2010605 Section C.1.12. (1 sample)

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that a sufficient number of inspection samples have been completed to evaluate the adequacy of procedures for the control and installation of electrical components and systems. This inspection procedure is considered to be closed; however, if major changes to the applicant's instructions and procedures are identified through observation of future work activities associated with electrical components and systems, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

OA.1.23 (Closed) Electrical Cable – Procedure Review (IP 51061)

a. Inspection Scope

The purpose of this inspection procedure was to determine whether the technical requirements contained in the SAR for safety-related electrical cables, terminations and associated items have been adequately translated into applicable specifications, drawings, instructions, and procedures. The inspection procedure also called for inspectors to determine whether the applicant's QA plans, instructions, and procedures for control and installation of safety-related electrical cables, terminations, and associated items have been established in licensee and contractor QA manuals in conformance with the QA program described in the facility SAR. In addition, inspectors were to determine if any generic problems or weaknesses existed within the operation of organizations responsible for QA programs and work specifications and instructions for control and installation of electric cables, terminations, and associated items.

The Unit 1 reconstitution of this inspection procedure was documented in Appendix K to NUREG-1528, "Reconstitution of the Manual Chapter 2512 Construction Inspection Program for Watts Bar Unit 1." The reconstitution demonstrated that adequate reviews had been completed. The reconstitution result was also documented in IIR 50-390/95-45. However, a sample of procedures in the area of electrical cables was inspected since the reconstitution was completed, and the results are documented in this report.

Section 02.01 of this IP requires the completion of NRC IP 35100, which was completed and documented in IIR 05000341/2009602, Attachment 3.

Section 02.02.a of this IP requires the determination on whether adequate receiving inspection procedures are provided on received components to verify that these are as specified, properly identified, and to include input from other groups to validate receipt inspection activities, and procurement requirements. This IP section requires verification that tests have been adequately documented and controlled.

Section 02.02.b of this IP requires the determination that storage procedures maintain proper storage environments to meet classification levels and establishment of periodic verification that ensure special and storage requirements are met.

Section 02.02.c of this IP requires that work procedures be established to ensure NRC requirements and SAR commitments are properly translated for adequate control and installation of electric cable and associated items.

Section 02.02.d of this IP requires that inspection procedures be established to provide positive identification of cable systems, determination that all technical aspects of installation, testing, maintenance and protection conform to specifications, proper personnel qualifications, and data recording of inspection reports.

Section 02.02.e of this IP requires that construction testing procedures are established to ensure that required construction testing is controlled and performed by qualified personnel, proper type of test equipment is specified, include sufficiently defined acceptance criteria and proper records of test results with evaluations by qualified personnel, and that discrepancies are resolved.

Section 02.02.f of this IP requires that a program has been established to ensure that all craft, examination and inspection personnel associated with electric cable systems are trained and qualified to perform their assigned duties.

Section 02.02.g of this IP requires that procedures are established to control design and field changes.

The inspectors identified additional inspections that were completed and documented in the following inspection reports.

- Section 02.02.a – IIR 05000391/2009603, Section C.1.6 (1 sample)
- Section 02.02.b – IIR 05000391/2009603 Section C.1.6. (1 sample)
- Section 02.02.c – IIR 05000391/2009602 Section C.1.7, and 05000391/2009603, Section C.1.6. (2 samples)
- Section 02.02.d – IIR 05000391/2009602 Section C.1.7. (1 sample)
- Section 02.02.e – IIR 05000391/2009602 Section C.1.3. (1 sample)
- Section 02.02.f – IIRs 05000391/2009604 Section T.1.1, and 05000391/2010604, Section T.1.1 (4 samples)

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that a sufficient number of inspection samples have been completed to evaluate the adequacy of procedures for the control and installation of electrical cables. This inspection procedure is considered to be closed; however, if major changes to the applicant's instructions and procedures are identified through observation of future work activities associated with electrical cables, the inspectors will inspect those as necessary to satisfy the requirements in this procedure.

OA.1.24 (Closed) Conduit Overfill Condition URI 86-24-05 (IP 51053)

a. Inspection Scope

Background:

The inspectors reviewed the applicant's open items / commitment completion form NGDC PP-19-2 in reference to NCR WBN7099PER and URI 391/86-24-05 to verify actions to track the resolution of the overfill condition in Unit 2. The inspectors reviewed FCR 58434-A on WO 112218169 to revise the size for conduit 2PLC2020, and WO 112517999 to delete cables 2A6221, 2A6222, and reinstall cable 2PL781 in conduit 2PLC2021. The inspectors reviewed conduit evaluation sheet WBN-EEB-EDQ00299920080021, R. 0 Appendix 9.5, for conduit overfill evaluation covering conduits with low risk for damage due to pullby concern dispositioned "accept-as-is", and Appendix 9.8 for conduits "reclassified" into low risk dispositioned "accept-as-is" after field verification including conduit 2VC0494B walkdown data to confirm 13.1 percent fill, instead of the design information calculated at 103.49 percent fill. The inspectors reviewed EDCR 54144 to verify resolution of PER 143626 addressing the overfill condition indicated in the original URI 86-24-05 that disconnected a number of cables such as 2PM4463A, 2PM4483A, 2V981A, 2V991A, 2V1070A, and 2V1090A.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that, based on the review of documentation available on PERs, FCRs, and WOs, there is sufficient evidence the issues associated with this URI were adequately addressed and are effectively tracked to close this item.

OA.1.25 (Closed) Construction Deficiency Report (CDR) 50-391/84-11: New Deficiencies in Barton Pressure Transmitters (IP 52053)

a. Inspection Scope

Background: Westinghouse notified TVA in 1982 that some Barton Model 763 and 764 transmitters located in a harsh environment were potentially subject to additional errors at elevated temperatures due to calibration techniques and electrical leakage through the zero and span potentiometers. This subject deficiency was initially reported to the NRC in accordance with 10 CFR 50.55(e) as NCR WBN NEB 8401. The manufacturer corrected the issue in transmitters manufactured or repaired at their facility since January 1, 1983.

Inspection Activities: The inspectors reviewed the PER associated with this issue, along with the associated closure package. Four transmitters associated with reactor coolant system (RCS) pressurizer pressure for Unit 2 were identified with this issue in both the PER and the closure package. The inspectors reviewed the EDCRs associated with the transmitters identified in the PER to verify that the EDCRs provided instructions to install new transmitters and that references to material requests or purchase orders existed for the new transmitters. The inspectors also reviewed EDCRs associated with transmitters for Unit 1 that had been dispositioned as located in a non-harsh environment to verify that the EDCRs adequately addressed these types of transmitters.

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors concluded that the actions as outlined in the PER and EDCRs adequately address the issue in CDR 391/84-11. Based on the results of this inspection, this item is closed for the Unit 2 completion project.

OA.1.26 (Closed) CDR 391/86-60: Questionable Weld Radiographs Previously Accepted (IP 57090)

a. Inspection Scope

Background: In November 1986, the applicant informed the NRC that two weld radiographs, which had been accepted, contained rejectable indications.

Inspection Activities: The corrective actions on Unit 1 included a 100 percent review of all existing weld radiographs. This represented about 2700 welds, 350 of which were rejected.

The applicant's corrective actions on Unit 2 were identical to Unit 1. A 100 percent re-review of all existing radiographs was performed. Radiographs with unacceptable film quality were rejected and re-shot, and welds with rejectable indications were evaluated on a case-by-case basis.

This CDR is identical to Welding CAP Sub-Issue 1, Radiographs for ASME Piping Welds. NRC inspector activities for this CDR/Welding CAP sub-issue are documented in the following report sections:

- 05000391/2010604 OA.1.2
- 05000391/2010605 OA.1.9

b. Observations and Findings

No findings of significance were identified during inspection activities related to Welding CAP Sub-Issue 1.

c. Conclusions

The corrective actions for this CDR are still ongoing. However, because this issue is identical to Welding CAP Sub-Issue 1, and since that sub-issue requires no further inspection and is considered closed, this item is therefore closed.

OA.1.27 (Closed) Inspector Follow-up Item (IFI) 05000391/90-27-20, Motor Operated Valves Thermal Overload Trip Setting (IP 51053)

a. Inspection Scope

Background: In 1990, the NRC identified a deficiency with the applicant's criterion for establishing the trip setpoint for MOV thermal overload relays. The criterion called for choosing an overload heater size that would cause the relay to operate when it sensed locked rotor current for 16 - 30 seconds. This criterion, by itself, was inadequate because current that the relays would see during the stroke times and duty cycles were not considered; therefore, the relays could have interfered with the MOVs completing their safety-related duty cycles.

Inspection Activities: The inspectors reviewed thermal overload calculation EDQ00299920080004, Rev. 12, and design specification WB-DC-30-28, Rev. 20, to determine if the heater sizing criteria could have interfered with the MOVs completing their safety-related duty cycles. The inspectors reviewed calculations for six MOVs in detail to determine if their thermal overload relays were sized appropriately. The inspectors reviewed the design specification to determine if the applicant corrected the improper sizing criteria as described in the IFI and whether the sizing criteria were consistent with IEEE Standard 741-1990, "IEEE Standard Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations."

Specific documents reviewed are listed in the attachment.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on the activities selected for review, the applicant correctly sized the thermal overload heaters for the population of GL 89-10 MOVs to allow the MOVs time to complete their safety-related duty cycles. The applicant adequately addressed the issues associated with this IFI. IFI 05000391/90-27-20 is closed.

OA.1.28 (Closed) CDR 50-391/82-18, Failure of Limitorque Motor Operators During Valve Closure (IP 50075)

a. Inspection Scope

Background: In 1990, the applicant notified the NRC of a deficiency they identified with Limitorque model SB-00 valve actuators. The SB-00 design utilized a floating drive sleeve restrained in the axial direction by Belleville springs enclosed in a cast iron housing that receives the motor torque after the springs have compressed. On each of the failed actuators, the cast iron housing fractured during valve closure. The applicant's

corrective actions consisted of replacing all SB-00 cast iron compensator housings with ductile iron housings.

Inspection Activities: As described in IIR 05000391/2011607, the inspectors previously confirmed that the applicant purchased new actuators for all Unit 2 safety-related MOVs. For this inspection, the inspectors reviewed procurement documents to determine if the applicant specified ductile iron compensator housings for each of the new safety-related SB-00 actuators. The inspectors reviewed receipt inspection documents, including Limitorque certificates of compliance for 31 SB-00 actuators, to determine if Limitorque certified that the compensator housings were made of ductile iron.

Documents reviewed are listed in the attachment.

The following sample was inspected:

- IP 50075 Section 02.02c - one MOV sample in safety-related systems outside the reactor coolant pressure boundary

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on the sample reviewed, the applicant specified and procured Limitorque model SB-00 actuators with ductile iron compensator housings. Additionally, procurement specifications required ductile iron compensator housings. Based on these observations, the applicant has adequately addressed the issues described in the CDR. CDR 50-391/82-18 is closed.

OA.1.29 (Closed) CDR 391/84-37: Lugs Welded to Spiral Welded Pipe (IP 50100)

a. Inspection Scope

Background: In October 1983, Watts Bar Nuclear Plant (WBN) nonconforming condition report (NCR) WBN-WBP 8318 identified a problem with duct supports installed in accordance with typical drawings 47A055-80, -81, and -83 which were attached to spiral weld pipe duct with lugs welded directly to the pipe without a “strap loop or ring.” This was contrary to the design requirements at that time which required a strap loop or ring. An extent of condition review found that this problem extended to other supports as well. As part of the final disposition, evaluations were performed for both Units 1 and 2 for attachments made to the ducts utilizing welded lugs only. These evaluations showed that local stresses in the duct were within the allowable limits. An additional evaluation was also performed which determined that the removal of excess weld reinforcement from the surface of the spiral welded pipe was acceptable since the removal would not affect the strength of the welded joints. This evaluation was performed as means to assist the craft in welding the lug directly to the spiral welded pipe.

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

- Reviewed the applicant's open item closure report which was issued to track required Unit 2 actions for historical NCR WBN-WBP 8318.
- Reviewed Design Criteria Document WB-DC-40-31.8, "Seismically Qualifying Round and Rectangular Duct," Revision 10, to verify the requirements for support/duct attachment.
- Reviewed Design Calculation WCG-1-1247, "Closure of WBPER 910372 and WBPER 910371 (144199)," Rev. 1, to ensure that the calculation is adequate.
- Reviewed American Welding Society D1.1-86 to ensure project Design Calculation WCG-1-1247, Rev. 1, was in compliance with code requirements.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

Based on these actions, the inspector determined that the applicant resolved the original CDR for Unit 2. This item is closed for Unit 2.

OA.1.30 (Closed) Three Mile Item (TMI) Action Item II.F.2: Instrumentation for Detection of Inadequate Core Cooling and GL 82-28: Inadequate Core Cooling Instrumentation System (IP 92717)

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" and later clarified in NUREG-0737, "Clarification of TMI Action Plan Requirements."

TMI Action Item II.F.2 was created to ensure that a mechanism existed for licensees to install any additional instrumentation or controls (primary or backup) to supplement existing instrumentation (including primary coolant saturation monitors) in order to provide an unambiguous, easy-to-interpret indication of inadequate core cooling (ICC) from the main control room. Additionally, the NRC issued GL 82-28 to identify that an instrumentation system, for detection of ICC consisting of upgraded subcooling margin monitors, core-exit thermocouples, and a reactor coolant inventory tracking system, is required for the operation of pressurized water reactor facilities.

Subsequently, TVA letter dated January 24, 1992, provided a response to this issue and identified that the Westinghouse reactor vessel level indicating system (RVLIS) was acceptable by NRC for tracking RCS inventory. Watts Bar Unit 1 installed the required equipment and it was verified appropriate by NRC staff in NRC Inspection Report 50-390/95-74 and 50-391/95-74, dated December 1, 1995.

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 82-28 and TMI Action Item II.F.2 for WBN2. The inspection focused on a review of various documents describing the methodology the applicant has initiated to satisfy the GL and TMI Action Item. 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. Specifically, an equivalent system to the Unit 1 ICC system (Westinghouse RVLIS), referred to as the Westinghouse Common Q Post Accident Monitoring System, will be installed on Unit 2. The projected equipment meets NRC regulatory requirements and satisfies the intent of the GL and TMI Action Item regarding reactor core monitoring. The justification for the change from Unit 1 equipment, applicable regulatory requirements, work instructions, purchase memorandum forms, and procurement specifications were all reviewed to verify that the intent of the GL and TMI Action Item was satisfied. Additional field inspection of main control room equipment installation was performed as documented in NRC IIR 05000391/2010605 (Section OA.1.4). Specific documents reviewed are listed in the attachment to this report.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors reviewed various completed actions associated with GL 82-28 and TMI Action Item II.F.2 to verify the adequacy of the applicant's actions. The inspectors concluded that the applicant's efforts were sufficient to satisfy the intent of the respective GL and TMI Action Item. GL 82-28 and TMI Action Item II.F.2 are considered closed.

OA.1.31 (Closed) CDR 391/87-04: Insufficient water available inside the crane wall to assure long term core and containment cooling after a LOCA (IP 92701)

a. Inspection Scope

Background: Prior to final construction and licensing, CDR 391/87-04 reported that WBN had performed a design change to seal the Reactor Building crane wall to a height of 13.2 feet. This was done to ensure that sufficient water was retained within the crane walls to adequately supply the containment spray system (CSS) and emergency core cooling system (ECCS) sump for long-term recirculation flow and decay heat removal. The design change failed to recognize that certain flow-paths existed that would cause CSS flow to migrate outside of the crane wall and subsequently make it unavailable to flow into the containment sump within the crane wall. This condition would gradually deplete the recirculation inventory (over 50 percent in less than two days) and could ultimately reduce net positive suction head and/or cause vortexing of emergency core cooling pumps, and therefore challenge long-term core cooling after a LOCA.

TVA identified the flow-paths where this issue would occur and made changes to the Unit 1 plant to mitigate this undesired outcome. Primarily, these actions consisted of revising modification procedures to ensure design changes are properly identified, scoped, coordinated, reviewed, and approved, installing curbs around the reactor building equipment and the personnel access hatch, to direct water back into the reactor cavity, and installation and modification to the applicable ECCS accumulator rooms to collect and return CSS flow back to within the crane wall. This item for Unit 1 was closed by the NRC in Notice of Violation (NRC IIR Nos.50-390/95-38 and 50-391/95-38) dated July 11, 1995. Specific documents reviewed are listed in the attachment.

Inspection Activities:

The inspectors performed the following:

- Reviewed the applicant's open item closure report including any actions associated with PER 143779 which was issued to track required Unit 2 actions for historical NCR WBN NEB 8655 (CDR 391/87-04).
- Reviewed the applicable piping system packages and drawings.
- Reviewed the applicable design change procedures and verified recurrence control measures had been incorporated.
- Reviewed the associated EDCRs, maintenance instructions, and WOs to ensure work was properly scoped and planned/performed.

b. Observations and Findings

No findings of significance were identified.

c. Conclusions

The inspectors determined that the Watts Bar Unit 2 completion project refurbishment program adequately identified and will subsequently correct the long-term core and containment cooling issue identified in CDR 391/87-04. The inspectors concluded that the in-process activities to close TVA's response for Unit 2 to CDR 391/87-04 were adequate, therefore the issue is closed.

V. MANAGEMENT MEETINGS

X.1 Exit Meeting Summary

On October 12, 2011, the resident inspectors presented the inspection results to Mr. Gordon Arent and other members of his staff. Although some proprietary information may have been reviewed during the inspection, no proprietary information was included in this inspection report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Applicant personnel

D. Stinson, Site Vice President, TVA, Unit 2
G. Scott, TVA Licensing
C. Stephenson, TVA Licensing
D. Beckley, Electrical Design, TVA Unit 2
D. Charlton, Licensing, TVA, Unit 2
W. Crouch, TVA Licensing
A. Hart, Field Engineer, Bechtel
B. Mahoney, Mechanical Construction Manager, Bechtel
A. Bangalore, Licensing Engineer
I. Kahn, Electrical Design Engineer
M. Bowman, Electrical Design Basis & Analysis
T. Womack, Electrical Design Basis & Analysis
D. Ferguson, Bechtel – Construction Engineer
S. Hilmes, TVA – Sr. Electrical Engineer
J. Boykin, TVA – Quality Control
D. Tinley, Quality Assurance, TVA, Watts Bar Unit 2
B. McDonald, Quality Assurance, TVA, Watts Bar Unit 2
T. Raley, I&C Engineering, TVA
G. Scott, Licensing, TVA
J. Barret, I&C

INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 37055	Onsite Design
IP 46051	Structural Concrete Procedure Review
IP 46071	Concrete Expansion Anchors
IP 49055	Reactor Coolant Pressure Boundary Piping Record Review
IP 49063	Piping - Work Observation
IP 50053	Reactor Vessel and Internals Work Observation
IP 50090	Pipe Support and Restrain Systems
IP 50100	Heating, Ventilation, and Air Conditioning Systems
IP 51051	Electrical Components and Systems - Procedure Review
IP 51053	Electrical Components and Systems - Work Observation
IP 51055	Electrical Components and Systems - Record Review
IP 51061	Electric Cable – Procedure Review
IP 51063	Electric Cable – Work Observation
IP 51065	Electric Cable – Record Review
IP 52053	Instrument Components and Systems – Work Observation
IP 52055	Instrument Components and Systems – Record Review
IP 57080	Nondestructive Examination Procedure Ultrasonic Examination Procedure Review/Work Observation/Record Review
IP 57090	Nondestructive Examination Procedure Radiographic Examination Procedure Review/Work Observation/Record Review
IP 64051	Procedures – Fire Prevention/Protection
IP 73051	Inservice Inspection Review of Procedures

IP 73055	Preservice Inspection Data Review and Evaluation
IP 92701	Followup
IP 92717	IE Bulletins for Information and IE Information Notice Followup
TI 2512/016	Inspection of Watts Bar Nuclear Plant Cable Issues Corrective Action Program Plan
TI 2512/020	Inspection of Watts Bar Nuclear Plant Electrical Issues Corrective Action Program Plan
TI 2512/021	Inspection of Watts Bar Nuclear Plant Equipment Seismic Corrective Action Program Plan
TI 2512/023	Inspection of Watts Bar Nuclear Plant Hanger Update Corrective Action Program Plan
TI 2512/025	Inspection of Watts Bar Nuclear Plant HVAC Duct and Supports Corrective Action Program Plan
TI 2512/028	Inspection of Watts Bar Nuclear Plant QA Records Corrective Action Program Plan
TI 2512/040	Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break Special Program
TI 2515/107	Electrical Distribution System Functional Inspection
TI 2515/109	Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance
TI 2515/140	Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves
TI 2515/172	Reactor Coolant System Dissimilar Metal Butt Welds
TI 2515/174	Hydrogen Igniter Backup Power Verification

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000391/2011608-01	NCV	Failure to Provide Documentary Evidence that Purchased Equipment Conformed to Procurement Documents (Section OA.1.21)
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Discussed

2512/021	TI	Equipment Seismic Qualification CAP (Section OA.1.1)
05000391/2011607-01 Example 7	IP	Electrical Design Issues Requiring Additional Review (Section OA.1.2)
05000391/2011607-01 Example 8	TI	Electrical Design Issues Requiring Additional Review (Section OA.1.3)
05000391/2011607-01 Example 9	TI	Electrical Design Issues Requiring Additional Review (Section OA.1.4)
76-02	BL	Relay Coil Failures – GE Type HFA, HGA, HKA, and HMA Relays (Section OA.1.5)
2512/016	TI	Cable Issues CAP Sub-Issue: Cable Proximity to Hot Pipes (Section OA.1.6)

2515/174	TI	Hydrogen Igniter Backup Power Verification (Section OA.1.7)
2512/020	TI	Electrical Issues CAP Sub-Issue: Cable Separation and Electrical Isolation (Section OA.1.8)
2512/040	TI	MELB SP (Section OA.1.9)
2515/172	TI	Reactor Coolant System Dissimilar Butt Welds (Section OA.1.10)
2515/109	TI	Safety-Related MOV Testing and Surveillance (OA.1.11)
2515/140	TI	Periodic Verification of Design-Basis Capability of Safety-Related MOVs (OA.1.11)
2512/025	TI	Inspection of HVAC Duct and Supports CAP (Section OA.1.12)
2512/028	TI	QA Records CAP (Section OA.1.13)
<u>Closed</u>		
46051	IP	Structural Concrete – Procedures Review (Section OA.1.14)
05000391/2011603-05	URI	Potential Inadequate Disposition and Verification of Relay Seismic Qualification Test Failure (Section OA.1.21)
51051	IP	Electrical Components and Systems – Procedure Review (Section OA.1.22)
51061	IP	Electrical Cable – Procedure Review (Section OA.1.23)
86-24-05	URI	Conduit Overfill Condition (Section OA.1.24)
391/84-11	CDR	New Deficiencies in Barton Pressure Transmitters (Section OA.1.25)
391/86-60	CDR	Questionable Weld Radiographs Previously Accepted (Section OA.1.26)
391/90-27-20	IFI	MOV Thermal Overload Trip Setting (Section OA.1.27)
391/82-18	CDR	Failure of Limitorque Motor Operators During Valve Closure (Section OA.1.28)
391/84-37	CDR	Lugs Welded to Spiral Welded Pipe (Section

		OA.1.29)
II.F.2	TMI	Instrumentation for Detection of Inadequate Core Cooling (Section OA.1.30)
82-28	GL	Inadequate Core Cooling Instrumentation System (Section OA.1.30)
391/87-04	CDR	Insufficient Water Available Inside the Crane Wall to Assure Long Term Core and Containment Cooling After a LOCA (Section OA.1.31)

LIST OF DOCUMENTS REVIEWED

I. QA PROGRAM

Q.1.1 Identification and Resolution of Construction Problem (IP 35007)

Miscellaneous

25402-WBN-SR-11-1965, System 063 Sense line Valve Installation
 25402-WBN-SR-11-1966, System 070 Hydrostatic Pressure Tests
 25402-WBN-SR-11-1967, New vent valves and piping, System 063
 25402-WBN-SR-11-1968, System 062 and 063 Sense Line Material Traceability
 25402-WBN-SR-11-1969, Backshift System 070 Hydrostatic Test
 25402-WBN-SR-11-1970, System 070 Instrument Sense Line Pressure Testing
 25402-WBN-SR-11-1971, Radiation Work permits and work in progress
 25402-WBN-SR-11-1973, System 070 Hydrostatic Test
 25402-WBN-SR-11-1974, Corrective Action Field Verification
 25402-WBN-SR-11-1937, NRC Notice Posting
 25402-WBN-SR-11-1940, Grout Placement in north valve room
 25402-WBN-SR-11-1943, Cable de-term/termination in control room
 25402-WBN-SR-11-1948, Commercial Grade Dedication
 25402-WBN-SR-11-1949, Weld Filler Material Control
 25402-WBN-SR-11-1950, ASME Section III Field Weld

II. MANAGEMENT OVERSIGHT AND CONTROLS

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

Work Control Documents

WO 111004050, Installation of Motor Control Center (MCC) buckets 5E-B, 6E-B, 9B-B, 10B-B, 11F-B, 12F-B, 15A-B, 16A-B, and 16D-B.
 WO 112021342, P and R Cable Separation for CSST C and D Transformers

C.1.5 Pipe Support and Restraint Systems (IP 50090 and TI 2512/023)

Calculations

Pipe Support Calculation No. 270159, Revision (Rev.) 3
 Pipe Support Calculation No. 270159, Rev. 4

Miscellaneous

Summary of Piping Analysis Problem No. N3-67-89R, Rev. 5
 Engineering Design Change Request 2 (EDCR-2) 52491, Rev. B
 Walkdown Package WBN2-PD-067-394-00, Rev. 3
 Drawing Revision Authorization (DRA) 52491-050 Rev. 0
 Drawing Revision Authorization (DRA) 52491-050 Rev. 1

C.1.8 Electrical Components and Systems – Work Observation (IP 51053)

Work Orders

WO 08-951353 -005 (Sump level Transmitter 2LT-063-180D and Transmitter 2LT-063-180E)
 WO 08-951353-006 (Sump level Transmitter 2LT-063-180F and Transmitter 2LT-063-180G)
 WO 08-951354-007 (Fabrication and Install New Sense Line and Interface Supports from Root Valves to Panel Isolation Valves)
 WO 111509606 (Foxboro Spec 200 Panel 11A Hardwire Installation)

WO 111525706 (Foxboro Spec 200 Panel 11B Wiring)

Engineering Design Change

EDCR 52419

C.1.9 Electrical Components and Systems – Work Observation (IP 51053) and Electric Cable – Work Observation (IP 51063)

Work Order

WO 11126357, RHR Pump RM B Hi Temp SW

Engineering Design Change

EDCR 53788, rev. A, Historical System 30 design changes

Miscellaneous

MAI 3.1, Rev. 19, Installation of Electrical conduit systems and boxes

DRA 53788-045

DRA 53788-049

DRA 53788-050

C.1.10 Construction Refurbishment Process – WBN Unit 2 (IPs 37002 and 49063)

Problem Evaluation Reports

PER 387038, System Restored without QC Inspection for Internal Cleanliness

PER 391528, Refurbishment Work was not Performed

PER 349138, Layup and Control of Cleaned Portions of Piping Systems

PER 387053, Layup Program Requirements not Established by Construction for ERCW

PER 392040, Layup Program Requirements need to be Evaluated by Startup

PER 400977, ASME Flow Elements Installed Backwards

PER 258969, Degradation of Cold Leg Accumulators

PER 422626, NRC Observations on CLA # 3

PER 422626, Historical ASME NRC Observations on #3 SIS Accumulator Tank, 8/23/2011

Work Order

WO 111070639, Inspect Unit 2 Accumulators 1, 2, 3, and 4 to Determine if Pressure Vessels Conform to Class “B” Cleanliness Requirements

C.1.11 Ultrasonic Testing Examination (IP 57080)

Procedures/Programs

2.0-NDES-001, IHI Southwest Technologies, Inc. Nondestructive Examination Personnel Qualifications and Certifications, rev.6 chg.1

IEP-300, Qualification and Certification of Ultrasonic TVA Nuclear Power Group (NPG)

Personnel for Preservice and Inservice ASME Examinations, rev.3

ISwT-AET3, Automated Eddy Current Examination of Piping Welds from the Inside Surface, Rev. 0

ISwT-PDI-AUT11, Automated Inside Surface Ultrasonic Examination of Piping Welds Using Phased Array, Rev. 1

ISwT-PDI-AUT4, Automated Inside Surface Ultrasonic Examination of Pressure Vessel Nozzle-to-Shell Welds Using Phased Array, Rev. 3

ISwT-PDI-AUT5, Automated Inside Surface Ultrasonic Examination of Pressure Vessel Welds Using Phased Array, Rev. 1

OS&FG/NPG-N-VT-8, TVA Visual Examination of PWR Vessel Interiors and Core Support Structures, rev.11

OS&FG/NPG-N-VT-8, Visual Examination of PWR Vessel Interiors and Core Support Structures, Rev. 11

PSI Examination Reports

Weld N11-SE, Outlet Nozzle-to-Safe End Examination Records: ID-93, ID-94, ID-95 and ID-96

Weld N12-SE, Outlet Nozzle-to-Safe End Examination Records: ID-101, ID-102, ID-103 and ID-104

Weld N15-SE, Outlet Nozzle-to-Safe End Examination Records: ID-85, ID-86, ID-87 and ID-88

Weld N18-SE, Outlet Nozzle-to-Safe End Examination Records: ID-141, ID-142, ID-143 and ID-144

Weld W02-03, RPV Bottom Head to Lower Shell, IHI Southwest Technologies Examination Record

Weld W03-04, RPV Lower Shell to Lower Middle Shell, IHI Southwest Technologies Examination Record

Weld W06-07, RPV Upper Shell to Flange, IHI Southwest Technologies Examination Record

Other Documents

ISWT-PDI-AUT5, Dynaray Calibration Record, Rev. 1, chg. 0 Sheet Nos.: 1100001, 1100002, 1100003, 1100004, 1100025, 1100026, 1100027, 1100028, 1100045, 1100046, 1100047, 1100048, 1100057, 1100058, 1100059, 1100060, 1100085, 1100086, 1100087, 1100088, 1100089, 1100090, 1100091 and 1100092

NDE Certificates of Qualification for TVA examiners: V3HWNIOTB, DO4261FE6, 0EA5CIZPM WAT-D-9385, Letter to W. L. Elliott, Tennessee Valley Authority Watts Bar Nuclear Plant Units 1 and 2 Reactor Vessel As-Built Weld Dimensions

Certificate of Calibration for Thermocouple Thermometer SN: 11291117

Certificate of Calibration for Olympus System Equipment No: MS5800-E1U

Certificate of Calibration for Zetec System Equipment No.: T3PA-32/128P1

IHISWT-PDI-AUT11 Calibration Record Nos.: 1100003 and 1100004

NDE Certificates of Qualification for IHISw examiners: CMB0045, 3490045, JRD0940, 3700940, RR0555, DJM9431, DRK5633, WHA5882, BW2763, CHB9334

Memorandum dated December 10, 2009, PDI Program Status for Code Compliance and Applicability, from: EPRI

C.1.12 Inservice Inspection Review of Program (IP 73051)

Procedures/Programs

2.0-NDES-001, Nondestructive Examination Personnel Qualification and Certification, Rev. 6
IEP-202, Quality Control (QC) and Nondestructive Examination (NDE) Monitoring Program, Rev. 4

IEP-204, Qualification Review for Contract Suppliers of Quality Control (QC)/Nondestructive Examination (NDE) Examiners, Rev. 4

Other Documents

L18 110821 800, Letter to Raul R. Baron, Approval of IHI Southwest Technologies, Inc. (IHISw) Nondestructive Examination Procedures

T03 110818 001, Letter to Raul R. Baron, Approval of IHI Southwest Technologies, Inc. (IHISw) Written Practice 2.0-NDES-001, Rev. 6, Chg. 1, "Nondestructive Examination Personnel Qualification and Certification"

C.1.13 Preservice Inspection Data Review and Evaluation (IP 73055)

Procedures/Programs

ISwT-PDI-AUT5, Automated Inside Surface Ultrasonic Examination of Pressure Vessel Welds using Phased Array, rev.1

WBN-2 PSI, Preservice Inspection Program Plan, rev.5

PSI Examination Records

Weld W02-03, RPV Bottom Head to Lower Shell, IHI Southwest Technologies Examination Record

Weld W03-04, RPV Lower Shell to Lower Middle Shell, IHI Southwest Technologies Examination Record

Weld W06-07, RPV Upper Shell to Flange, IHI Southwest Technologies Examination Record

Other Documents

ISwT-PDI-AUT5, Dynaray Calibration Record, Rev. 1, chg. 0 Sheet Nos.: 1100001, 1100002, 1100003, 1100004, 1100025, 1100026, 1100027, 1100028, 1100045, 1100046, 1100047, 1100048, 1100057, 1100058, 1100059, 1100060, 1100085, 1100086, 1100087, 1100088, 1100089, 1100090, 1100091 and 1100092

NDE Certificates of Qualification for IHISw examiners: CMB0045, 3490045, JRD0940, 3700940, RR0555, DJM9431, DRK5633, WHA5882, BW2763, CHB9334

III. OPERATIONAL READINESS ACTIVITIES

F.1 Fire Protection (IP 64051)

Miscellaneous

0-FOR-228-2B, Quarterly Inspection of Emergency Light Packs, Rev. 0039

0-FOR-26-4, Quarterly Inspection of Fire Hose Stations in Accessible Areas, Rev. 0007

0-FOR-26-5, 18 Month Inspection of Fire Hose Stations in Accessible Areas, Rev. 0006

IV. OTHER ACTIVITIES

OA.1.1 Equipment Seismic Qualification Corrective Action Program (TI 2512/021, IPs 37055, 49055, 51055 and 52055)

Limited Scope Walkdown Packages (LSWD)

LSWD – 0447, “Auxiliary Control Room Panel WBN-2-PNL-276-L011A & WBN-2-PNL-276-L011B Anchorage Weld Inspection.” Revision (Rev.) 0

LSWD – 0449, “Control

Problem Evaluation Reports (PERs)

PER 300162

PER 417724

PER 382156

Quality Assurance Surveillances

25402-SA-ENG-11-005, “Unit 2 Equipment Seismic Qualification (ESQ) Program

Calculations/Design Procedures

WCGE-1099, “Seismic Qualification of Unit 2 Wall Mounted Unistrut Panels and Associated Instruments”, Rev. 1

WCG-ACQ-0189, Rev. 1
 WCGAC-1-1292, "Anchorage Evaluation of Worst Cases for Heat Exchangers PKG-3," Rev. 1
 TI-205, "Piping and Instrument Analysis," Rev. 2
 25402-3DP-G06G-00001, "Material Requisitions," Rev. 10

Vendor Documents

WAT-D-10147, "Equipment Qualification Documentation Information," T30951013818
 WBT-D-3396, "Project Deliverable: Pressurizer Nozzle Loads"
 LTR-SGDA-11-187

Miscellaneous Documents

Master Equipment List Transmittal Form (SSP-9.6-6) for UNID 64
 S/SQ Review/Approval Memo EDMS # T97110310001
 Civil Interface Information Exchange (CIIE) -506
 Implementation Plan for the Equipment Seismic Qualification (ESQ) Corrective Action Program
 PSAM-1853

OA.1.5 NRC Bulletin 76-02, Relay Coil Failures – General Electric Type HFA, HGA, HKA, and HMA Relays (IP 51053)

Work Orders

WO 110935882, Install 30X Relay CME SYS 072 2-RLY-072-0027B-A
 WO 110935818, Install 30X Relay CME SYS 072 2-RLY-072-0010B-B
 WO 111806434, Install 30RX Relay for CENT CHARGING PMP MTR 2A-A
 WO 112764162, Inspect and test following relays in Compartment 10
 WO 112763612, Inspect and test following relays in Compartment 10

OA.1.7 Inspection of Watts Bar Unit 2 TMI Commitments on Hydrogen Backup Power Supply (IP51053)

Miscellaneous

Purchase Order Details, PO 238317-1, Portable Diesel Generator
 MRR 25447, Material Receiving Report for PO 238317

OA.1.8 Electrical Issues CAP – Sub-issue: Cable Separation and Electrical Isolation (IP 51063)

Corrective Action Documents

Electrical Issues Corrective Action Program Plan: Physical Cable Separation and Electrical Isolation (CP5.2), Closure Report Rev. 000, 1/25/11
 PER 305739, Revise Unit 2 Calculations & EDCRs for Self Assessment 25402-SA-ENG-10-18

Design Change Requests

EDCR 55125, Rev. A, Resolution of calculation EDQ0029920090006 for external physical Class 1E conduit/tray separation
 EDCR 55127, Rev. A, Resolution of physical internal cable separation and electrical isolation breakages in calculation

Work Order

WO: 111832696, Separation Barriers Sys 278

Miscellaneous

FCR: 57336-A, Correct separation issues, terminate cables and install barriers

OA.1.10 Reactor Coolant System Dissimilar Metal Butt Welds (TI-2515/172)Procedures/Programs

ISwT-PDI-AUT4, Automated Inside Surface Ultrasonic Examination of Pressure Vessel Nozzle-to-Shell Welds Using Phased Array, Rev. 3
 OS&FG/NPG-N-VT-8, Visual Examination of PWR Vessel Interiors and Core Support Structures, Rev. 11

Drawings

ISI-2068-W-01, Watts Bar Nuclear Plant Unit 2 Reactor Coolant System Piping 068 (RCS) Weld Locations, Rev. 1

PSI Examination Reports

Weld N11-SE, Outlet Nozzle-to-Safe End Examination Records: ID-93, ID-94, ID-95 and ID-96
 Weld N12-SE, Outlet Nozzle-to-Safe End Examination Records: ID-101, ID-102, ID-103 and ID-104
 Weld N15-SE, Outlet Nozzle-to-Safe End Examination Records: ID-85, ID-86, ID-87 and ID-88
 Weld N18-SE, Outlet Nozzle-to-Safe End Examination Records: ID-141, ID-142, ID-143 and ID-144

Other Documents

Letter from Westinghouse Electric Corporation to W.L. Elliot, Tennessee Valley Authority Watts Bar Nuclear Plant Units 1 and 2 Reactor Vessel As-Built Weld Dimensions, July 16, 1993
 T03110818001, Approval of IHI Southwest Technologies, Inc. (IHISw) Written Practice 2.0-NDES-001, Rev. 6, Chg. 1, "Nondestructive Examination Personnel Qualification and Certification," August 17, 2011
 L18110821800, Approval of IHI Southwest Technologies, Inc. (IHISw) Nondestructive Examination Procedures, August 21, 2011
 Performance Demonstration Initiative Program Qualification for procedures: ISwT-PDI-AUT4, Rev. 3 and ISwT-PDI-AUT11, Rev. 1
 Certificate of Calibration for Thermocouple Thermometer SN: 11291117
 Service Request 422427, RPV N-13 SE Eddy Current Indication
 Certificate of Calibration for Olympus System Equipment No: MS5800-E1U
 Certificate of Calibration for Zetec System Equipment No.: T3PA-32/128P1
 IHISwT-PDI-AUT11 Calibration Record Nos.: 1100003 and 1100004
 NDE Certificates of Qualification for IHISw examiners: CMB0045, 3490045, JRD0940, 3700940, RR0555, DJM9431, DRK5633, WHA5882, BW2763, CHB9334
 ISwT Project 11-0690, Automated Ultrasonic Examination of the Reactor Pressure Vessel at Watts Bar Nuclear Plant Unit 2
 LTR-A600-10-8, Inspection Requirements for MSIP, January 20, 2010

OA.1.11 Safety-Related MOV Testing and Surveillance and Periodic Verification of Design-Basis Capability of Safety-Related MOVs (TIs 2515/109 and 2515/140)Procedures/Programs

NETP-115, MOV Program, rev. 0
 GTE-11, Motor Operated Valve/Damper Test, rev. 3
 0-MI-0.03, Limitorque Motor Operator Adjustment Guideline Type SMB and SB (10 CFR 50.49), rev. 1
 0-MI-0.006, MOVATs Testing of Motor Operated Valves, rev. 0
 NEDP-7, Engineering Support Personnel Training, rev. 16

SMP-5.0, Watts Bar Nuclear Plant Unit 2 Indoctrination, Training and Qualification of Preoperational Startup Engineers, rev. 4
 NPG-SPP-31.2, Records Management, rev. 2
 G-50, Torque and Limit Switch Settings for Motor Operated Valves, Rev. 7

Design Criteria Document

WB-DC-30-28, Low and Medium Voltage Power Systems, rev. 20
 Unit 2 FSAR Table 3.9-17, Active Valves for Primary Fluid Systems
 Unit 2 FSAR Table 3.9-25, Valves Required to be Active for Design Basis Events
 Unit 2 FSAR Table 3.9-26, Inservice Inspection Category Valves

Calculations

MDQ0020672009-0310, GL 89-10 MOV Population for Watts Bar Unit 2, Rev. 1
 EDQ00299920080004, 480V Class 1E Protection, coordination and Thermal Overload heater Calculation – Unit 2, rev. 12; valves: 2-FCV-67-295-A, 2-FCV-63-22-B, 2-FCV-67-95-A, 2-FCV-63-118-A, 2-FCV-3-87-A, 2-FCV-74-1-A
 WBN-OSG4-095, Selection Criteria for MOVs Requiring Thermal Overload Bypass and/or Torque Switch Bypass, Rev. 20
 MOV Thrust/Torque, Valve Actuator Capability, 2-FCV-67-091, MDQ0020672008-0256, Rev 0
 MOV Thrust/Torque, Valve Actuator Capability, 2-FCV-67-095, MDQ0020672008-0257, Rev 0
 MOV Thrust/Torque, Valve Actuator Capability, 2-FCV-67-104, MDQ0020672008-0262, Rev 0
 MOV Thrust/Torque, Valve Actuator Capability, 2-FCV-67-112, MDQ0020672008-0266, Rev 0

Test Data Package

MOV 2-FCV-067-095, CTN 2-067-05261-E11-000
 MOV 2-FCV-067-0104, CTN 2-067-5456-E11-000

Work Orders

111480583, Perform Component Testing on MOV 2-FCV-067-0104, 3/5/2011
 112109700, Perform Component Testing on MOV 2-FCV-067-0095

Drawings

2-47W811-1, Safety Injection System, Rev 4
 1-47W845-5, Essential Raw Cooling Water System, Rev 40
 2-47W845-3, Essential Raw Cooling Water System, Rev 5
 1-47W845-2, Essential Raw Cooling Water System, Rev 80
 1-47W845-5, Essential Raw Cooling Water System, Rev 40
 2-47W859-1, Component Cooling System, Rev 3
 1-47W859-1, Component Cooling System, Rev 49

Corrective Action Documents

PER 386990, no WO step for torquing during installation of Limitorque motor operator, 7/23/2011
 PER 352540, U2 MOV butterfly valve design output needed for MOV program valves, 5/11/2011
 PER 293153, hardware non-conformance review of NRC EN46403 for potential applicability to WBN Unit 2, 12/06/2011
 SR 433427, motor operated valves and thermal overload heaters, 09/16/2011
 PER 327410, Limitorque MOV Actuator Pinion Gear Spur Issue, 2/17/2011
 PER 411340, Limitorque MOV Actuator Pinion Gear Spur Issue, 8/1/2011
 PER 418603, Limitorque MOV Actuator Pinion Gear Spur Issue, 8/16/2011
 PER 343525 trending for work orders being placed in ready status without Ops review 3/23/2011
 PER 231471 torque switches wired in accordance with incorrect drawing revision, 5/26/2010

PER 172632, Replace all Affected Unit 2 Cast Iron Compensator Housings, 6/1/2009
 PER 231469, Torque Switches Wired per Wrong Drawing Revision, 5/26/2010
 PER 278539, Metal Shavings in Actuator Grease, 11/4/2010

Training Records

Selected Personnel Training Records for NEDP-7 Engineering Support Personnel Training
 Selected Personnel Training Records for SMP 5.0 Test Director Qualifications
 Selected Personnel Training Records for Limitorque Limit and Torque Switch Maintenance
 Selected Personnel Training Records for MOVATS Test Equipment setup/hookup to MOV Actuator
 Crane Nuclear Representative Diagnostic Test Engineer and Diagnostic Test Technician qualification record

QA Surveillance Reports

25402-WBN-SR-11-1705, Inspection of Safety Related Actuators in Warehouse, 4/28/2011
 25402-WBN-SR-11-1765, Inspection of Limitorque MOV, 6/1/2011
 25402-WBN-SR-11-1728, Subcontractor Inspection of Limitorque MOV, 5/11/2011
 25402-WBN-SR-11-1790, Installation of Limitorque MOV on System 72, 6/13/2011

Miscellaneous

WBN2-63-4001, Safety Injection System, Rev 1
 WBN2-67-4002, Essential Raw Cooling Water, Rev 1
 WBN2-70-4002, Component Cooling System, Rev 1

OA.1.12 Inspection of HVAC Duct and Supports CAP (TI 2512/025, IP 50100)

Procedures and Standards

G-95, Installation, Modification and Maintenance of HVAC Duct, Rev. 0, SRN 7
 N3M-914, Quality Assurance Requirements for Construction, Construction Testing, and Inspection of Safety-Related HVAC Systems, Rev. 4
 N3C-942, Structural Requirements for HVAC Ducts and Ducts Supports, Rev. 3
 MAI-4.3, HVAC Duct Systems, Rev. 9
 WDP-C-3, Walkdown Procedure for Civil, Rev. 3

Walkdown Packages

WBN2-C-065-250-06
 WBN2-C-065-250-08
 WBN2-C-065-250-30
 WBN2-C-030-250-00
 WBN2-C-030-250-02
 WBN2-C-030-250-01
 WBN2-C-030-250-12
 WBN2-C-030-250-14
 WBN2-C-030-250-20
 WBN2-C-030-250-22
 WBN2-C-030-250-23
 WBN2-C-030-250-25
 WBN2-C-030-250-26
 WBN2-C-030-250-30
 WBN2-C-030-250-31
 LSWD-1374

Service Request Reports

SR 439715 - Underfill/Undersize Welds
SR 439724 - Arc Strikes
SR 439761 - Leaching in Concrete at Vent Stack
SR 439830 - Bent Support Kicker Flanges
SR 440145 - Flex Connector Tears/Abrasions
SR 441253 - Unused Bolt Holes/Incomplete Rivets
SR 442132 - General Rust on Supports and Ducts

HVAC Duct Supports

Support ID: 2030-DW915-15H-1407
Support ID: 2030-DW915-15H-1408
Support ID: 2030-DW915-15H-1409
Support ID: 2030-DW915-15H-1410
Support ID: 2030-DW915-15H-1411
Support ID: 2030-DW915-15H-1420
Support ID: 2030-DW915-15H-1421
Support ID: 2030-DW915-15H-1422
Support ID: 2030-DW915-15H-1423
Support ID: 2030-DW915-15H-1424
Support ID: 2030-DW915-15H-1425
Support ID: 2030-DW915-15H-1428
Support ID: 2065-DW915-15H-1603
Support ID: 2065-DW915-15H-1605
Support ID: 2065-DW915-15H-1606
Support ID: 2065-DW915-15H-1607
Support ID: 2065-DW915-15H-1608
Support ID: 2065-DW915-15H-1609
Support ID: 2030-DW915-15H-1564
Support ID: 2030-DW915-15H-1565
Support ID: 2065-DW915-15H-1466
Support ID: 2030-DW920-12H-2133
Support ID: 2030-DW920-12H-2134
Support ID: 2030-DW920-02H-0003
Support ID: 2030-DW920-02H-0004
Support ID: 2030-DW915-15H-1505
Support ID: 2030-DW915-15H-1506
Support ID: 2030-DW915-15H-1507
Support ID: 2030-DW915-15H-1508
Support ID: 2030-DW915-15H-1525
Support ID: 2030-DW915-15H-1526
Support ID: 2030-DW915-15H-1481
Support ID: 2030-DW915-15H-1482
Support ID: 2030-DW915-15H-1483
Support ID: 2030-DW915-15H-1484
Support ID: 2030-DW920-03H-0189/188
Support ID: 2030-DW920-05H-0198
Support ID: 2030-DW920-05H-0199
Support ID: 2030-DW920-05H-0200
Support ID: 2030-DW920-05H-0201

HVAC Duct Runs (Support ID to Support ID)

Support ID: 2030-DW915-15H-1408 to Support ID: 2030-DW915-15H-1409
Support ID: 2030-DW915-15H-1420 to Support ID: 2030-DW915-15H-1421

Support ID: 2030-DW915-15H-1421 to Support ID: 2030-DW915-15H-1422
 Support ID: 2030-DW915-15H-1422 to Support ID: 2030-DW915-15H-1423
 Support ID: 2030-DW915-15H-1423 to Support ID: 2030-DW915-15H-1424
 Support ID: 2065-DW915-15H-1605 to Support ID: 2065-DW915-15H-1606
 Support ID: 2065-DW915-15H-1606 to Support ID: 2065-DW915-15H-1607
 Support ID: 2065-DW915-15H-1607 to Support ID: 2065-DW915-15H-1608
 Support ID: 2065-DW915-15H-1608 to Support ID: 2065-DW915-15H-1609
 Support ID: 2030-DW915-15H-1564 to Support ID: 2030-DW915-15H-1565
 Support ID: 2065-DW915-15H-1466 to Support ID: 2065-DW915-15H-1467
 Support ID: 2030-DW915-15H-1504 to Support ID: 2030-DW915-15H-1505
 Support ID: 2030-DW915-15H-1505 to Support ID: 2030-DW915-15H-1506
 Support ID: 2030-DW915-15H-1506 to Support ID: 2030-DW915-15H-1507
 Support ID: 2030-DW915-15H-1507 to Support ID: 2030-DW915-15H-1508
 Support ID: 2030-DW915-15H-1525 to Support ID: 2030-DW915-15H-1526
 Support ID: 2030-DW915-15H-1525 to Bend
 Support ID: 2030-DW915-15H-1481 to Support ID: 2030-DW915-15H-1480
 Support ID: 2030-DW915-15H-1482 to Support ID: 2030-DW915-15H-1483
 Support ID: 2030-DW915-15H-1483 to Support ID: 2030-DW915-15H-1484
 Support ID: 2030-DW920-03H-0189/188 to 5 feet above support
 Support ID: 2030-DW920-05H-0198 to Support ID: 2030-DW920-05H-0197
 Support ID: 2030-DW920-05H-0199 to Support ID: 2030-DW920-05H-0200
 Support ID: 2030-DW920-05H-0199 to Support ID: 2030-DW920-05H-0326
 Support ID: 2030-DW920-05H-0200 to Wall
 Support ID: 2030-DW920-05H-0201 to Wall

Engineering Calculations

50098.01-C-003
 WCG-1-1244
 WCG-1-1247
 WCG-1-1230
 WCG-2-386
 WCG-2-466

Miscellaneous Documents

Design Criteria, WB-DC-40-31.8, Seismically Qualifying Round and Rectangular Duct, Rev. 10
 Report, AES 90051243-1Q-1, Analysis of HVAC Ducts in Tennessee Valley Authority's Watts
 Bar Nuclear Plant, Units 1 and 2, Rev. 1

OA.1.20 Example 6 of URI-05000391/2011606-01, Electrical Design Issues Requiring Additional Review - TI 2515/107

Calculations

EDQ00299920080016, Rev. 000, Appendix D, sheets 19, 50, 62, 125, and 134
 EDQ00299920080016, Rev. 000, Attachment 2, sheets 14 of 19 (GEK-34-53) on IAC51 and
 IAC66 published Time/Current Curves

Published Time Current Curves

GEI-44233 Time-current Characteristic curves for type IAC66K relay
 GEH-2059 Time-current curves for type IAC77 and IAC78 relays
 GEK-45376 Time-current curves for type IFC66 relay
 GEK-105570A Time-current curves for type IAC53 relay

OA.1.21 URI 05000391/2011603-05, Potential Inadequate Disposition and Verification of Relay Seismic Qualification Test Failure (IP 51053)

Corrective Action Documents

SR 442543, ATC Nuclear Qualification Report QTR10T3000-06 additional documentation
 PER 443185, NRC identified ATC Nuclear Report QTR10T3000-06 additional documentation

Miscellaneous

QTR10T3000-06, Rev. 0, "ATC Qualification Report for Cutler-Hammer Relay P/N: AR880AR",
 12/13/10

CEB-SS-5.10, Seismic Qualification of Electrical, Mechanical, and I&C Devices, 2/01/08

QAP-16-001, Corrective Action Request, CAR No. 10T-102, Exhibit 16-001-1

OA.1.25 CDR 391/84-11: New Deficiencies in Barton Pressure Transmitters (IP 52053)

Problem Evaluation Report

PER 172662

Engineering Design Changes

EDCR 52449, Rev A, Pressurizer Pressure and Level transmitters

EDCR-2 53756, Rev. A, 68 wrap EDCR Instrumentation in Reactor Building

EDCR 53391, Rev. A, Steam Generator level and Instrument lines

EDCR 55385, Rev. A Local Panel 2-L-388 and 2-L-340 for Unit 2 RVLIS

Miscellaneous

Closure Package for PER 172662

OA.1.27 Inspector IFI05000391/90-27-20, MOV Thermal Overload Trip Setting (IP 51053)

Calculations

EDQ00299920080004, 480V Class 1E Protection, coordination and Thermal Overload heater
 Calculation – Unit 2, rev. 12; valves: 2-FCV-67-295-A, 2-FCV-63-22-B, 2-FCV-67-95-A, 2-FCV-
 63-118-A, 2-FCV-3-87-A, 2-FCV-74-1-A

Design Criteria Document

WB-DC-30-28, Low and Medium Voltage Power Systems, rev. 20

OA.1.28 CDR 50-391/82-18, Failure of Limitorque Motor Operators During Valve Closure (IP 51055)

Specifications

Specification 25402-011-3PS-MUMA-00001, Class 1E and Non-Class 1E Valve Electric Motor
 Operators, Rev. 1

Procurement Documents

Material Requisition No. 25402-011-MRA-JV15-00005, Rev. 4

PO 25157-1, Limitorque Actuators, 3/26/10

Material Receiving Inspection Instruction 25402-011-MRI-JV15-00005, Limitorque Actuators,
 7/2/10

PO 44823, Butterfly Valves, 11/18/09

Material Receiving Inspection Instruction 25402-011-MRI-JV08-00001, Butterfly Valves, Rev. 1
 Revised Certificates of Compliances for PO 25157, Line Items 6, 7, 8, 9, 12, 13, 14, 15, 16, 17,
 21, 22, 28, 36, and 41

OA.1.30 TMI Action Item II.F.2: Instrumentation for Detection of Inadequate Core Cooling and GL 82-28: Inadequate Core Cooling Instrumentation System (IP 92717)

Miscellaneous

TVA TMI Action Item II.F.2/GL 82-28 Commitment Closure Package

NRC IIR 50-390/95-74 & 50-391/95-74, dated December 1, 1995

Regulatory Framework Letter from TVA to NRC dated January 21, 2011

TVA Letter to NRC regarding TMI Action Item II.F.2, dated January 24, 1992

EDCR 52351, Rev. B

WO 08-951054-000

WO 112068525

WO 112068641

WO 112209900

WO 112242511

OA.1.31 CDR 391/87-04: Insufficient Water Available Inside the Crane Wall to Assure Long Term Core and Containment Cooling After a LOCA (IP 92701)

Miscellaneous

EDCR 52983 Rev. A

EDCR 54318 Rev. A

WO 09-951493-001

WO 09-951493-002

WO 09-951493-003

WO 10670606

WO 110843538

WO 111458155

MI 271.010, Removal and Replacement of Equipment Access Hatch, Doors, Bridge, Track, and Shield Wall, Rev. 21

LIST OF ACRONYMS

ASME	American Society of Mechanical Engineers
AWS	American Welding Society
CAP	Corrective Action Program
CATD	corrective action tracking document
CCP	centrifugal charging pump
CDR	Construction Deficiency Report
CFR	Code of Federal Regulations
CLA	cold leg accumulator
DAS	data acquisition system
DM	dissimilar metal
ECCS	emergency core cooling system
ECP	Employee Concerns Program
EDCR	Engineering Design Change Request
EDG	emergency diesel generator
EPRI	Electric Power Research Institute
ESQ CAP	Equipment Seismic Qualification Corrective Action Program
ETAP	Electrical Transient Analyzer Program
ERCW	essential raw cooling water
FCR	field change request
FSAR	Final Safety Analysis Report
GL	Generic Letter
ICC	inadequate core cooling
IFI	Inspector Follow-Up Item
IIR	Integrated Inspection Report
IMC	Inspection Manual Chapter
IP	Inspection Procedure (NRC)
LOCA	loss of coolant accident
LOOP	loss of offsite power
M&TE	Measuring and Test Equipment
MAI	Modification and Addition Instruction
MCC	motor control center
MELB	moderate energy line break
NCR	non-conformance report
NCV	non-cited violation
NDE	Nondestructive Examination
NRC	Nuclear Regulatory Commission
NOA	Notice of Anomaly
PA-UT	Phased-array Ultrasonic Testing
PER	Problem Evaluation Report
PSI	preservice inspection
QA	quality assurance
QC	quality control
RCS	reactor coolant system
REV.	revision
RHR	residual heat removal
RPV	reactor pressure vessel
SALP	Systematic Assessment of Licensee Performance
SAR	Safety Analysis Report
SL	severity level
SP	Special Program
TI	Temporary Instruction

TMI	Three Mile Island
TVA	Tennessee Valley Authority
UNID	unique identifier
URI	Unresolved Item
UT	Ultrasonic Examination
WBN	Watts Bar Nuclear Plant

Specific Response to the Reposting Requirements for Reactor Coolant System Dissimilar Metal Butt Welds (TI 2515/172, Rev. 1)

a. Inspection Scope

The inspectors observed licensee activities related to MRP-139, "Primary System Piping Butt Weld Inspection and Evaluation Guideline", Rev 1 that were available for review during the inspection period, specifically, the phased-array ultrasonic (PA-UT) examinations performed on four reactor pressure vessel nozzles following the application of mechanical stress improvement (MSIP) which are within the scope of MRP-139. Because Watt's Bar Unit 2 has not operated yet, an MRP-139 program has not been fully established, nor have the requirements been fully implemented.

b. Observations

In accordance with requirements of TI 2515/172, Revision 1, the inspectors evaluated and answered the following questions:

(1) Implementation of the MRP-139 Baseline Inspections

This section was addressed during a previous TI 2515/172 inspection as described in NRC Inspection Report 05000391/2010604 and was not reviewed during this inspection.

(2) Volumetric Examinations

For each volumetric examination inspected,

1. Was the activity performed in accordance with the examination guidelines in MRP-139 Section 5.1 and consistent with NRC staff relief request authorizations for weld overlaid welds?

Yes. The licensee conducted the examinations per ISwT-PDI-AUT11, Rev 1, a Performance Demonstration Initiative (PDI) Program qualified procedure that meets the examination requirements detailed in MRP-139, Section 5.1.

2. Was the activity performed by qualified personnel? (Briefly describe the personnel training/qualification process used by the licensee for this activity).

Yes. The examination was conducted by PDI certified personnel qualified for procedure ISwT-PDI-AUT11, Rev. 1.

3. Was the activity performed such that deficiencies were identified, dispositioned, and resolved?

Yes, the activity was performed such that deficiencies were identified, dispositioned, and resolved using the licensee's corrective action program.

(3) Weld Overlays

No weld overlays were performed during this inspection period. The licensee does not have any weld overlay activities planned.

(4) Mechanical Stress Improvement (SI)

This section was addressed during a previous TI 2515/172 inspection as described in NRC Inspection Report 05000391/2010605 and was not reviewed during this inspection.

(5) Application of Weld Cladding and Inlays

No weld cladding or inlay activities were performed during this inspection period. The licensee does not have any weld cladding or inlay activities planned.

(6) Inservice Inspection Program

1. Has the licensee prepared an MRP-139 inservice inspection or equivalent (e.g. Alloy 600) program? If not, briefly summarize the licensee's basis for not having a documented program and when the licensee plans to complete preparation of the program.

This question was addressed during a previous TI 2515/172 inspection as described in NRC Inspection Report 05000391/2010604 and was not reviewed during this inspection.

2. In the MRP-139 inservice inspection or equivalent (e.g. Alloy 600) program, are the welds appropriately categorized in accordance with MRP-139? If any welds are not appropriately categorized, briefly explain the discrepancies.

This item requires additional inspection upon completion of the applicant's program.

3. In the MRP-139 inservice inspection or equivalent (e.g. Alloy 600) program, are the inservice inspection frequencies, which may differ between the first and second intervals after the MRP-139 baseline inspection, consistent with the inservice inspections frequencies called for by MRP-139?

This item requires additional inspection upon completion of the applicant's program.

4. If any welds are categorized as H or I, briefly explain the licensee's basis of the categorization and the licensee's plans for addressing potential PWSCC.

This item requires additional inspection upon completion of the applicant's program.

5. If the licensee is planning to take deviations from the MRP-139 inservice inspection guidelines, what are the deviations and what are the general bases for the deviations? Was the NEI 03-08 process for filing deviations followed?

This item requires additional inspection upon completion of the applicant's program.

c. Findings

No findings were identified.

Specific Response to the Reporting Requirements for Inspection Requirements For Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing And Surveillance (TI 2515/109, Rev. 4)

The inspectors observed applicant activities in response to Generic Letter 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," through Supplement 5. The inspectors performed a combination of Phase 1 and Phase 2 inspections as documented in TI 2515/109. The inspectors performed these reviews to determine if the applicant had established and was implementing a program that will ensure the proper performance of MOVs in safety-related systems. Because Watt's Bar Unit 2 has not operated yet, the applicant has not fully established a GL 89-10 program; therefore, the requirements of GL 89-10 have not been fully implemented.

In accordance with requirements of TI 2515/109, Revision 4, the inspectors evaluated and answered the following questions for Parts 1 and 2:

Part 1, Program Review

1. Review licensee commitments in response to the generic letter.

The inspectors reviewed commitments made for Unit 1 and compared the actions being taken for Unit 2 to those commitments. At the time of this inspection, the licensee had not formalized their plan for dynamic testing. More inspection is required to answer this question.

2. Evaluate whether the licensee has established a program to provide assurance that the MOVs within the scope of Generic Letter 89-10 are capable of operating under design-basis differential pressure and flow conditions. For each aspect of the generic letter listed below, the inspector should make a determination of whether the licensee's actions are adequate.
 - a. Establishment of the scope of the program (as part of this evaluation, the inspector should sample several MOVs and assess whether their inclusion or exclusion was appropriate).

The inspectors reviewed the scope of MOVs included in the 89-10 program and determined that the scope was consistent with the requirements of GL 89-10. The inspectors reviewed 17 MOVs that the applicant excluded from the GL 89-10 program and all valves included in the program. The inspectors reviewed system descriptions, the FSAR, and Emergency Operating Procedures for Unit 1 and did not identify any MOVs that should have been included in the program but were not.

- b. Development of plans and procedures for the performance of design-basis reviews of the MOVs in the generic letter program.

The applicant used established procedures to perform design-basis reviews that were common to all TVA nuclear units including Watts Bar Unit 2. The inspectors determined that the procedures complied with the requirements of GL 89-10 with one exception. As a result of efforts related to GL 96-05, the procedures did not require dynamic testing of all new actuators. At the time of this inspection, the applicant had not formalized their plan for dynamic testing the Unit 2 actuators. More inspection is required to answer this question.

- c. Development of plans and procedures for performing calculations to verify proper sizing of MOVs in the generic letter program and to set their switches adequately.

The applicant used established procedures, which were common to all TVA nuclear units including Watts Bar Unit 2, to perform these calculations. The inspectors did not have any concerns with these procedures. The inspectors reviewed four MOV thrust and torque capability engineering calculations and verified the adequacy of the engineering design was completed in accordance with the requirements, verified the correct design inputs and calculation methods were used, and compared the engineering calculations to the approved procedures. The inspectors observed two diagnostic equipment tests and verified test activities accurately set the limit switches in accordance the applicable requirements

- d. Development of plans and procedures for demonstrating the capability of the MOVs in the generic letter program.

The applicant used established procedures, which were common to all TVA nuclear units including Watts Bar Unit 2, to demonstrate the capability of the GL 89-10 MOVs. The inspectors did not have any concerns with these procedures. At the time of this inspection, the applicant had not formalized their plan for dynamic testing the Unit 2 MOVs. More inspection is required to answer this question.

- e. Development of plans and procedures for periodic verification of the capability of MOVs in the generic letter program.

The applicant maintained established procedures, which were common to all TVA nuclear units including Watts Bar Unit 2, to perform this periodic verification. The inspectors did not have any concerns with these procedures.

- f. Development of plans and procedures for analyzing each MOV failure, for justifying corrective action, and for trending MOV failures and corrective actions for MOVs in the generic letter program.

The applicant maintained established procedures, which were common to all TVA nuclear units including Watts Bar Unit 2, to perform these analyses. The inspectors did not have any concerns with these procedures. The inspectors reviewed 9 corrective action documents related to MOVs and verified the corrective action program had the appropriate threshold, trending, prioritized the issues appropriately, evaluated them properly, developed corrective actions appropriate to the significance of the issue, and appropriately implemented the corrective actions.

- g. Establishment of a schedule for the completion of the individual recommended actions of the generic letter.

All actions will be complete before Unit 2 fuel load.

- h. The inspectors should verify that all elements of the MOV program are encompassed by the quality assurance criteria of Appendix B to 10 CFR Part 50.

The inspectors verified that all elements of the GL 89-10 MOV program are controlled by the applicant's 10 CFR Part 50, Appendix B quality assurance program.

3. Review the following aspects of the licensee's GL 89-10 program:

- a. Plan, scope and oversight of the MOV program.

The inspectors reviewed the scope of MOVs included in the 89-10 program and determined that the scope was consistent with the requirements of GL 89-10. The applicant utilizes trained and qualified MOV engineers to provide effective oversight of the program.

- b. Design control for motor and actuator size, torque and limit switch settings, thermal overload protection, and torque switch limiter plate values.

The applicant used established design and work control programs and procedures to control the integrity of these values. The applicant issued thermal overload calculation EDQ00299920080004, Rev. 12, to document the thermal overload heater size selections for all GL 89-10 MOVs. The inspectors verified the adequacy of the calculation. The inspectors also reviewed four MOV thrust and torque capability engineering calculations. The inspectors verified the adequacy of the engineering design and verified the correct design inputs and calculation methods were used to ensure the design requirements were met. The inspectors reviewed the design control for motor and actuator sizing, torque, limit switch settings, and thermal overload protection to ensure adequate justification existed for assumptions used by the licensee.

- c. Control of MOV switch settings.

The applicant used established design and work control programs and procedures to control the integrity of MOV switch settings. The inspectors observed MOV actuator setup and concluded that the applicant set the limit switches and mechanical stops in accordance with procedures.

- d. Preparation and implementation of inservice testing (IST) program and procedures in accordance with 10 CFR 50.55a and the ASME Boiler and Pressure Vessel Code.

At the time of this inspection, the licensee had not formalized their Unit 2 IST program. More inspection is required to answer this question.

- e. Preparation and implementation of preventive and corrective maintenance program and procedures.

The applicant maintained established preventive and corrective maintenance programs and procedures as a result of Unit 1 activities. These programs and procedures are applicable to Unit 2.

- f. Training of personnel involved in MOV activities.

The applicant maintained an established MOV training program as a result of ongoing Unit 1 maintenance. The inspectors toured the training facility, discussed various aspects of the training program with instructors, and observed MOV mock-ups in the training facility. Personnel supervising and conducting the testing were qualified in accordance with the licensee's procedures. Areas of the MOV testing which required specialized training included engineering support personnel, preoperational test director, diagnostic testing, and Limitorque limit and torque switch maintenance.

- g. Followup and trending of MOV maintenance and problems.

The applicant maintained an established program to perform this follow-up and trending for Unit 1. These programs and procedures are applicable to Unit 2. The inspectors reviewed four corrective action documents and determined that the applicant was identifying, evaluating, and correcting Unit 2 MOV issues at an appropriate threshold.

- h. Processing and control of operating experience and vendor notifications to the same level of importance as NRC Information Notices (such as receiving all vendor notifications, taking appropriate action, and incorporating applicable information into the training program).

The applicant was incorporating operating experience, vendor notifications, and 10CFR21 notifications into the GL 89-10 program. The inspectors interviewed personnel and determined that the applicant's processing and control of MOV operating experience, vendor notifications, and 10CFR21 notifications was current.

- i. Control of MOV modifications and design changes.

The applicant was effectively controlling MOV modifications and design changes through established Unit 2 programs and procedures.

- j. Procurement of replacement parts and equipment.

As described in inspection report 05000391/2011607, the inspectors reviewed procurement activities for the new Unit 2 actuators. The inspectors had no concerns with those procurement activities.

- k. Control of use of diagnostics (including procedures, training, and evaluation of results).

The applicant used established programs and procedures to control the use of diagnostic equipment during MOV testing. The inspectors observed diagnostic testing with MOVATS test equipment on two GL 89-10 MOVs. The inspectors noted that the applicant was properly performing and controlling the tests in accordance with procedures.

- l. Control of open MOV maintenance items.

The inspectors did not review this aspect of their GL 89-10 program. More inspection is required to answer this question.

Part 2, Verification of Program Implementation

For a sample of MOVs from the population of MOVs in the generic letter program:

1. Verify that the licensee has performed design-basis reviews of the sampled MOVs consistent with the generic letter or its commitments (where accepted under Part 1), as appropriate.

The inspectors sampled three GL 89-10 MOVs to review. The inspectors determined that the applicant's design basis review was adequate.

2. Verify that the licensee has adequately sized the sampled MOVs in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate. Verify that switch settings are consistent with the expected design conditions for operation of

the valve.

The inspectors verified that the applicant properly sized the sampled MOVs and that the limit and torque switch settings were appropriate. The inspectors verified the adequacy of the engineering design was completed in accordance with applicable site specifications and design criteria. The inspectors reviewed four MOV thrust and torque capability engineering calculations and 6 thermal overload heater calculations. The inspectors verified that the engineering designs were completed in accordance with site specifications and verified the correct design inputs and calculation methods were used in the supporting calculations. The inspectors reviewed the design control for motor and actuator sizing, torque, limit switch settings, and thermal overload protection to ensure that adequate justification existed for assumptions used by the licensee.

3. Verify that the licensee has demonstrated the design-basis capability of the sampled MOVs and the adequacy of the licensee's program applied to the sampled MOVs in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate.

At the time of this inspection, the applicant had not formalized their plan for dynamic testing the Unit 2 actuators. More inspection is required to answer this question.

4. Verify that the licensee has established a method for periodic verification of adequate capability of the sampled MOVs in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate.

The applicant maintained established procedures, which were common to all TVA nuclear units including Watts Bar Unit 2, to perform this periodic verification. The inspectors did not have any concerns with these procedures.

5. Verify that the licensee has analyzed MOV failures which have occurred and has an effective corrective action plan to prevent reoccurrence and the licensee trends failures of MOVs in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate.

No Unit 2 actuators have failed during operations for those systems that have been turned over to Operations; however, the applicant maintained established procedures, which were common to all TVA nuclear units including Watts Bar Unit 2, to analyze MOV failures. The inspectors did not have any concerns with these procedures. The inspectors reviewed 9 corrective action documents related to MOV deficiencies for Unit 2. Based on the samples reviewed, the inspectors determined that the applicant was generally entering MOV-related deficiencies into their corrective action program.

6. Verify that the licensee is meeting the program schedule in accordance with the generic letter or its commitments (where accepted under Part 1), as appropriate.

This item is not applicable for Watts Bar Unit 2 because the Unit is under construction.

7. Verify quality assurance program implementation in the design control and testing of the sampled MOVs.

Based on the activities inspected, the inspectors determined that the applicant was properly implementing their quality assurance program with regards to Unit 2 GL 89-10 MOVs.

Specific Response to the Reporting Requirements for Periodic Verification of Design-Basis Capability of Safety-Related Motor Operated Valves for Generic Letter 96-05 (TI 2515/140)

The inspectors observed applicant activities in response to Generic Letter 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor Operated Valves." The inspectors performed these reviews to determine if the applicant had established and was implementing a program that will ensure the long-term performance of MOVs in safety-related systems. Because Watt's Bar Unit 2 has not operated yet, the applicant has not fully established a GL 96-05 program; therefore, the requirements of GL 96-05 have not been fully implemented.

In accordance with requirements of TI 2515/140, the inspectors evaluated and answered the following questions:

1. Verify the implementation of plans and commitments made as part of the completion of the MOV program in response to GL 96-05.

Because the applicant has not submitted their response to GL 96-05 for Unit 2, more inspection is required to answer this question.

2. On the basis of a sample of MOVs, the inspector should evaluate the licensee's justification for the following aspects of its GL 96-05 program:

- a. Scope of the GL 96-05 program.

All MOVs within the scope of GL 89-10 are included in the scope of GL 96-05. The inspectors verified the scope of valves included in the GL 89-10 program was appropriate.

- b. Current design basis of the MOVs in the GL 96-05 program.

All GL 96-05 MOVs have new actuators. The applicant is effectively maintaining appropriate design control of the current design basis for those MOVs.

- c. Degradation rate for the potential increase in the thrust or torque (as applicable) requirements to operate the valves.

The applicant incorporates degradation rates into their MOV program, which is applicable to all TVA nuclear units, including Unit 2. However, because the Unit remains under construction, the applicant has not had the opportunity to monitor for degradation.

- d. Degradation rate for the potential decrease in MOV actuator output under dynamic conditions.

The applicant incorporates degradation rates into their MOV program, which is applicable to all TVA nuclear units, including Unit 2. However, because the Unit remains under construction, the applicant has not had the opportunity to monitor for degradation.

- e. Periodic test method to identify age-related degradation affecting the valve thrust or torque requirements, and actuator output.

The applicant incorporates degradation rates into their MOV program, which is applicable to all TVA nuclear units, including Unit 2. However, because the Unit remains under construction, the applicant has not had the opportunity to monitor for degradation.

- f. Evaluation of test data to justify MOV test intervals.

The applicant incorporates degradation rates and actuator margin into their MOV program, which is applicable to all TVA nuclear units, including Unit 2. However, because the Unit remains under construction, the applicant has not had the opportunity to monitor for degradation. Initial actuator capability margin calculations were not complete as of this inspection. Because the applicant will use this margin data to initially set the MOV test intervals, consistent with the JOG recommendations, more inspection is required to answer this question.

- g. Periodic test interval that ensures continued MOV design-basis capability until next scheduled test.

The periodic test intervals for the Unit 2 valves will be based on the same criteria as the Unit 1 valves.

- 3. Verify that all elements of the MOV program are encompassed by the quality assurance criteria of Appendix B to 10 CFR Part 50.

The inspectors verified that all elements of the GL 96-05 MOV program are controlled by the applicant's 10 CFR Part 50, Appendix B quality assurance program.