



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

February 14, 2014

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

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2013610

Dear Mr. Skaggs:

On December 31, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on January 22, 2014 with you and other members of your staff.

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

No findings were identified during this inspection.

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

M. Skaggs

2

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

Sincerely,

/RA/

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

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

Enclosure: Inspection Report
05000391/2013610
w/Attachment

cc w/encl: (See next page)

M. Skaggs

2

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

Sincerely,

/RA/

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

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

Enclosure: Inspection Report
05000391/2013610
w/Attachment

cc w/encl: (See next page)

* Previous Concurrence

■ PUBLICLY AVAILABLE □ NON-PUBLICLY AVAILABLE □ SENSITIVE ■ NON-SENSITIVE
ADAMS: ■ Yes ACCESSION NUMBER: ML14049A158 ■ SUNSI REVIEW COMPLETE ■ FORM 665 ATTACHED

OFFICE	RII:DCP	RII:DCP	RII:DCP	RII:DCP	RII:DCP	RII:DCI	RII: DCI
SIGNATURE	TXN via e-mail	TXN for EJP1 via e-mail	SEA1 via e-mail	JBB5 via e-mail	CJE via e-mail	JXL2 via e-mail	ATM1 via e-mail
NAME	TNazario	EPatterson	STemple	JBaptist	CEven	JLizardi	AMatos
DATE	02/07/2014	2/07/2014	1/31/2014	02/03/2014	01/31/2014	02/18/2014	02/04/2014
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
OFFICE	RII: DCI	RII: DCI	RII: DCI	RII: DCP			
SIGNATURE	TCS via e-mail	GXC2 via e-mail	CAJ via e-mail	AAW			
NAME	TSteadham	GCrespo	CJulian	AWilson			
DATE	02/07/2014	02/02/2014	1/31/2014	2/14/2014			
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: OFFICIAL RECORD COPY DOCUMENT NAME:
G:\CC\IDCP\CPB3\WATTS BAR 2\CURRENT DRAFT INSPECTION REPORT\2013\IR 2013-610\INTEGRATED IR 2013610
REV3.DOCX

cc w/encl:

Mr. Gordon P. Arent
Director, Licensing
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. O. J. Zeringue, General Manager
Engineering and Construction
WBN Unit Two
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. R. A. Hruby, General Manager
Technical Services
WBN Unit Two
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City Tennessee 37381

Mr. James O'Dell, Manager
Licensing and Industry Affairs
WBN Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. Joseph P. Grimes
Chief Nuclear Officer
and Executive Vice President
Tennessee Valley Authority
1101 Market Place
3R Lookout Place
Chattanooga, Tennessee 37402-2801

County Executive
375 Church Street
Suite 215
Dayton, Tennessee 37321

Mr. Dave Gronek
Plant Manager, WBN Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. R. R. Baron, Senior Manager
Nuclear Construction Quality Assurance
WBN Unit Two
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

Mr. Joseph Shea, Vice President
Nuclear Licensing
Tennessee Valley Authority
1101 Market Street
3R Lookout Place
Chattanooga, TN 37402-2801

Mr. E. J. Vigluicci
Assistant General Counsel
Tennessee Valley Authority
400 West Summit Hill Drive
6A West Tower
Knoxville, Tennessee 37402

Mr. Lawrence E. Nanney, Director
Tennessee Department of Environmental
Health & Conservation
Division of Radiological Health
3rd Floor, L&C Annex
401 Church Street
Nashville, TN 37243-1532

Mr. T. P. Cleary
Site Vice President
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, Tennessee 37381

County Mayor
P.O. Box 156
Decatur, Tennessee 37322

Ms. Ann P. Harris
Public
341 Swing Loop
Rockwood, TN 37854

M. Skaggs

4

cc email distribution w/encl:

Greg Scott

Tennessee Valley Authority

Electronic Mail Distribution

Watts Bar 2 Licensing

Tennessee Valley Authority

Electronic Mail Distribution

Letter to Michael D. Skaggs from Robert C. Haag dated February 14, 2014.

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2013610

Distribution w/encl:

Region II Regional Coordinator, OEDO (B. Rini)

J. Quichocho, NRR

J. Poole, NRR

A. Hon, NRR

C. Evans, RII

L. Douglas, RII EICS

J. Bartley, RII DRP

R. Monk, RII WBN Unit 1 SRI

OE Mail (email address if applicable)

ConE_Resource@nrc.gov

PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2013610

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: Spring City, TN 37381

Dates: November 17 – December 31, 2013

Inspectors: T. Nazario, Senior Resident Inspector, Construction Projects
Branch (CPB) 3, Division of Construction Projects (DCP)
Region II (RII)
E. Patterson, Resident Inspector, CPB3, DCP, RII
S. Temple, Resident Inspector, CPB3, DCP, RII
C. Julian, Senior Construction Inspector, Construction Inspection
Branch (CIB) 1, Division of Construction Inspection (DCI), RII,
Sections OA.1.5, OA.1.6, OA.1.7 and OA.1.9
G. Crespo, Senior Construction Inspector, CIB1, DCI, RII,
Sections OA.1.5, OA.1.6, OA.1.7 and OA.1.9
A. Matos, Construction Inspector, CIB1, DCI, RII, Section OA.1.6
T. Steadham, Senior Construction Inspector, CIB3, DCI, RII,
Sections OA.1.4
J. Lizardi, Construction Inspector, CIB2, DCI, RII, Sections OA.1.2
and OA.1.3
J. Baptist, Senior Construction Project Inspector, CPB3, DCP, RII,
Sections P.1.1 and P.1.2
C. Even, Senior Construction Project Inspector, CPB3, DCP, RII,
Section OA.1.8

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

Enclosure

EXECUTIVE SUMMARY

Watts Bar Nuclear Plant, Unit 2

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

Inspection Results

- The inspectors concluded that issues pertaining to a Construction Deficiency Report (CDR) involving electrical calculations have been appropriately addressed for WBN Unit 2. A corresponding inspection item was identified as Item 7 in Appendix HH of Supplement 22 to NUREG-0847. These items are closed.
- Other areas inspected were adequate with no findings identified. These areas included QA; piping; mechanical systems and components; electrical systems and components; fire protection; pre-operational testing activities; various NRC inspection procedures; and refurbishment activities.

Table of Contents

I. QUALITY ASSURANCE PROGRAM.....	5
Q.1 Quality Assurance Oversight Activities.....	5
Q.1.1 Identification and Resolution of Construction Problems (Inspection Procedure 35007)	5
II. MANAGEMENT OVERSIGHT AND CONTROLS.....	6
C.1 Construction Activities.....	6
C.1.1 Unit 1 and Unit 2 Construction Activity Interface Controls.....	6
C.1.2 Mechanical Components – Work Observation and Construction Refurbishment Process (Inspection Procedures 50073 and 37002)	6
C.1.3 Piping – Piping Cleanliness and Flushing Work Observations (Inspection Procedure 49063).....	7
C.1.4 Pipe Support (Snubber) Work Observations (Inspection Procedure 50090).....	8
C.1.5 Reactor Vessel and Internals Work Observation (Inspection Procedure 50053) ..	9
C.1.6 Electrical Components and Systems – Work Observation (Inspection Procedure 51053)	10
F.1 Fire Protection.....	101
F.1.1 Fire Protection (Inspection Procedure 64051).....	11
P.1 Pre-Operational Activities	12
P.1.1 Preoperational Test Program Implementation Verification (Inspection Procedure 71302)	12
P.1.2 (Closed) Preoperational Test Procedure Review (Inspection Procedures 70300 and 70311)	14
IV. OTHER ACTIVITES	15
OA.1.1 (Discussed) Electrical Cable Issues Corrective Action Program – Sub-Issue: Supports in Vertical Trays and Construction Deficiency Report 391/89-04: Support of Class 1E Cables Installed in Long Vertical Cable Tray Runs (Temporary Instruction 2512/016 and Inspection Procedure 35007)	15
OA.1.2 (Discussed) Inspection of Equipment Seismic Qualification Corrective Action Program (Temporary Instruction (TI) 2512/021, Inspection Procedure (Inspection Procedure) 51055)	16
OA.1.3 (Discussed) Violation 391/86-21-02: Instrument Valves, Foxboro Transmitters, and Instrument Panels Not Seismically Qualified (Inspection Procedure 51055).....	17
OA.1.4 (Discussed) Generic Letter 89-10: Safety Related Motor Operated Valve (MOV) Testing and Surveillance (Inspection Procedures 50073 and 51053, Temporary Instruction 2515/109).....	18
OA.1.5 (Discussed) Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (Temporary Instruction 2512/037)	22
OA.1.6 (Discussed) Construction Deficiency Report 391/85-37: Incorrect Use of AMP PIDG Terminals (IP 35007)	23
OA.1.7 (Discussed) Electrical Cable Issues Corrective Action Program – Sub-issue: Cable Bend Radius Deficiencies (Temporary Instruction 2512/016, Inspection Procedures 51063 and 51065).....	24
OA.1.8 (Discussed) Inspection of Watts Bar Nuclear Plant QA Records Corrective Action Program Plan (Temporary Instruction 2512/028, Inspection Procedure 51055) ..	26

OA.1.9	(Closed) Construction Deficiency Report 391/86-13, Inadequate Calculations to Document Electrical System Design Basis and Supplemental Safety Evaluation (SSER) Appendix HH Item 7, Verify Commitment Completion and Review Electrical Design Calculations (Inspection Procedure 92701).....	26
--------	--	----

V. MANAGEMENT MEETINGS.....	27
------------------------------------	-----------

X1 Exit Meeting Summary.....	27
-------------------------------------	-----------

REPORT DETAILS

Summary of Plant Status

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

I. QUALITY ASSURANCE PROGRAM

Q.1 Quality Assurance Oversight Activities

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

a. Inspection Scope

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

The inspectors reviewed the disposition and actions associated with the following PERs:

- PER 786866, Flush plans for Unit 2 CCS may not meet regulatory requirements
- PER 792916, Incorrect response spectra applied in residual heat removal system stress calculation
- PER 801874, Dents on U2 Lower Internals Storage Stand, and previously in PER 210732, Significant Near-Miss: Ice Condenser Hoist Wire Rope Failed
- PER 810906, SYS WBN081 Pumps, Structural Interface Boundary (ABSCE) has been violated (also referenced in Section C.1.1 of this report)

The inspectors reviewed PER 810906, which documents a non-permitted breach in the Auxiliary Building Secondary Containment Envelope (ABSCE) boundary, to verify that the breach was evaluated, documented, and entered into the breach tracking program in accordance with TI-65, "Breaching the Containment Annulus, ABSCE, or MCRHZ Pressure Boundaries", Revision (Rev.) 21. The review of PER 801874 and PER 210732 is discussed in more detail in Section C.1.5, "Reactor Vessel and Internals Work Observation."

b. Observations and Findings

No findings were identified.

c. Conclusions

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

II. MANAGEMENT OVERSIGHT AND CONTROLS

C.1 Construction Activities

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

a. Inspection Scope

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

Specific work activities observed included work associated with:

- Work Order (WO) 11568522, 2-CP-070-01-03, Component Cooling System ESF Header Cleanness Plan
- WO 115189593, PMTI-62151 "A" train ERCW pre flow balance
- WO 115240661 and 115240643 which are associated with PER 810906, SYS WBN081 Pumps, Structural Interface Boundary (ABSCE) has been violated (also discussed in Section Q.1.1 of this report)

Specific work activities that the applicant had screened out as not affecting Unit 1 included, but were not limited to, electrical work activities and refurbishment activities as noted in this inspection report.

b. Observations and Findings

No findings were identified.

c. Conclusions

Overall, adequate management oversight and controls were in place for observed construction activities that could potentially impact the operating unit, and an adequate level of protection had been implemented.

C.1.2 Mechanical Components – Work Observation and Construction Refurbishment Process (Inspection Procedures 50073 and 37002)

a. Inspection Scope

The inspectors observed the foreign object retrieval of hardened non-metallic debris as part of the foreign object search and retrieval (FOSAR) activities on steam generator

(SG) 3. The inspections were completed to verify the precautions were taken to maintain the integrity of SG 3, and to determine whether work instructions were adequate and being followed.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The observed foreign object removal process associated with the refurbishment of SG 3 was completed in accordance with the approved procedures, and the records reviewed were in compliance the American Society of Mechanical Engineers Boiler and Pressure Vessel code 1971 edition through 1973 summer addenda.

C.1.3 Piping – Piping Cleanliness and Flushing Work Observations (Inspection Procedure 49063)

a. Inspection Scope

The inspectors reviewed cleanliness procedure SMP-7.0, "Control of Cleanliness, Layup and Flushing," Rev. 3, and engineering specification N3M-938, "Cleaning and Cleanness for fluid Systems and Components," Rev. 2, to determine if the procedures met the requirements of American National Standards Institute (ANSI) N45.2.1, "Cleaning of Fluid Systems and Associated Components During Construction Phase of Nuclear Power Plants," 1973.

The inspectors reviewed four temporary modifications packages to support the flushing of the piping for the component cooling system, interviewed four seismic structural engineers, and observed the final as-installed walkdowns of the temporary piping, supports and temporary filters. The reviews and walkdowns were completed to independently assess that the piping was installed in accordance with the engineered system specifications; that the interactions and clearances met the requirements of WB-DC-20.32, "Integrated Interaction Program Screening and Acceptance Criteria," Rev. 5; that the installation met the requirements for seismic category 1(L) position 2 as described in Regulatory Guide 1.29; and that the applicant implemented controls to prevent adverse impact on Unit 1 operational safety.

Also, the inspectors reviewed the component cooling system clean plans and work orders to verify that the scope of work and acceptance criteria met the requirements of SMP-7.0 and ANSI N45.2.1. The inspectors observed a sample of the flushing activities for the component cooling 2A safety-related coolers and 2B main header flush. In addition, the inspectors reviewed two test director qualifications to verify the test directors were qualified in accordance with SMP-5.0, "Indoctrination, Training and Qualification of Preoperational Startup Engineers," Rev. 5.

During the inspection period the inspectors entered the containment sump to observe preparations for cleanliness activities. The inspectors verified the existence of a divider

plate between the residual heat removal (RHR) and containment spray suction lines. The inspectors also interviewed personnel regarding the cleanliness preparations.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The applicant's procedures and implementation of the cleanliness plan for the component cooling system piping was implemented in accordance with ASNI N45.2.1-1973 and approved procedures for those activities observed during the inspection period.

C.1.4 Pipe Support (Snubber) Work Observations (Inspection Procedure 50090)

a. Inspection Scope

The inspectors observed dynamic pipe support (snubber) installations for the following samples and reviewed the as-built records to verify that the work activities relative to dynamic pipe support systems were completed in accordance with NRC requirements and the applicant's approved procedures.

Snubbers inspected:

- WBN-2- SNUB-062-0158N; size PSA 3, chemical and volume control system (CVCS)
- WBN-2- SNUB-062-0158S; size PSA 3, CVCS
- WBN-2- SNUB-062-0158V; size PSA ¼, CVCS
- WBN-2-SNUB-063-0169; size PSA 1, safety injection system
- WBN-2-SNUB-062-0182; size PSA ¼, CVCS
- WBN-2-SNUB-062-0185; size PSA 1, CVCS
- WBN-2-SNUB-063-0213; size PSA 3, safety injection system

The inspectors observed snubber installations to verify:

- the supports were free of damage and corrosion;
- pre-installation checks were completed;
- correct materials were used;
- extension rods and connecting joints were not deformed;
- the snubbers were installed with the correct pin to pin and cold set points in accordance with the design specifications; and
- measuring and test equipment (M&TE) was properly controlled and calibrated.

Design and installation records were reviewed to verify that the design inputs to include field changes and vendor specifications were properly translated to the field installation procedures and that the pipe support installations were completed in accordance with the approved drawings and design specifications.

The inspectors conducted interviews with three field engineers and two craft workers engaged in the installation of snubbers to verify:

- pre-installation checks were performed for damage, rust, or other conditions that may interfere with their proper operation;
- pre-installation checks were made to ensure that bolts, nuts, and other fastener items were available and of the correct type, size, and material with the required identification markings;
- any pre-installation field repairs or adjustments to the units were performed in accordance with specifications to ensure that proper seal materials and performance requirements were met; and
- personnel engaged in the installation of safety-related pipe supports and restraints were adequately trained to perform the tasks and processes contained in procedures, specifications, and work orders.

The following samples were inspected:

- IP 50090 Section 02.03a – five samples
- IP 50090 Section 02.03c – seven samples

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The installations of the dynamic supports (snubbers) were completed in accordance with the approved drawings and procedures.

C.1.5 Reactor Vessel and Internals Work Observation (Inspection Procedure 50053)

a. Inspection Scope

The inspectors conducted inspections of the reactor pressure vessel (RPV) and reactor vessel internals 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. The inspectors observed coverings for the stored reactor vessel and vessel internals to verify that protective devices were installed around top of open vessel and the vessel side openings to prevent entry of foreign objects or debris and protected from construction damage. The core barrel and internals were inspected to verify storage locations were adequate and controls were in place to provide protection from construction damage. The storage supports for the core barrel and internals were inspected to verify storage locations were adequate. The inspectors observed the documentation and initial assessment of minor visible construction damage on the stand utilized to support the stored reactor vessel lower internals and verified that the damage was appropriately characterized, documented, and evaluated by

engineering. This damage was captured in PER 801874, Dents on U2 Lower Internals Storage Stand, and previously in PER 210732, Significant Near-Miss: Ice Condenser Hoist Wire Rope Failed.

The following samples were inspected:

- IP 50053 Section 02.01.c - one sample
- IP 50053 Section 02.02.a - one sample
- IP 50053 Section 02.03.b - one sample
- IP 50053 Section 02.03.c - one sample

b. Observations and Findings

No findings were identified.

c. Conclusions

Adequate controls were in place to protect the reactor vessel and internals.

C.1.6 Electrical Components and Systems – Work Observation (Inspection Procedure 51053)

a. Inspection Scope

The inspectors observed in-process work associated with modifications to the configuration of 2-XS-30-83A-A double throw transfer switch located in containment pertaining to motor 2-MTR-30-83-A, to evaluate if the components used were of the right size, were installed at the proper location by qualified craft personnel using suitable tools, adequate documentation of installation activities were completed in a timely manner, and required inspections were performed by QC personnel. The inspectors reviewed work packages to determine whether the latest approved revision procedures and specifications were available and used by the craftsmen. The inspectors measured cable bend radius of the low voltage cables used as compression lug wire assemblies to verify adequate bend radius inside the panel was maintained within limits. The inspectors reviewed Drawing Revision Authorization (DRA) 54172-076 to evaluate if the final configuration of the equipment was in accordance with the DRA.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that adequate measures were in place to ensure that electrical work was performed in accordance with applicable procedures and drawings.

F.1 Fire Protection

F.1.1 Fire Protection (Inspection Procedure 64051)

a. Inspection Scope

The inspectors performed a walkdown of construction areas to determine whether construction activities and areas met procedure requirements for fire protection. The inspectors took a limited set of field-verifiable attributes from preventive maintenance guidance into the field and evaluated 12 fire suppression devices. The inspectors reviewed labeling, accessibility, cartridge weight, extinguisher agent, and physical condition of fire extinguishers to verify no evidence of deterioration was present, the extinguisher agent was free of contamination, and cartridge weight met the preventive maintenance specifications. The inspectors reviewed preventive maintenance instructions to determine whether records of these 12 fire suppression devices met procedure inspection requirements.

The inspectors observed three construction activities using ignition sources to determine whether fire prevention procedure requirements were met. This included the handling and use of flammable materials and the use of combustible materials relative to locations of flammable ignition sources. Specifically, the inspectors observed fire watch activities related to:

- grinding under WO 114546527, Pipe support hanger 2-62-A-271 (12/04/13);
- welding under WO 115181833, Install Steam Generator #2 bumper stops and threads per DRA 55880-002 (12/12/13); and
- WO 11488809, Install Supports Reactor Cavity wall

The following fire suppression devices were observed, and associated records were reviewed:

Temporary Hose stations:

- U2 Annulus El. 750 Az. 180
- U2 Annulus El. 730 Az. 180

Portable Fire Extinguishers:

- U2-FW-10 U2 Safety Trailer
- U2-FW-21 Access Stairwell El. 713
- U2-FW-50 U2 Safety Trailer
- U2-FW-69 U2 Safety Trailer
- U2-FW-140 U2 Safety Trailer
- U2-FW-28 El. 708 Az. 335
- U2-FW-137 El. 708 Az. 70
- U2-FW-154 El. 708 Az. 70
- U2-FW-29A El. 708 Az. 300
- U2-FW-32A El. 708 Az. 300

The following samples were inspected:

- IP 64051 Section 02.07 – 12 samples
- IP 64051 Section 02.08 – 3 samples

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

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

P.1 Pre-Operational Activities

P.1.1 Preoperational Test Program Implementation Verification (Inspection Procedure 71302)

a. Inspection Scope

2.01 (Weekly Inspection Activities): The inspectors verified that the applicant's management control system was effectively discharging its responsibilities over the preoperational testing program by direct observation of activities, tours of the facility, interviews and discussions with applicant personnel, and review of facility records. Preoperational testing activities were limited during the inspection period and included the following systems or portions thereof:

- System 074, RHR system

As systems became available for preoperational testing, inspectors toured the accessible areas of the facility to make an independent assessment of equipment conditions, plant conditions, security, and adherence to regulatory requirements. Inspectors also verified the following, as available and on a sampling basis during the tours:

- general plant/equipment conditions;
- plant areas for fire hazards; examined fire alarms, extinguishing equipment, actuating controls, fire fighting equipment, and emergency equipment for operability; verified that ignition sources and flammable material were being controlled in accordance with licensee's procedures (further discussed in Section F.1.1);
- activities in progress (e.g., maintenance, preoperational testing, etc.) were being conducted in accordance with licensee's procedures; and
- construction work force authorized to perform activities on systems or equipment.

In addition, the inspectors witnessed the performance of component test procedure GTE-11, "Motor Operated Valve/Damper Test," Rev. 5, for the 2-FVC-074-0033-A, system 074 residual heat removal system, Motor Operated Valve Analysis and Test System (MOVATS) test. The inspections were completed to verify that the testing was

conducted in accordance with approved procedures and to verify the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following activities associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- plant systems in service to support the test;
- test equipment was installed and within calibration;
- test was performed in accordance with the approved procedure;
- testing events and discrepancies were properly documented;
- test was executed and coordinated properly;
- data was properly collected; and
- test personnel were using approved drawings and vendor manuals.

In addition, the inspectors observed the test to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineers to assure that the preliminary test evaluations were consistent with the inspectors' observations. During the test, inspectors observed important data gathering activities to ensure the data was properly gathered and recorded. A post-test cursory review of the test data was performed to verify legibility, traceability, and permanence of the data sheet entries.

The inspectors conducted interviews for three motor operated valve (MOV) engineers involved in motorized valve testing to verify they had received appropriate training for performing the test.

02.02 (Monthly Inspection Activities): During this inspection period, the inspectors reviewed the turnover package for the Unit 2 portion of the Essential Raw Cooling Water system (System 67) as part of Startup Manual Procedure (SMP) 4.0, "System Completion and Turnover," Rev.9, to verify jurisdiction controls were appropriate and applicant procedures were followed. Additionally, the inspectors reviewed the turnover package to ensure required preventative maintenance was incorporated into a schedule for accomplishment.

The inspectors reviewed maintenance plans on safety-related equipment, to determine if the maintenance was scheduled in accordance with developed procedures and that these procedures were adequate for the maintenance being performed. The maintenance had not been performed but the methodology was discussed with the Refurbishment and Preventative Maintenance Manager to determine how systems with completed preoperational testing would be protected.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The applicant's implementation of the preoperational test program and RHR system MOV testing was implemented in accordance with procedures for those activities observed during the inspection period.

P.1.2 (Closed) Preoperational Test Procedure Review (Inspection Procedures 70300 and 70311)

a. Inspection Scope

Background: The purpose of Inspection Manual Chapter (IMC) 2513, Light Water Reactor Inspection Program - Preoperational Testing and Operational Preparedness Phase, is to verify through direct observation, personnel interviews, and review of facility records that:

- Systems and components important to the safety of the plant are fully tested to demonstrate that they satisfy their design requirements.
- Management controls and procedures, including quality assurance programs, necessary for operation of the facility have been documented and implemented.

IMC 2513 defines the minimum inspection program for a finding of readiness for license issuance (IP 94300, Status of Plant Readiness for an Operating Licensee). IMC 2513 requires the procedural review of the mandatory tests defined in IMC 2513 and five of the primal tests defined in IMC 2513. The following inspection was performed in relation to satisfying the required procedural review.

Inspection Activities: The inspectors reviewed pre-operational test procedure 2-PTI-067-02-A, ERCW System Flow Balance – Train A, to verify that the procedure contained the following administrative good practice attributes:

- the title described the purpose of the procedure
- the cover page had appropriate information and approval signatures
- each page had appropriate identification information
- the last page was clearly identifiable by markings
- a clear statement of procedure purpose/objectives
- planning information such as prerequisites, precautions, required tools, reference documents, and coordination requirements
- signoff requirements including concurrent and independent verification steps established where appropriate
- equipment alignment instructions are clear and concise
- equipment identifiers are accurate (10 percent sample)
- actions to be taken within the steps are specifically identified (20 percent sample)
- instrumentation units consistent for data collection (10 percent sample)
- graphs, charts, tables, data sheets, and work sheets are clearly usable
- calculation sheets were technically accurate
- clear coordination instructions for test activities involving multiple test personnel
- clear instructions for system restoration
- guidance for follow-up actions and points of contact
- overall, clear concise steps for testing with action critical (acceptance criteria) steps identified (20 percent sample)
- clear quantitative acceptance criteria with acceptability and contingencies

- overall sequence of the procedure consistent with the obtaining the intended result

The inspectors also reviewed the procedure to verify that precautions or explanations were placed immediately ahead of the steps to which they applied. The inspectors performed a detailed review with the responsible test engineer to verify that the acceptance criteria met design requirements.

Documents reviewed are listed in the Attachment

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the applicant's test procedure was written in a manner consistent with NRC requirements and the guidance of applicant procedure SMP-8.0, "Watts Bar Nuclear Plant Unit 2 Administration of Preoperational Test Instructions," Rev. 9.

IV. OTHER ACTIVITIES

OA.1.1 (Discussed) Electrical Cable Issues Corrective Action Program – Sub-Issue: Supports in Vertical Trays and Construction Deficiency Report 391/89-04: Support of Class 1E Cables Installed in Long Vertical Cable Tray Runs (Temporary Instruction 2512/016 and Inspection Procedure 35007)

a. Inspection Scope

Background: The concern that long vertical cable tray runs may not be adequately supported was initially reported to the NRC on May 26, 1989, in accordance with 10 CFR 50.55(e) as CAQR WBP 880575. Additional background information is provided in NRC integrated inspection report (IIR) 05000391/2010605 (ADAMS Accession No. ML110410680) and IIR 05000391/2013605 (ADAMS Accession No. ML13220A640).

Inspection Activities: The inspectors conducted interviews, document review and in-process work observation associated with WO 114309440 in order to evaluate the adequacy of the field implementation of the corrective actions associated with construction deficiency report (CDR) 391/89-04. The inspectors conducted walkdowns to determine if work performed on the horizontal portion of trays 0-4TRY-292-1928 and 0-4TRY-292-1927 located in the annulus was completed in accordance with established procedures and applicable drawings and whether it was sufficient to provide adequate support to the cables in the vertical section of the trays.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Activities observed during the inspection were accomplished in accordance with procedures. Additional inspections will be required to obtain an adequate sample size of implementation activities associated with the corrective actions for CDR 391/89-04.

OA.1.2(Discussed) Inspection of Equipment Seismic Qualification Corrective Action Program (Temporary Instruction (TI) 2512/021, Inspection Procedure (Inspection Procedure) 51055)

a. Inspection Scope

Background: The Equipment Seismic Qualification Corrective Action Program (ESQ CAP) was developed by TVA to provide reasonable assurance that category I and I(L) equipment were adequately qualified for design basis seismic events, and were in compliance with the regulatory and licensing requirements. The ESQ CAP was developed to address a number of issues associated with documentation retrievability, interface control among engineering disciplines, interface control between engineering and other organizations, discrepancies between design documents and installed conditions, and discrepancies between the inspection documentation and the installed conditions.

Inspection Activities: The purpose of this inspection was to evaluate the adequacy of several actions taken to address the ESQ CAP, and to review some of the programmatic aspects involving the ESQ CAP as characterized by the applicant. The inspectors interviewed applicant staff, and reviewed the applicant's open item closure report, including referenced documents and actions associated with commitment tracking number 111032078, to determine if programmatic issues associated with the ESQ CAP were properly developed as required by Calculation WCG-1-1419, WBN Seismic/Civil Validation Program Methodology Summary Report, Section B3 and Attachment C4. The inspectors held multiple interviews with the applicant staff responsible for the ESQ CAP implementation and development, including engineering, quality control, and quality assurance personnel. 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.

During this inspection, the inspectors reviewed several calculations, procedures, walk-down packages, and design input and output documents. These documents were reviewed to verify whether they were adequate, complete, and whether changes to these documents were properly controlled in accordance with commitments described in the ESQ CAP and TVA's Nuclear Quality Assurance Program. The inspectors reviewed several design input documents to verify that this information was appropriately used in the seismic evaluations performed by engineering personnel.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors reviewed several actions completed as part of the ESQ CAP implementation and development. 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 the ESQ CAP, with an emphasis on verifying adequate seismic design and field implementation of the ESQ CAP.

OA.1.3 (Discussed) Violation 391/86-21-02: Instrument Valves, Foxboro Transmitters, and Instrument Panels Not Seismically Qualified (Inspection Procedure 51055)

a. Inspection Scope

Background: Violation (VIO) 391/86-21-02 was issued as part of NRC Inspection Report (IR) 50-390/86-21 and 50-391/86-21 (ADAMS Accession No. ML082280243). The notice of violation concerned TVA's failure to ensure that vendor information, specifically seismic qualification reports and calculations, was correctly translated into specifications, drawings, procedures, instructions, and the field installation as required by 10 CFR Part 50, Appendix B, Criterion III. IIR 05000391/2013608 (ADAMS Accession No. ML 13316A776) documented previous inspection results and background details of VIO 391/86-21-02.

Inspection Activities: The inspectors interviewed applicant staff and reviewed the applicant's open item closure report, including referenced documents and actions associated with PERs 143758, 143701, and 143538 and commitment tracking number 114113692 to determine if the corrective actions associated with the seismic qualification deficiencies were properly resolved and documented.

The inspectors reviewed several work plan packages, calculations, drawings and material qualification documents. These documents were reviewed to determine the adequacy of field installation, seismic qualification, and material traceability. The inspectors reviewed design calculations associated with instrument racks installed in series to verify adequate seismic qualification. The inspectors observed as-built condition of mounting plates and support brackets for two Rosemount transmitters associated with PERs 143758 and 143701. These installations were compared against design and installation drawings to determine if these matched the as-built condition. The following newly installed Rosemount transmitters were walked-down:

- 2-FT-68-6-A-D
- 2-FT-70-6-D-F

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Corrective actions were conducted in accordance with PER corrective action plans, and the as-built condition matched final drawings and records. Additional document review needs to be performed to ensure that changes to procedures, instructions, and drawings do not affect original commitments for this violation. Supplementary field observations are required to verify whether implemented corrective actions adequately corrected discrepancies on existing installations and controlled future rework and installations.

OA.1.4 (Discussed) Generic Letter 89-10: Safety Related Motor Operated Valve (MOV) Testing and Surveillance (Inspection Procedures 50073 and 51053, Temporary Instruction 2515/109)

a. Inspection Scope

The inspectors observed static MOV diagnostic tests for the following Generic Letter (GL) 89-10 MOVs:

- 2-FCV-74-008, reactor coolant system to residual heat removal inlet bypass isolation valve; and
- 2-FCV-74-035, residual heat removal crosstie isolation valve.

For these MOVs the inspectors: (1) reviewed the limit and torque switches to determine if the components were properly set and, (2) reviewed the test activities to determine if they were properly controlled and handled. To make those determinations, the inspectors used work instructions, applicable design specifications, calculations, system descriptions, work packages, and approved procedures. 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.

During the observance of these tests, the inspectors determined if:

- measuring and test equipment used during the test was properly identified, traceable, and within the current calibration interval;
- measuring and test equipment was suitable for the application, was used within the calibrated range, and was recorded in the applicable work orders;
- testing results were recorded during the activity; and
- test discrepancies were properly identified for resolution.

The inspectors reviewed MOV thrust and torque capability engineering calculations for the two MOVs listed above to determine if the:

- actuator selections were in compliance with applicable site specifications and design requirements;
- design inputs for design basis operating conditions (such as temperature, flow, and pressure – including differential pressure) were consistent with the applicable system description and the Final Safety Analysis Report;

- calculations complied with design standard DS-M18.2.22, TVA Mechanical Design Standard for MOV Design Basis and Joint Owner's Group (JOG) Review Methodologies Rev. 5; and
- calculations complied with design standard DS-M18.2.21, Mechanical Design Standard for Motor Operated Valve Thrust and Torque Calculations, Rev. 20.

The inspectors reviewed the applicant's plans to determine the design basis capability of all Unit 2 GL 89-10 MOVs to determine if their plans met the requirements of GL 89-10, design standard DS-M18.2.22, and the method previously used for Unit 1. Specifically, the inspectors reviewed the applicant's plans to establish the design basis through dynamic testing, Electric Power Research Institute Performance Prediction Methodology, and grouping. The inspectors performed field walkdowns of 13 MOVs that the applicant planned to use the grouping method to determine the design basis capability. The inspectors obtained nameplate data on the valves and actuators to determine if the:

- data was consistent with the applicable MOV valve and actuator capability engineering calculations; and
- valve type, size, and manufacturer were consistent with the applicant's grouping methodology.

The inspectors observed applicant activities in response to GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." 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 WBN 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.

The inspectors previously reviewed applicant actions to address GL 89-10 as described in Section OA.1.11 of NRC Inspection Report 05000391/2011608 (ADAMS Accession NO. ML 11311A082). Therefore, this inspection was a limited scope inspection of the requirements of this TI. In accordance with requirements of TI 2515/109, Rev. 4, the inspectors evaluated and answered the following questions for Parts 1 and 2:

Part 1, Program Review:

04.01 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. The applicant's plans for Unit 2 were consistent with the Unit 1 commitments.

04.02 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.

- 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 WBN Unit 2. The inspectors determined that the procedures complied with the requirements of GL 89-10 and that the applicant's plans to establish the design basis for all GL 89-10 MOVs met the requirements of GL 89-10.

- 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 WBN Unit 2, to demonstrate the capability of the GL 89-10 MOVs. The inspectors determined that the procedures complied with the requirements of GL 89-10 and that the applicant's plans to demonstrate the capability for all GL 89-10 MOVs met the requirements of GL 89-10.

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

- I. Control of open MOV maintenance items.

The applicant used their established corrective action program and work control program to control and resolve open MOV maintenance items.

Part 2, Verification of Program Implementation:

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

- 04.05 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 two GL 89-10 MOVs, 2-FCV-74-008 and 2-FCV-74-035, to review as part of this inspection. The inspectors determined that the applicant's design basis review was adequate for the sampled valves. The inspectors determined that more inspections are required to meet the sample requirements contained in Section 05.02.k of the TI.

- 04.06 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 and that it was completed in accordance with applicable site specifications and design criteria. The inspectors reviewed the applicable thrust/torque and actuator capability engineering calculations for the sampled MOVs to ensure that the applicant had appropriately sized the

actuators. The inspectors observed static MOV testing on the sampled valves and determined that the licensee appropriately set the limit switches. For MOVs that were limit seated in the closed direction, the inspectors visually verified that the torque switches were not wired into the control circuit.

- 04.07 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.

Although the static testing serves a role in the final design basis capability demonstration, this capability will be demonstrated upon successful differential pressure testing on the sampled valves.

- 04.08 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 WBN Unit 2, to perform this periodic verification. The inspectors determined that these procedures were adequate.

- 04.09 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.

Neither of the sampled MOVs has experienced a failure. The applicant maintained established procedures, which were common to all TVA nuclear units including WBN Unit 2, to analyze MOV failures. The inspectors determined that these procedures were adequate.

- 04.10 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 WBN Unit 2 because the unit is under construction.

- 04.11 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.

The following samples were inspected:

- TI 2515/109, Section 04.04 – two samples
- IP 51053, Section 02.02.g – two samples
- IP 50073, Section 02.02.c(4) – two samples

Documents reviewed are listed in the attachment.

b. Observations and Findings

No findings 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 was adequately implementing GL 89-10 requirements. Additional inspection activities are required to complete this TI. These activities include additional MOV samples for Part 2 and all Part 3 requirements of this TI. Part 3 inspections will be performed after the applicant completes all GL 89-10 related actions. Based on this limited review and the remaining actions by the applicant, no additional conclusion is warranted for this inspection.

OA.1.5(Discussed) Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (Temporary Instruction 2512/037)

a. Inspection Scope

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

The previous inspection of this SP on Unit 2 was documented in inspection report 05000391/2013604 (ADAMS Accession No. ML13179A079), Section OA.1.23. That report documented acceptable results for a sample of 15 fuses in three plant systems.

Inspection Activities: The inspectors reviewed the engineering complete closure package regarding the Master Fuse List Special program. The inspectors selected a sample of fuses that had been installed and verified by the applicant from three safety related systems that have been turned over to startup, including system 67, essential raw cooling water (ERCW), system 70, component cooling water system (CCS), and system 84, flood mode boration system. The inspectors reviewed work orders associated with the system inspected. The inspectors interviewed applicant staff members responsible for the design and selection of the fuses list on the Master Equipment List (MEL) where the Master Fuse List is stored. The inspectors performed a direct visual inspection on a sample of fuses to verify that they agreed with the fuses listed in the MEL. The inspectors conducted walk downs of Motor Control Centers (MCCs) to verify fuses installed in the individual compartments matched those listed in the design documents.

Documents reviewed and the list of fuses verified for this inspection is listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that the fuses in the systems reviewed were adequately sized, installed, and properly documented for the samples selected for inspection. Based on the small number of systems reviewed, inspectors will continue inspecting fuses in more safety related systems as they are turned over to startup.

OA.1.6(Discussed) Construction Deficiency Report 391/85-37: Incorrect Use of AMP PIDG Terminals (IP 35007)

a. Inspection Scope

Background: This CDR involved the discovery that AMP Products Corporation Pre-Insulated Diamond Grip (PIDG) terminals had been used on solid conductor component leads despite the fact that the vendor did not recommend using these terminals for solid copper wire applications. This use was identified on Class 1E discrete electrical components in Foxboro control loops and test points, relay racks, and local panels. This deficiency was reported to the NRC in 1985 in accordance with 10 CFR 50.55(e) and is further described in inspection reports 50-390, 391/91-26 (ADAMS Accession No. ML072880173) and 50-390, 391/94-55 (ADAMS Accession No. ML072980605). The applicant determined that the cause of this deficiency was the failure to incorporate the requirements of TVA General Construction Specification, G-38 "Installation, Modification and Maintenance of Insulated Cables Rated Up to 15,000 Volts," into site procedures for the installation and acceptance of lugs used in solid conductor component leads. CDR 391/85-37 has been inspected previously as documented in IR 05000391/2012602 (ADAMS Accession No. ML12087A324). This deficiency was also documented for Unit 1 as CDR 390/85-38 which was closed in IR 50-390, 391/94-55 (ADAMS Accession No. ML072980605).

Inspection Activities: Responsible personnel were interviewed, and the applicant's Open Item/Commitment Completion Form (Engineering Complete) tracking number PER 172698 R1, was reviewed. PER 172698 R1, as well as the previous revision, was reviewed to evaluate whether the proposed corrective actions were adequate. The inspectors observed formal TVA training for electricians on crimping, splicing, and terminations to determine if the changes made to site procedures as a result of this CDR were being incorporated into indoctrination of craftsmen. The inspectors reviewed the Engineering Document Construction Releases (EDCRs) referenced in PER 172698 and the associated implementing work orders. The inspectors conducted field observations in the control, auxiliary and reactor buildings to verify work completed to address the concerns identified in the CDR. A sample of 10 panels was selected to visually verify that AMP PIDG lugs were no longer being used in the termination of components with solid conductors. The selected population included panels in which solid conductors were not found present by the applicant and junction boxes in which solid conductors were found being used with terminals approved for the application. The samples also included junction boxes in which the applicant identified solid conductors with PIDG terminals and replaced them with terminals approved for use with solid conductors. The panels selected included the following: WBN-2-PNL-278-L11A, WBN-2-PNL-278-L11B,

2-JB-293-0523-A, 2-JB-293-0525-B, 2-JB-293-0527-A, 2-JB-293-0529-B, 2-JB-293-0712-B, 2-JB-293-0714-A, 2-JB-293-0744-B, and 2-JB-293-0747-A.

Documents and records reviewed for this inspection are listed in the Attachment.

b. Observations and Findings

No findings were identified.

The inspectors interviewed responsible personnel and obtained multiple documents containing additional information relevant to the reasoning for, and scope of actions taken to address the CDR which were not referenced on the applicable PP-19-2 Open Item/Commitment Completion Form (Engineering Complete). The PP-19-2 Engineering Complete partial closure package was being revised by the applicant to ensure that the actions taken to address the CDR are inclusive of all the areas possibly affected.

c. Conclusions

Based on the review of revision 1 of the applicable Open Item/Commitment Completion Form (Engineering Complete), as well as previous NRC inspection reports, the inspectors determined that the applicant's proposed corrective actions are adequate to address the concerns identified in CDR 391/85-37. Further inspection will be required before closing this item to evaluate the next revision of PP-19-2 Open Item/Commitment Completion Form (Engineering Complete), PER 172698 R1, which was being revised by the applicant to ensure that the actions taken to address the CDR are inclusive of all the areas possibly affected.

OA.1.7 (Discussed) Electrical Cable Issues Corrective Action Program – Sub-issue: Cable Bend Radius Deficiencies (Temporary Instruction 2512/016, Inspection Procedures 51063 and 51065)

a. Inspection Scope

Background: Based on various employee concerns and non-conformance reports, TVA determined that the minimum bend radius recommended by Insulated Cable Engineers Association (ICEA) had been violated at WBN.

Excessive bending has the potential of damaging cables and adversely affects their performance. Damage can be caused by (a) elongation stress to the insulation system, which may reduce the qualified life of the cable, (b) interfacial disruption of medium voltage cable's stress control layers of insulation and insulation shield, which may have likelihood of corona degradation, and (c) conductor creeping, which will likely put radial stress on the insulation system. Items (a) and (c) apply to low voltage cables, while all three items apply to medium voltage cables.

To resolve this issue at Unit 1, TVA established bend radius parameters (upper and lower bounds) for Class IE cables, and revised General Construction Specification G-38 "Installation, Modification and Maintenance of Insulated Cables Rated Up to 15,000 Volts," to include the bend radius requirements for cable installation. Cables were categorized based on 10 CFR 50.49 (Equipment Qualification) requirements, classifications, and voltage levels. They were then inspected, replaced, retrained, or

their qualified life was reduced based on bending or kinking relative to upper and lower bend radii.

TVA will implement the Unit 1 approach on Unit 2 to resolve this issue.

The previous inspection of this CAP on Unit 2 was documented in IIR 05000391/2012602 (ADAMS Accession No. ML12087A324), Section OA.1.5.

Inspection Activities: Inspectors reviewed the work order records of locations where TVA had inspected cable splices and terminations for suspected instances of excessive bending of the cables. Inspectors visually examined the current installed conditions. The inspectors reviewed CDR 85-30, calculations, work orders, work procedures for high voltage nuclear motor connections (Raychem NMCK8), specifications, drawings, correspondence, and field change requests (FCRs) to determine the adequacy of cable bend radius installations and motor terminations. The inspectors walked down the installation of safety related medium voltage feeders 2PP625A (both ends) feeding Containment Spray Pump 2A-A, 2PP600A feeding Safety Injection Pump 2A-A, 2PP637B feeding Containment Spray Pump 2B-B, and 2PP612B feeding Safety Injection Pump 2B-B, all part of DRA 55121-015 to verify adequacy of bend radius for cables installed. The inspectors interviewed engineering staff responsible for the design and engineering input for the motor connections and cable routing to discuss bend radius limits inside motor connection boxes, type of terminations used, and potential for water infiltration into the conduits for feeders under review, and exposed cable protection and separation. The inspectors reviewed operating mode calculations to assess required separation of exposed safety related cables to cooling system pipes and any dynamic stresses imposed on the cables by motion of the cooling piping. The inspectors reviewed conduit seals for safety related feeders with potential for water infiltration caused by pipe rupture or sprinkler system activation to verify integrity of the installation. The following samples were inspected:

- IP 51063 Section 02.02.e - 4 samples

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that medium voltage cables reviewed were adequately installed and properly documented for the samples selected for inspection. A population of low voltage, Class 1E cables require further review during future inspections. This item will remain open pending inspection of a sample of the low voltage cable installations.

OA.1.8 (Discussed) Inspection of Watts Bar Nuclear Plant QA Records Corrective Action Program Plan (Temporary Instruction 2512/028, Inspection Procedure 51055)

a. Inspection Scope

The inspectors reviewed a sample of QA records of 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. To verify that records were retrievable, the inspectors observed document control personnel locate independent samples of records from within the vault.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

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

OA.1.9 (Closed) Construction Deficiency Report 391/86-13, Inadequate Calculations to Document Electrical System Design Basis and Supplemental Safety Evaluation (SSER) Appendix HH Item 7, Verify Commitment Completion and Review Electrical Design Calculations (Inspection Procedure 92701)

a. Inspection Scope

Background: This issue originated from CDR 50-391/86-13, "Lack of Adequate Calculations to Document Electrical System Design Basis," which stated that the applicant had not established adequate electrical engineering calculations to support the adequate design of their nuclear plants. The inspectors followed up on TVA resolution of CDR 50-391/86-13. TVA initiated PER 144072 on February 3, 1989, to track this item. NRC's Office of Nuclear Reactor Regulation addressed this item as Action Item 7 in Appendix HH of the Watts Bar 2 Safety Evaluation Report Supplement 22.

TVA originally established a list of a minimum set of electrical calculations necessary to fully document the design basis of a TVA nuclear plant in a document designated Procedure Method PM-86-02, "Electrical Calculations," Rev. 1, dated 7/17/87. That list has been subsequently revised and incorporated into a Nuclear Power Group Standard Department Procedure, NEDP-2, "Design Calculation Process Control", Rev. 17, as Appendix E.

The NRC last reviewed the status of this item in November 2011 as documented in IIR 05000391/2011612 (ADAMS Accession No. ML11348A081). At that time, TVA initiated PER 458200 to track corrective action on this item. That PER was initiated due to NRC-identified omissions of calculation topics in the computer based "Calculation Cross-

reference Information System,” which has been replaced by the “Calculation Tracking System”.

Inspection Activities: The inspectors reviewed the applicant's PP-19-2, Engineering Complete Closure package report, including referenced documents and actions associated with PER 458200. The inspectors interviewed responsible personnel in conjunction with the reviews to better understand the PP-19-2 document. The inspectors compared the original TVA list of electrical calculations documented in PM-86-02 to the revised one in NEDP-2, Rev. 17, to identify any substantive differences between the two documents. The inspectors reviewed a sample of the issued calculations for Unit 2 and common to both Units to verify that calculation content addressed the specified technical topic.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors concluded that TVA has prepared and issued the required electrical engineering calculations for Unit 2, and sufficient inspections have been performed to close these two items.

V. MANAGEMENT MEETINGS

X1 Exit Meeting Summary

An exit meeting was conducted on January 22, 2014, to present inspection results Mr. Skaggs and other members of his staff. The inspectors identified that no proprietary information had been received during the inspection and none would be used in the inspection report. The applicant acknowledged the observations and provided no dissenting comments.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Applicant personnel

A. Aboulfaida, Bechtel - Electrical
A. Bangalore, Bechtel – Electrical Engineer
R. Baron, TVA - QA Manager, Unit 2
D. Beckley, Bechtel – Electrical Engineer
J. Boykin, TVA QA Specialist, Unit 2
J. Bruce, TVA - Licensing, Unit 2
J. W. Clark, TVA - QA Specialist, Unit 2
T. Das, Bechtel - Civil Engineering
J. Fisher, TVA - Regulatory Compliance
R. Hruby, TVA - General Manager Technical Services
G. Lee, Bechtel - MOV Engineer
J. Mills, Bechtel - MOV Specialist
M. McGrath, TVA – Licensing
J. O'Dell, TVA - Regulatory Compliance
R. Onis, TVA - QA Oversight, Unit 2
B. Pittman, TVA - Plant Support Engineer
G. Scott, TVA – Licensing
M. Skaggs, TVA – Senior Vice President
C. Stewart, Bechtel - Construction
N. Welch, TVA - Operational Startup Manager
O. J. Zeringue, TVA - General Manager Engineering and Construction

INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction and Pre-Construction Activities
IP 37002	Construction Refurbishment Process – Watts Bar Unit 2
IP 49063	Piping – Work Observation
IP 50053	Reactor Vessel and Internals – Work Observation
IP 50073	Mechanical Components – Work Observation
IP 50090	Pipe Support and Restraint Systems
IP 51053	Electrical Components and Systems – Work Observation
IP 51055	Electrical Components and Systems – Record Review
IP 51063	Electrical Cable – Work Observation
IP 51065	Electrical Cable – Records Review
IP 52053	Instrument Components and Systems – Work Observation
IP 64051	Procedures – Fire Prevention/Protection
IP 70300	Preoperational Test Procedure Review
IP 70311	Preoperational Testing Procedure Verification
IP 71302	Preoperational Test Program Implementation Verification
IP 92701	Follow-up
TI 2512/016	Inspection of Watts Bar Nuclear Plant Cable Issues Corrective Action Program Plan

TI 2512/021	Inspection of Watts Bar Nuclear Plant Equipment Seismic Corrective Action Program Plan
TI 2512/028	Inspection of Watts Bar Nuclear Plant QA Records Corrective Action Program Plan
TI 2512/037	Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program
TI 2515/109	Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

Item 7	SSER Appendix HH	Verify Commitment Completion and Verify Electrical Design Calculations (Section OA.1.9)
391/86-13	CDR	Inadequate Calculations to Document Electrical System Design Basis (Section OA.1.9)

Discussed

2512/016	TI	Cable Issues Corrective Action Program – Sub-Issue: Supports in Vertical Trays (Section OA.1.1)
391/89-04	CDR	Support of Class 1E Cables Installed in Long Vertical Cable Tray Runs (Section OA.1.1)
2512/021	TI	Inspection of Equipment Seismic Qualification Corrective Action Program (Section OA.1.2)
391/86-21-02	VIO	Instrument Valves, Foxboro Transmitters, and Instrument Panels Not Seismically Qualified (Section OA.1.3)
89-10	GL	Safety Related Motor Operated Valve (MOV) Testing and Surveillance (Section OA.1.4)
2515/109, Rev. 4	TI	Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance (Section OA.1.4)
2512/037	TI	Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program (Section OA.1.5)
391/85-37	CDR	Incorrect Use of AMP PIDG Terminals (Section OA.1.6)
2512/016	TI	Electrical Cable Issues CAP – Sub-issue:

Cable Bend Radius Deficiencies (Section OA.1.7)

2512/028	TI	Inspection of Watts Bar Nuclear Plant QA Records Corrective Action Program Plan (Section OA.1.8)
----------	----	--

LIST OF DOCUMENTS REVIEWED

I. MANAGEMENT OVERSIGHT AND CONTROLS

C.1.2 Mechanical Components – Work Observation and Construction Refurbishment Process

Work Orders

WO 115325022, Foreign Object Removal steam generator 3

C.1.3 Piping – Piping Cleanliness and Flushing Work Observations

Work Orders

WO 111027383, Component Cooling System ESF 2A Header Flushing

WO 115068529, Component Cooling System ESF 2B Header Flushing

Miscellaneous

WBN-2-2013-001, Temporary Modification Component Cooling Train 2A Full Flow Flushing Filter, Rev. 1

WBN-2-2013-002, Temporary Modification Component Cooling Train 2B Full Flow Flushing Filter, Rev. 1

WBN-2-2013-003, Temporary Modification Component Cooling Train 2B Side Stream Flushing Filter, Rev. 1

WBN-2-2013-004, Temporary Modification Component Cooling Train 2A Side Stream Flushing Filter, Rev. 1

EXC-N3M-938-11, Engineering Exception to TVA Site Engineering Specification N3M-938 (R2) For cleaning and cleanliness of Fluid Systems and Components, Rev 1

Calculations

CDQ 0020702013000374, Seismic Verification of WBN2 System 70 Flushing T-Mod Piping and Supports, Rev. 0

CDQ 0020702013000182, WB2CCP System 70 Flushing Filter TACF Supporting Calculation, Rev. 1

Procedures

2-CP-070-01-3, Component Cooling System ESF 2B Header Cleanliness Plan, Rev. 1

2-CP-070-01-1, Component Cooling System ESF 2A Header Cleanliness Plan, Rev. 2

C.1.4 Pipe Support (Snubber) Work Observations

Drawings

DRA 52488-150, Rev. 0

DRA 52488-151, Rev. 0

DRA 52488-152, Rev. 0

DRA 52487-055, Rev. 2
 DRA 52487-056, Rev. 1
 DRA 52487-102, Rev. 3
 DRA 52491-013, Rev. 2
 DRA 52491-014, Rev. 1
 DRA 52488-094, Rev 1
 DRA 52488-095, Rev 1
 DRA 52487-028, Rev. 1
 DRA 52487-029, Rev. 1
 DRA 52487-030, Rev. 1
 DRA 52487-102, Rev. 3

Calculations:

CEB850125926, Calculation for pipe support No. 2-62A-369, Rev. 003
 CEB850211995, Calculations for pipe support No. 2-63-014, Rev 005
 CEB850511956, Calculations for pipe support No. 2-62A-265, Rev 002
 CEB85020894, Calculations for pipe support No. 2-62A-557, Rev 003

Engineering Design Construction Release (EDCRs):

EDCR 52487, "Modification of pipe supports on the Chemical and Volume Control System (System 062)", Rev. C
 EDCR 52488, "Modification of pipe supports on the Chemical and Volume Control System (System 062)", Rev. B

Field Change Requests (FCRs):

FCR 61328-A, "Piping reanalysis to incorporate FCR 55108 and 56817"
 FCR 61386-A, "Change in pipe routing per FCR 56887 and change in structure boundary per PER 704887 (Stress Problem No. N3-62-14R and N3-68-04R)"
 FCR 62194-A, "Redline Rollup"
 FCR 62290-A, "Redline Rollup"
 FCR 62593-A, "Redline Rollup"

Procedures

25402-000-GPP-0000-N3504, "Pipe and Instrument Tubing Supports", Rev. 4
 MAI-4.2A, "Piping/Tubing Supports", Rev. 18

C.1.6 Electrical Components and Systems – Work Observation

Work Orders

WO 114656692, Electrical Work associated with EDCR 55116

Drawings

DRA 54172-076; Dated: 11/15/2013

Procedures

MAI-3.3 "Cable Terminating, Splicing, and Testing for Cables rated Up To 15,000 Volts" Rev 0031, Dated: 6/11/2013

F.1.1 Fire Protection

Work Orders

WO 114546527 Rev. 1, Pipe support hanger 2-62-A-271 – 12/4/13

WO 115181833, Install Steam Generator #2 bumper stops and stake threads per DRA 55880-002 – 12/10/13 and 12/12/13

P.1.1 Preoperational Test Program Implementation Verification

Work Orders

WO 111451553 2-FCV-074-0033-A GTE-11 MOVATS test

Calculation

MDQ0020742008-0306, Thrust/Torque Calculations and valve and Actuator Capability Assessment for Valve 2-FVC-74-033, Rev. 2

P.1.2 Preoperational Test Procedure Review

Misc.

2-PTI-067-02-A, ERCW System Flow Balance – Train A, Rev. 003

2-TSD-67, ERCW Test Scoping Document, Rev.4

System Description, WBN2-67-4002, Essential Raw Cooling Water System, System 67

System Description, WBN2-30AB-4001, Auxiliary Building Heating, Ventilation, Air Conditioning System (30,31,44)

IV. OTHER ACTIVITIES

OA.1.1 Cable Issues Corrective Action Program – Sub-Issue: Supports in Vertical Trays and Construction Deficiency Report 391/89-04: Support of Class 1E Cables Installed in Long Vertical Cable Tray Runs

Procedures

MAI-3.2 “Cable Pulling for Insulated Cables Rated Up to 15,000 Volts” Rev 27

Drawings

DRA 55116-007

Drawing# 45W889-4

Work Orders

WO 114309440, “EDCR 55116” (in-process)

OA.1.2 Inspection of Equipment Seismic Qualification Corrective Action Program

Procedures, Standards and Specifications:

WDP-GEN-1, Walkdown Procedure for General Walkdown Requirements, Rev. 14

WDP-C-3, Walkdown Procedure for Civil, Rev. 3

WB-DC-40-31.12, Seismic/Structural Qualification of Seismic Category I and I(L) In-Line Valves and Other In-Line Fluid System Components, Rev. 11

WB-DC-40-31.2, Seismic/Structural Qualification of Seismic Category I Electrical and Mechanical Equipment, Rev. 14

25402-3DP-G04G-00503, Master Equipment List, Rev. 5

Walk-down Packages:

WBN2-C-001-1706-00, Document Identification, Anchorage and Mounting Detail on # WBN-2-TURB-001-002A-S, Rev. 0

WBN2-C-003-1342-00, Document Information for Pump, Oil Cooler, Oil Reservoir for Auxiliary Feedwater Pump 2B-B, UNID# WBN-2-PMP-003-0128, WBN-2-PMP-003-0128D, WBN-2-CLR-003-0128D, WBN-2-TANK-003-0128D, Rev. 0

WBN2-C-003-1375-00, Document Information for Auxiliary Feedwater Oil Cooler # WBN-2-CLR-003-0001B, Rev. 0

Engineering Design Construction Release (EDCR):

53654

Calculations:

WCG-1-1419, WBN Seismic/Civil Validation Program Methodology Summary Report, Rev. 6

WCGACQ1131, In Cabinet Required Response Spectra for MCC 'Buckets' on 480 Volt Motor Control Center Boards, Rev. 0

Closure Reports/Packages:

U2 ESQ CAP CR, "Watts Bar Nuclear Plant Unit 2 Equipment Seismic Qualification Corrective Action Program Closure Report," Rev. 0

Open Items/Commitment Completion Form for: 111032078. Final Closure (Engineering Complete) Dated: 2/23/2013

Drawings:

2-47W600-135, Rev. 1

2-47W600-19, Rev. 0

2-47W600-14, Rev. 0

2-47W600-307, Rev. 1

Work Order (WO) Packages:

10-951299-001

10-951303-002

110756656

Design Revision Authorization (DRAs):

53645-001, Rev. 2

Limited Scope Walkdown Packages (LSWDs):

LSWD-0443, Control Room Panel 2-M-15 anchorage weld inspection, Rev. 0,

Miscellaneous Documents:

WBNB600-0-39, WBNP Panel Tabulation, Rev. 1

Implementation Plan for the Equipment Seismic Qualification (ESQ) Corrective Action Program

OA.1.3 Violation (VIO) 391/86-21-02: Instrument valves, Foxboro transmitters, and instrument panels not seismically qualified

Closure Reports/Packages:

Open Items/Commitment Completion Form for: PER 143758, Rev. 0. Final Closure (Engineering Complete) Dated: 6/11/2012

Open Items/Commitment Completion Form for: PERs 143538 and 143701, Rev. 0. Partial Closure (Engineering Complete) Dated: 2/28/2012

Open Items/Commitment Completion Form for: 114113692. Final Closure (Engineering Complete) Dated: 5/13/2013

Miscellaneous Documents:

25402-011-V1A-JL07-00024-001, Rosemount 1153 Series D, Reference Manual, Rev. BA
 25402-011-V1A-JL07-00031-001, Rosemount 1154 Series H, Reference Manual, Rev. BA
 WBN-VTD-R369-0620, Rosemount 1152 Alphaline, Reference Manual, Rev. BA
 25402-011-V1A-JL07-00024-001, Rosemount 1153 Series D, Reference Manual, Rev. BA

Procedures, Standards and Specifications:

MAI-3.1, Installation of Electrical Conduit Systems & Conduit Boxes, Rev. 25
 G-40, Installation, Modification and Maintenance of Electrical Conduit Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lightning and Miscellaneous Systems, Rev. 17

Engineering Design Construction Release (EDCR):

54154

53610

Drawings:

2-47W600-62, Rev. 1
 2-47W600-114, Rev. 3
 2-47W600-307, Rev. 1
 2-47W600-181, Rev. 2
 2-47W600-230, Rev. 2
 2-47W600-86, Rev. 1
 2-47W600-22, Rev. 2
 2-47W600-14, Rev. 0
 2-47W600-16, Rev. 1

Calculations:

WCGACQ1094, WBN Seismic/Civil Validation Program Methodology Summary Report, Rev. 6

OA.1.4 Generic Letter 89-10: Safety-Related Motor-Operated Valve Testing and Surveillance

Procedures/Programs

0-MI-0.03, Limitorque Motor Operator Adjustment Guideline Type SMB and SB, Rev. 5
 0-MI-0.15, Adjustment of Westinghouse Supplied Motor Operated Valve Limit and Torque Switches, Rev. 1
 0-MI-0.006, MOVATS Testing of Motor Operated Valves, Rev. 3
 GTE-11, Motor Operated Valve/Damper Test, Rev. 5
 SMP-6.0, Administration, Conduct, and Test Results Processing of Generic Test Instructions, Rev. 7

Calculations

MDQ0029992009-0310, Generic Letter 89-10 MOV Population for Watts Bar (Unit 2), Rev. 5
 EPMTSS110791, Generic Letter 89-10 MOV Population for Watts Bar (Unit 1), Rev. 22
 MDQ0020742008-0307, MOV Valve and Actuator Capability for 2-FCV-74-035, Rev. 2
 MDQ0020742008-0301, MOV Valve and Actuator Capability for 2-FCV-74-008, Rev. 4
 MDQ0020032008-0217, MOV Valve and Actuator Capability for 2-FCV-3-179B, Rev. 2
 MDQ0020032008-0216, MOV Valve and Actuator Capability for 2-FCV-3-179A, Rev. 2
 MDQ0020032008-0214, MOV Valve and Actuator Capability for 2-FCV-3-136A, Rev. 2

MDQ0020742008-0304, MOV Valve and Actuator Capability for 2-FCV-74-021, Rev. 1
 MDQ0020632008-0232, MOV Valve and Actuator Capability for 2-FCV-63-005, Rev. 2
 MDQ0020722008-0290, MOV Valve and Actuator Capability for 2-FCV-72-021, Rev. 2
 MDQ0020632008-0230, MOV Valve and Actuator Capability for 2-FCV-63-003, Rev. 1
 MDQ0020632008-0234, MOV Valve and Actuator Capability for 2-FCV-63-007, Rev. 3
 MDQ0020722008-0292, MOV Valve and Actuator Capability for 2-FCV-72-034, Rev. 2
 MDQ0020722008-0289, MOV Valve and Actuator Capability for 2-FCV-72-013, Rev. 2
 MDQ0020722008-0291, MOV Valve and Actuator Capability for 2-FCV-72-022, Rev. 2
 MDQ0020672008-0272, MOV Valve and Actuator Capability for 2-FCV-67-143, Rev. 3
 MDQ0020262008-0218, MOV Valve and Actuator Capability for 2-FCV-26-240, Rev. 2

Work Orders

111481166, Perform MOVATS Test on 2-FCV-74-0035-B

111481095, Perform MOVATS Test on 2-FCV-74-0008-A

Drawings

2-47W810-1, Flow Diagram Residual Heat Removal System, Rev. 17

Corrective Action Documents

SR 809890, Test Anomalies on 2-FCV-074-0024-B, Dated 11/18/2013

SR 811819, MOV Packing Loads Exceed Design Value, Dated 11/21/2013

Training Records

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

Miscellaneous

WBN2-74-4001, Residual Heat Removal System Description, Rev. 5

OA.1.5 Inspection of Watts Bar Nuclear Plant Master Fuse List Special Program

Work Orders

WO 114198016, Routine Work Order, system 67, location: WBN-2-FCV-067-0141-B for Upper Containment Vent Cooler D Supply isolation valve. Dated: 10/09/2013

WO 113014778, Minor Maintenance, system 67, location WBN-2-FCV- 067-0105-B for Lower Containment B Cooler Supply Isolation valve. Dated: 8/8/13

WO 111480789, Minor Maintenance, system 70, location: WBN-2-FCV-0089-B for RC Pump Oil Cooler Return Containment Isolation Valve. Date Closed: 09/16/2013.

WO 112241761, Routine Work Order, system 70, location: WBN-2-FCV-0134-B for RC Pump Thermal Barrier Containment Isolation Valve. Dated 8/21/13.

WO 112232664, Minor Maintenance, system 84, location: WBN-2-PMP-084-0016 for Auxiliary Charging Pump 2A, Date Closed: 10/15/2013.

WO 112232647, Minor Maintenance, system 84, location: WBN-2-PMP-084-0021 for Auxiliary Charging Pump 2B, Dated: 10/09/2013

Engineering Design Construction Release (EDCR)

EDCR 54797-A

EDCR 52324-A

Master Equipment List (MEL)

MEL Package No.: 10EEC3104, dated: 04/02/2010

MEL Package No.: 11AEC4659, dated: 02/25/2011

MEL Package No.: 11AEC5113, dated: 08/29/2011

MEL Package No.: 10EEC3105, dated: 04/02/2010

Procedures

Startup Manual Procedure SMP-6.0, Rev. 0007, WBNP2 Administration, Conduct and Test Results Processing of Generic Test Instructions, dated: 03/26/2012, (Startup Manual Procedure) Appendix I: Fuse Verification Program.

Pre-Op/Startup Instruction GTE-02 Scheme Verification, Rev. 4, dated: 07/24/2013

Fuses Verified

2-FU-213-B213/31-B in 2-MCC-213-B002-B compartment 13D, RCP Oil Cooler CCS Return (2-FCV-70-89B) Containment isolation valve.

2-FU-213-B213/32-B in 2-MCC-213-B002-B compartment 13D, RCP Oil Cooler CCS Return (2-FCV-70-89B) Containment isolation valve.

2-FU-213-B216/11A-B in 2-MCC-213-B002-B compartment 16B, RCP Thermal Barrier CCS Supply (2-FCV-70-134B) Containment Isolation Valve.

2-FU-213-B216/11N in 2-MCC-213-B002-B compartment 16B, RCP Thermal Barrier (2-FCV-70-134B) Containment Isolation Valve.

2-FU-213-B211/12-B in 2-MCC-213-B002-B compartment 11B, Lower Containment 2B CLR Supply (2-FCV-67-105B) Containment Isolation Valve.

2-FU-213-B211/11A-B in 2-MCC-213-B002-B compartment 11B, Lower Containment 2B CLR Supply (2-FCV-67-105B) Containment Isolation Valve.

2-FU-213-B211/11N-B in 2-MCC-213-B002-B compartment 11B, Lower Containment 2B CLR Supply (2-FCV-67-105B) Containment Isolation Valve.

2-FU-214-B113/1-B in 2-MCC-214-B001-B compartment 13A, Flood Mode Auxiliary Charging Pump 2B (2-PMP-84-21)

2-FU-214-A113/1-A in 2-MCC-214-A001-A compartment 13A, Flood Mode Auxiliary Charging Pump 2A (2-PMP-84-16)

2-FU-213-B210/51-N in 2-MCC-213-B002-B compartment 10F, Upper Containment Vent CLR 2D ERCW Supply (2-FCV-67-141)

2-FU-213-A15/21N in 2-MCC-213-A001-A compartment 5C, Lower Containment CLR HDR C ERCW Supply (2-FCV-67-97) Containment Isolation Valve.

2-FU-213-A15/21A in 2-MCC-213-A001-A compartment 5C, Lower Containment CLR HDR C ERCW Supply (2-FCV-67-97) Containment Isolation Valve.

2-FU-213-A15/22 in 2-MCC-213-A001-A compartment 5C, Lower Containment CLR HDR C ERCW Supply (2-FCV-67-97) Containment Isolation Valve.

2-FU-213-A216/11N-A in 2-MCC-213-A002-A compartment 16A, RCP Thermal Barrier CCS Return (2-FCV-70-90).

2-FU-213-A216/1A-A in 2-MCC-213-A002-A compartment 16A, RCP Thermal Barrier CCS Return (2-FCV-70-90).

2-FU-213-B27/32-B in 2-MCC-213-B002-B compartment 7D, Lower Containment B CLR ERCW Return (2-FCV-67-103).

2-FU-213-B27/31N-B in 2-MCC-213-B002-B compartment 7D, Lower Containment B CLR ERCW Return (2-FCV-67-103).

2-FU-213-B27/31A-B in 2-MCC-213-B002-B compartment 7D, Lower Containment B CLR ERCW Return (2-FCV-67-103).

2-FU-213-B025/2A-B in 2-MCC-213-B002-B compartment 5C, Lower Containment CLR HDR D ERCW Supply (2-FCV-67-113).

2-FU-213-B025/21N-B in 2-MCC-213-B002-B compartment 5C, Lower Containment CLR HDR D ERCW Supply (2-FCV-67-113).

- 2-FU-213-B025/22-B in 2-MCC-213-B002-B compartment 5C, Lower Containment CLR HDR D ERCW Supply (2-FCV-67-113).
- 2-FU-213-A115/32-A in compartment 15D, Lower Containment CLR HDR A ERCW Supply (2-FCV-67-89).
- 2-FU-213-A115/31N-A in compartment 15D, Lower Containment CLR HDR A ERCW Supply (2-FCV-67-89).
- 2-FU-213-A115/31A-A in compartment 15D, Lower Containment CLR HDR A ERCW Supply (2-FCV-67-89).

OA.1.6 Construction Deficiency Report 391/85-37: Incorrect Use of AMP PIDG Terminals

Closure Package

NGDC PP-19-2 Open Item/Commitment Completion Form (Engineering Complete) for IP&S 384, Tracking Number: PER 172698 R1

Miscellaneous

AMP Products Corporation Letter to TVA: "Use of AMP Diamond Grip Insulated Terminal Lugs with Solid Copper Wire"; Dated: 04/03/1985

DRA 53817-051 Rev.0; Dated: 11/5/2009

Field DCN 37683-A, Dated 8/16/95

Field DCN 38041-A, Dated 8/31/95

ECN 5880; Dated: 2/27/1986

Engineering Evaluation of ECN 5880; Dated: 10/19/1989

ECN Closure Sheet titled "Use of AMP Diamond grip insulated terminal lugs with solid copper wire". Dated; Feb/27/1986

NRC IR 05000391/2012-602

NRC IR 50-390, 391/94-55

NRC IR 50-390, 391/91-26

TVA Report: "Watts Bar Nuclear Plant Units 1 and 2 – Incorrect use of AMP PIDG Terminal Lugs WBRD-50-390/85-38, WDRD-50-391/85-37 – Final Report"; Dated: 10/17/1985

Westinghouse letter to TVA #WAT-D-6571, "Response to TVA NCR #6076 Concerning AMP Products Corporation Letter on Diamond Grip Insulated Terminal Lugs"; Dated: 05/24/1984

Problem Evaluation Reports

172698

490726

Procedures

MAI-3.3 "Cable Terminating, Splicing, and Testing for Cables rated Up To 15,000 Volts" Rev 0031, Dated: 6/11/2013

Work Orders

WO 112377051 CCE EDCR 53817 SYS 067; Dated: 6/30/2011

WO 111081007 CRDR EDCR2 53580 SYS 063; Dated: 4/25/2013

WO 114633793 CCE EDCR2 54172 FCR 61637-AA06 SYS 030; Dated: 8/29/2013

WO 09-954500-001 Miscellaneous Equipment Record Unit 2 System 077 Non-EQ, Dated: 8/20/2010

WO 111080999 CRDR EDCR2 53580 SYS 278 2-PNL-276-L011A; Dated: 11/4/2013

OA.1.7 Electrical Cable Issues CAP – Sub-issue: Cable Bend Radius Deficiencies

Work Orders

WO 114569049 Safety Injection Pump 2A-A,.

WO 115284805 Resolve Cable Clearance for Cable 2PP600A. Cable Wrapping to address minor scuffing found on cable. Dated 11/20/2013.

Engineering Design Construction Release (EDCR)

EDCR 55121

Problem Evaluation Report (PER)

793441

787521

Field Change Request (FCR)

FCR56071 SYS 063 2PP600A (retrain cable 2PP600A at tray 0-5TRY-292-2027/2026-A and 0-5TRY-292-2204/2205-A and at 2-MTR-63-10-A. Replace stress cones on cable at 2-MTR-63-10-A IAW MAI-3.3 data sheet 5.

Drawings

45W888-1, Rev. 4 Auxiliary Building Conduit & Grounding Cable Tray Node Diagram, EL. 692.0' COL. A1-A15, Q-X-NV-5A, NV-5B, NV-5 dated: 01/10/1985.

47W464-221, Rev. 9 System N3-70-4A Isometric-Static, Thermal & Dynamic Analysis of CCS Piping inside the Auxiliary Building.

Calculations

EPM-JKJ-022988, Rev. 14 Data Table for Dual Unit Operation – Component Cooling System (70) Operating Modes Calculation

Maximum Pipe Movements in the Nodal Coordinate System for Load Case Name = MAXMOV for N#-70-04A dated 10/20/2011.

Specifications

General Engineering Specification G-38 for Installation, Modification, and Maintenance of Insulated Cables Rated up to 15,000 Volts. Rev. 21

General Engineering Specification G-40 for Installation, Modification, and Maintenance of Electrical Conduit Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting and Miscellaneous Systems. Rev. 17

Commodity Clearance Requirements SRN-N3C-941-7 Section 2.0.

OA.1.8 Inspection of Watts Bar Nuclear Plant QA Records Corrective Action Program Plan

QA Records

2-MCCC-214-A1/13C-A, Inspections 25A and 61A

2-JB-292-755-B, Inspection 25A

0-CBLP-273-0307, Inspection 78A

2-MCCC-213-A1/5F-A, Inspections 25A and 61B

2-JB-292-2243-S, Inspections 25B and 61A

2-MCCC-213-B1/10B-B, Inspections 25A, 61A, and 70A

2-MTR-62-AOP-A, Inspections 25A, 44A, 61A, 64A, 67A, and 75A

2-JB-2931097, Inspection 25B

2-MCCC-213-B2/3B-B, Inspections 25B and 70A

2-JB-292-1373-B, Inspections 25C and 61A

2-JB-292-916-B, Inspections 25A and 61A
 2-JB-292-1637, Inspection 25A
 2-MCCC-213-B2/18D-B, Inspection 25A and 61A
 2-JB-293-672, Inspection 25A
 2-MCCC-213-A2/8D-A, Inspections 25A, 61A, and 70A
 2-JB-293-1832, Inspection 25A
 2-MTR-30-80/1-B, Inspections 25A and 67A
 2-MTR-63-10-A, Inspections 25A, 62A, 64A, 66A, 75A, and 85A
 2-JB-293-439, Inspection 25A
 2-TB-61-P17, Inspections 25A, 61A, and 62A
 2-BKR-211-B/10-B, Inspections 5A, 25A, and 75A
 2-JB-293-1286-B, Inspection 25A
 2-MCCC-213-B2/12D-B, Inspections 25A and 70A

**OA.1.9 Construction Deficiency Report 391/86-13, Inadequate Calculations to Document
 Electrical System Design Basis and Supplemental Safety Evaluation (SSER)
 Appendix HH Item 7, Verify Commitment Completion and Review Electrical Design
 Calculations**

Procedures/Programs

NEDP-2 Design Calculation Process Control, Rev. 17

Closure Package

PP-19-2, Open Items/Commitment Completion Form 114097351 - Engineering Complete

LIST OF ACRONYMS

ABSCE	Auxiliary Building Secondary Containment Enclosure
ADAMS	Agencywide Documents Access and Management System
ANSI	American National Standards Institute
CAP	Corrective Action Program
CCS	Component Cooling Water System
CDR	Construction Deficiency Report
CFR	<i>Code of Federal Regulations</i>
CVCS	Chemical and Volume Control System
DCN	Design Change Notice
DRA	Drawing Revision Authorization
ECN	Engineering Change Notice
EDCR	Engineering Document Construction Release
EQ	Environmental Qualification
ERCW	Essential Raw Cooling Water
ESQ CAP	Equipment Seismic Qualification Corrective Action Program
FCR	Field Change Request
FCV	Flow Control Valve
FOSAR	foreign object search and retrieval
GL	Generic Letter
ICEA	Insulated Cable Engineers Association
IMC	Inspection Manual Chapter (NRC)
IP	Inspection Procedure (NRC)
IIR	Integrated Inspection Report
IR	Inspection Report

JOG	Joint Owner's Group
MCC	Motor-Control Center
MEL	Master Equipment List
MOV	Motor Operated Valve
MOVATS	Motor Operated Valve Analysis and Test System
M&TE	Measuring and Test Equipment
NRC	Nuclear Regulatory Commission
PER	Problem Evaluation Report
PIDG	Pre-Insulated Diamond Grip
QA	Quality Assurance
QC	Quality Control
Rev.	Revision
RCP	Reactor Coolant Pump
RHR	Residual Heat removal system
RPV	Reactor Pressure Vessel
SG	Steam Generator
SMP	Startup Manual Procedure
SP	Special Program
SR	Service Request
TI	Temporary Instruction
TVA	Tennessee Valley Authority
VIO	Violation
WBN	Watts Bar Nuclear Plant
WO	Work Order