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

September 14, 2016

Mr. Michael D. Skaggs
Senior Vice President
WBN Operations & 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 05000391/2016608

Dear Mr. Skaggs:

On July 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of construction and testing activities at your Watts Bar Unit 2 reactor facility. The enclosed integrated inspection report documents the inspection results, which were discussed on August 19, 2016, with Mr. Russell Stroud.

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

Based on the results of this inspection, no findings were identified.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," 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 System (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

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

Sincerely,

/RA/

Daniel W. Rich, Chief
Reactor Projects Branch 8
Division of Reactor Projects

Docket No. 50-391
License No. NPF-96

Enclosure:
IIR 05000391/2016608
w/Attachment: Supplemental Information

cc w/encl: (See next page)

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

Sincerely,

/RA/

Daniel W. Rich, Chief
Reactor Projects Branch 8
Division of Reactor Projects

Docket No. 50-391
License No. NPF-96

Enclosure:
IIR 05000391/2016608
w/Attachment: Supplemental Information

cc w/encl: (See next page)

☒ PUBLICLY AVAILABLE ☐ NON-PUBLICLY AVAILABLE ☐ SENSITIVE ☒ NON-SENSITIVE

ADAMS: ☒ Yes ACCESSION NUMBER: ML16258A203 ☒ SUNSI REVIEW COMPLETE ☒ FORM 665 ATTACHED

OFFICE	RII:DRP	RII:DRP	RII:DRP	RII:DRP		
SIGNATURE	JSJ1 via email	CJE	DWR1	JBB5		
NAME	JJandovitz	CEven	DRich	JBaptist		
DATE	9/1/2016	9/2/2016	9/14/2016	9/12/2016		
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: G:\DRPII\RPB8\WATTS BAR II\IR 2016608.DOCX

cc w/encl:
Mr. Gordon P. Arent
Director, Licensing
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Mr. Paul Simmons, Vice President
WBN Unit Two Project
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Mr. Sean Connors
Plant Manager, WBN Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

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

Mr. S. A. Vance
Assistant General Counsel
Tennessee Valley Authority
400 West Summit Hill Drive
6A West Tower
Knoxville, TN 37902

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

Mr. G. E. Pry
Director, Plant Support
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Mr. E. D. Schrull
Manager, Fleet Licensing
Tennessee Valley Authority
1101 Market Street, LP 5A-C
Chattanooga, TN 37402-2801

Debra G. Shults, Director
Tennessee Department of Environment and Conservation (TDEC)
Division of Radiological Health
William R. Snodgrass Tennessee Tower
15th Floor
312 Rosa L. Parks Avenue
Nashville, TN 37243

Meigs County Mayor
17214 State Hwy 58 N.
Decatur, TN 37322

Rhea County Executive
375 Church Street
Suite 215
Dayton, TN 37321

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

cc email distribution w/encl:

Watts Bar 2 Licensing
Tennessee Valley Authority
Electronic Mail Distribution

Letter to Michael D. Skaggs from Daniel W. Rich dated September 14, 2016

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED INSPECTION REPORT 05000391/2016608

DISTRIBUTION:
Region II Regional Coordinator, OEDO
B. Beasley, NRR
R. Schaaf, NRR
C. Haney, RII
L. Douglas, RII EICS
A. Blamey, RII DRP
J. Nadel, RII WBN Unit 1 SRI
OE Mail
ConE_Resource@nrc.gov
PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-391
License No.:	NPF-96
Report No.:	05000391/2016608
Licensee:	Tennessee Valley Authority (TVA)
Facility:	Watts Bar Nuclear Plant, Unit 2
Location:	Spring City, TN 37381
Dates:	July 1, 2016 – July 31, 2016
Inspectors:	J. Jandovitz, Senior Resident Inspector
Approved by:	Daniel W. Rich, Chief Reactor Projects Branch 8 Division of Reactor Projects

Enclosure

SUMMARY
Watts Bar Nuclear Plant, Unit 2

This integrated inspection included aspects of engineering and construction activities performed by Tennessee Valley Authority (TVA) associated with the Watts Bar Nuclear (WBN) Plant Unit 2 construction project. This report covered a one month period of inspection in the areas of quality assurance (QA), identification and resolution of construction problems, engineering and construction activities, preoperational and startup testing, and follow-up of other activities. The inspection program for Unit 2 construction activities is described in Nuclear Regulatory Commission (NRC) Inspection Manual Chapter (IMC) 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 one open item, Final Corrective Action Program/ Special Program Inspection, have been appropriately addressed for WBN Unit 2. This item is closed.

- Other areas inspected were adequate with no findings identified. These areas included QA; preoperational testing activities; startup testing activities; and various NRC inspection procedures.

- The inspectors concluded that the parts of IMC 2517 that describe the policies and requirements for the WBN Unit 2 construction inspection program and all 560 construction inspection items that made up the program have been completed. Therefore, Inspection Manual Chapter 2512, Light Water Reactor Inspection Program - Construction Phase, has been completed and is closed.

Table of Contents

REPORT DETAILS

Summary of Plant Status

During the inspection period covered by this report, Tennessee Valley Authority (TVA) performed construction completion, preoperational and startup 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.1.1 Identification and Resolution of Construction Problems (Inspection Procedure 35007)

a. Inspection Scope

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

b. Observations and Findings:

No findings were identified.

c. Conclusion

The issues identified in the CRs 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 and Testing Activity Interface Controls

a. Inspection Scope

The inspectors independently assessed licensee controls, associated with Unit 2 testing 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 planning meetings were observed, at least once per week, to assess the adequacy of the licensee's efforts to identify those testing activities that could potentially impact the operating unit. This included the review of select testing activities, which the licensee had screened as not affecting Unit 1, to verify the adequacy of that screening effort. Additionally, the inspectors independently assessed select testing 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 testing work locations to verify that controls to protect the operating unit provided an adequate level of protection and had been properly implemented.

b. Observations and Findings

No findings were identified.

c. Conclusions

Overall, management oversight and controls were in place for the observed preoperational tests and surveillance activities that could potentially impact the operating unit.

P.1 Preoperational Activities

P.1.1 (Closed) Testing Piping Support and Restraint Systems (Inspection Procedure 70370)

a. Background: As identified in Appendix A to IMC 2513, Inspection Procedure (IP) 70370 – Testing Piping Support and Restraint Systems, shall be performed prior to fuel load. The purpose of IP 70370 is to ensure that pipe supports, component supports, and restraint systems were installed in accordance with regulatory requirements, programs, and procedures for the following plant conditions:
   - ambient temperature;
   - intermediate temperature;
   - normal operating temperature and pressure; and
   - and after steam transient testing.

   Inspections under this IP were previously documented in integrated inspection report (IIR) 05000391/2015605 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML 15226A345) and IIR 05000391/2015607 (ADAMS Accession No. ML15273A452).

   Inspection Activities: The inspectors reviewed the licensee's programs and procedures to determine their adequacy for the examination and testing of piping support and restraint systems. Specifically, inspectors verified that the programs and procedures:
   - examined piping support systems at various temperatures from ambient to normal operating temperature to detect interference caused by thermal expansion;
   - set and/or calibrated snubbers, restraints, and vibration arrestors and that these were checked at predetermined temperatures;
   - examined piping supports and restraint systems during transient testing to ascertain that pipe motion and vibration were within design limits and that water hammer did not exist;
   - conducted vibration tests, including resolution of high vibration;
   - ensured that displacement measurements were made at ambient and operating temperatures;
   - described sampling and that future inspection schedules were in conformance with Technical Specifications (TS); and
   - ensured that pipe support and component support inspection schedules were in conformance with the American Standard of Mechanical Engineers (ASME) Code Section XI and TS.

In addition to reviewing the licensee's programs and procedures, the inspectors also performed direct observation of licensee activities related to field measurements and performed visual examination of dynamic, fixed, and component supports. Specifically, the inspectors ensured that:

- hydraulic fluid in snubbers, shock suppressors, and restraints were at the proper level;
- fluid leaks through seals or elsewhere were not evident;
- deterioration, corrosion, physical damage, or deformation was not noticeable;
- lubricants were applied as required;
- all required bolts, locking devices, nuts, and washers were installed;
- support plates, extension rods, and connecting joints were not bent, deformed, loose, or otherwise out of specification;
- connecting joints, moving parts, piston shafts, seals, etc. were free from arc strikes, weld spatter, paint, scoring, roughness, general corrosion, or other materials that may obstruct proper operation;
- snubber positions were at or near their predicted position and not near their limits in either extension or compression;
- fixed pipe supports were not deteriorated and corrosion was not evident;
- springs in hangers were not obstructed by foreign material;
- spring hangers provided with indicators were consistent with the plant condition;
- threaded connections were secured by locknuts, fasteners, cotter pins, or similar locking devices and conform to the as-built drawings;
- sliding or rolling supports were provided with material and/or lubricants suitable for the environment and compatible with sliding contact surfaces;
- thermal expansion of the piping system was not restricted by the supports; and
- component supports show no signs of deformation and that no other discontinuities or detrimental indications appeared on welded surfaces

The inspectors also performed a walkdown of at least 25% of three systems subjected to steam/water transient following Steam/Water Transient Testing performed by the licensee. Specific activities included verifying for the piping supports and restraint systems that:

- position indicators were in the appropriate position;
- deformation was not evident;
- component support structures were securely attached to the building structure and no cracks were observed in structure support welds;
- bolts, nuts, and other fastener type devices were secure;
- debris that may affect the operation of piping supports or restraint systems was not evident; and
- fluid leaks through seals or elsewhere were not evident.

Finally, the inspectors performed a review of the records for pipe support testing to verify that:

- the licensee had evaluated all piping support testing;
- results were within the established acceptance criteria; and
- identified deficiencies identified in pipe support testing records were corrected.

b. Observations and Findings

During review of IP 70370, the inspectors determined that steps 02.04, Inservice Tests for Snubbers, and 02.05, Licensee's Pipe Support Surveillances, were not applicable to preoperational and startup testing and do not need to be performed at this time. These steps will be performed as part of the baseline inspection program under IMC 2515.

c. Conclusion

The inspectors determined that the licensee's program was adequate and their implementation was in accordance with procedures. IP 70370, Testing Piping Support and Restraint Systems, is closed for preoperational and startup testing.

P.1.2 (Closed) Preoperational Test Program Implementation Verification (Inspection Procedure 71302)

a. Inspection Scope

Background: The purpose of IP 71302 is to verify, through direct observation, personnel interviews, and review of facility records, that the licensee's management control system is effectively discharging its responsibilities over preoperational testing. Inspection in this area was periodically documented to support the prescribed periodicity and to meet the intent of the IP. Specifically, during the completion of construction and preoperational testing, the inspectors have focused on:

- performance of construction activities to ensure they were performed in accordance with the licensee's procedures;
- testing and construction activities to ensure these activities did not affect previously constructed or tested components;
- installation of equipment to verify cleanliness controls were maintained;
- turnover of systems to ensure custody was transferred in accordance with the licensee's procedures;
- preventative maintenance to ensure it was technically accurate in accordance with vendor recommendations;
- field tagging of equipment to verify jurisdictional controls were communicated to construction staff;
- the knowledge of personnel performing testing to ensure they are knowledgeable and qualified to perform testing; and
- test methodology to ensure conduct of testing, interruption criteria, and deficiency resolution are in accordance with the licensee's procedures.

Inspection Activities: The inspectors reviewed documentation supporting the completion of the IMC 2512 – construction phase program as documented in Section OA.1.2 of this report. Additionally, the inspectors reviewed the basis for the closure of IP 70329, "Preoperational Test Result Evaluation Verification," documented in Section P.1.3 of this report to ensure that all prescribed construction and preoperational testing activities were complete and finalized.

b. Observations and Findings

No findings were identified.

c. Conclusion

Based on the aforementioned inspection activities, the inspectors concluded that the inspection efforts of IP 71302 are complete.

P.1.3 (Closed) Preoperational Test Result Evaluation Verification (Inspection Procedure 70329)

a. Inspection Scope

Background: The purpose of preoperational test inspection is to verify through direct observation, personnel interviews, and review of facility records that:

- systems and components important to the safety of the plant were fully tested to satisfy their design requirements; and
- management controls and procedures, including quality assurance (QA) programs, necessary for operation of the facility have been documented and implemented.

IMC 2513 defines the preoperational inspection program that supports the issuance of an Operating License. IMC 2513 requires a results evaluation of the completed preoperational test procedures to ensure they are consistent with regulatory requirements and licensee commitments. The following inspections were performed in relation to satisfying the required results evaluation.

Inspection Activities: The inspectors reviewed the licensee's test library to verify that approved test procedure results existed for the areas/systems of IP 70329 that were applicable to Watts Bar Unit 2. Additionally, for the applicable primal systems listed in IMC 2513 Appendix A, that were not chosen for in-depth procedure review, the inspectors also reviewed the licensee's document library to verify that test results were available, approved, and controlled.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's test results were present and appropriately managed in the document control library. This completes the procedure review of preoperational test procedure IP 70329.

SU.1 Startup Testing Activities

SU.1.1 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-PAT-1.2 (Work Order (WO) 115928639), "Load Swing Test," Rev. 3, to verify that the test was conducted in accordance with approved procedures, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;
- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;
- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS LCOs was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, test directors log, control room log, and plant information report daily.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's power ascension test was performed in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-PAT-1.2, Rev. 3 for the 50% power plateau.

SU.1.2 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-PAT-5.2 (WO 115931050), "Turbine Generator Trip With Coincident Loss of Offsite Power," Rev. 3, to verify that the test was conducted in accordance with approved procedures, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;
- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;
- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS LCOs was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, test directors log, control room log, and plant information report daily.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's power ascension test was performed in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-PAT-5.2, Rev. 3 for the 50% power plateau.

SU.1.3 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-PAT-6.1 (WO 115931100), "Automatic Reactor Control System," Rev. 3, to verify that the test was conducted in accordance with approved procedures, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;

- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;
- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS LCOs was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, test directors log, control room log, and plant information report daily.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's power ascension test was performed in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-PAT-6.1, Rev. 3 for the 50% power plateau.

SU.1.4 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-PAT-6.2 (WO 115931113), "Automatic Steam Generator Level Control Transients at 50% Power," Rev. 3, to verify that the test was conducted in accordance with approved procedures, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;
- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;

- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS LCOs was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, test directors log, control room log, and plant information report daily. Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's power ascension test was performed in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-PAT-6.2, Rev. 3 for the 50% power plateau.

SU.1.5 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The purpose of IMC 2514, "Light Water Reactor Inspection Program – Startup Testing Phase," issue date August 21, 1989, is to verify that the licensee is meeting the requirements and conditions of the facility license for precritical tests, initial fuel loading, initial criticality, low-power testing, and power ascension tests. This verification is to be achieved through reviewing procedures and records, direct observation, witnessing tests, reviewing test data, and evaluating test results.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-PET-301, "Core Power Distribution Factors," which included the observations of the data collection for 2-TI-41, "Incore Flux Mapping"; 2-SI-0-22, "Incore QPTR"; 2-SI-0-21, "Excore QPTR & Axial Flux Difference;" and 2-SI-0-20, "Hot Channel Factors Determination." The inspectors observed the test to verify that the test was conducted in accordance with the approved procedure, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;
- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;

- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS limiting conditions of operation (LCOs) was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, test directors log, control room log, and plant information report daily.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's power ascension test was performed in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-PET-301 for the 75% power plateau.

SU.1.6 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-PAT-1.6 (WO 115928483), "Startup Adjustment of Reactor Control System," Rev. 02 (WO 115928483) to verify that the test was conducted in accordance with approved procedures, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;
- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;
- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS LCOs was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, and test directors log.

Witnessing and observation of this PAT was at the 75% plateau and encompassed the prerequisite requirements, test equipment setup, and Section 6.4 data taking. Completion of 2-PAT-1.6 requires data taking at each of the hold points (Mode 3, 30%, 50%, 75%, 90%, and 100%). Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's power ascension test was performed in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-PAT-1.6, Rev.2, at the 75% plateau.

SU.1.7 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-PAT-1.7 (WO 115930917), "Operational Alignment of Process Temperature Instrumentation," Rev. 2, to verify that the test was conducted in accordance with approved procedures, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;
- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;
- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS LCOs was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, and test directors log.

Witnessing and observation of this PAT was at the 75% plateau and encompassed the prerequisite requirements, test equipment setup, and Section 6.2.1 data taking. Completion of 2-PAT-1.7 requires data taking at each of the hold points (Mode 3, 30%, 50%, 75%, 90%, and 100%).

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's power ascension test was performed in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-PAT-1.7, Rev.2, at the 75% plateau.

SU.1.8 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-PAT-7.1 (WO 115931136), "Calibration of Steam and Feedwater Flow Instruments at 75% Power," Rev. 2 to verify that the test was conducted in accordance with approved procedures, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;
- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;
- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS LCOs was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, and test directors log.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's power ascension test was performed in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-PAT-7.1, Rev.2, at the 75% power plateau.

SU.1.9 Startup Test Witnessing and Observation (Inspection Procedures 72302)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors observed activities associated with the performance of test procedure 2-TI-6, "Calorimetric", Rev. 0 to verify that the test was conducted in accordance with approved procedures, to observe operating staff performance, and to ascertain the adequacy of test program records and preliminary evaluation of test results. The inspectors verified the following:

- current revision of the appropriate procedure was available and in use by the operating staff;
- minimum crew requirements were met;
- test prerequisites and initial conditions were met and those that were waived were reviewed/approved in accordance with procedure and TS requirements;
- required test equipment or data collection equipment was calibrated and in service;
- the test was performed as required by procedure;
- crew actions appeared to be timely during the performance of the test and coordination was adequate;
- all data were collected for final analysis by proper personnel;
- overall acceptance criteria was met;
- the licensee's preliminary test evaluation was consistent with the inspector's observation; and
- adherence to TS LCOs was maintained during testing.

Additionally, the inspectors reviewed the test sequencing document and applicable changes, and test directors log.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's test results were within the required acceptance criteria, and were reviewed, evaluated, and accepted by licensee

management in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the witnessing of power ascension test procedure 2-TI-6, Rev 0, at the 75% power plateau.

SU.1.10 Startup Test Results Evaluation (Inspection Procedure 72301)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors performed a detailed review of the results for power ascension test procedure 2-PAT-6.3 (WO 115931118), "Calibration of Steam and Feedwater Flow instruments at 50% Power," Rev. 2, to verify that the licensee's evaluation of the procedure performance and results was conducted in accordance with approved procedures. This review was performed to provide assurance that the test data was within the established acceptance criteria and the licensee's methods for identifying and correcting deficiencies were adequate. The inspectors performed the following activities associated with this test results review:

- Reviewed all changes made to the test procedure to verify they were properly annotated, did not affect the objective of the test, and were performed in accordance with administrative procedures.
- Reviewed all documented test deficiencies to verify they had been properly resolved, reviewed, and accepted.
- Reviewed the original 'as-run' copy of the test procedure to verify that data sheets were completed and properly initialed and dated, data was recorded within acceptance tolerances, and test deficiencies that were identified were noted.
- Reviewed the test summary and evaluation to verify that the system was evaluated to meet design requirements and acceptance criteria.
- The approval of the test results was reviewed for completeness with respect to the acceptance of the test results.

The inspectors reviewed the test results to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the test evaluation was performed in accordance with established procedures.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's test results were within the required acceptance criteria, and were reviewed, evaluated, and accepted by licensee management in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear plant Unit 2 Power Ascension Test Program," Revision 5. This completes the test results evaluation of power ascension test procedure 2-PAT-6.3.

SU.1.11 Startup Test Results Evaluation (Inspection Procedure 72301)

a. Inspection Scope

Background: The background for this startup test procedure review is the same as that in the background of Section SU.1.1 above.

Inspection Activities: The inspectors performed a detailed review of the results for test procedure 2-PAT-5.0, "Test Sequence for the 50% and 75% Plateau," which included 2-PET-301, "Core Power Distribution Factors"; 2-TI-41, "Incore Flux Mapping"; 2-TRI-0-22, "Incore QPTR"; 2-SI-0-21, "Excore QPTR & Axial Flux Difference"; and 2-SI-0-20, "Hot Channel Factors Determination." The inspectors completed the result review to verify that the licensee's evaluation of the procedure performance and results were conducted in accordance with approved procedures at the 50 % and 75% plateaus. This review was performed to provide assurance that the test data was within the established acceptance criteria and the licensee's methods for identifying and correcting deficiencies were adequate. The inspectors performed the following activities associated with this test results review:

- Reviewed all changes made to the test procedure to verify they were properly annotated, did not affect the objective of the test, and were performed in accordance with administrative procedures.
- Reviewed all documented test deficiencies to verify they had been properly resolved, reviewed, and accepted.
- Reviewed the original 'as-run' copy of the test procedure to verify that data sheets were completed and properly initialed and dated, data was recorded within acceptance tolerances, and test deficiencies that were identified were noted.
- Reviewed the test summary and evaluation to verify that the system was evaluated to meet design requirements and acceptance criteria, specifically:
    - measured incore quadrant tilt was less than or equal to 1.04;
    - measured hot channel factors (peaking factors) were within their respective TS limits;
    - measured TS quadrant power tilt ratio (QPTR) was within TS limits;
    - hot channel factors were evaluated to ensure that limits would not be exceeded before reaching the next power plateau; and
    - the absolute value of the difference between predicted and measured core reactivity at hot full power is less than 1000pcm.
- Reviewed the approval of the test results to verify completeness with respect to the acceptance of the test results.

The inspectors reviewed the test results to verify that the overall test acceptance was met. The inspectors conducted a review with the responsible test engineer to assure that the test evaluation was performed in accordance with established procedures.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that the licensee's test procedure results were reviewed, evaluated, and accepted in a manner consistent with the guidance of procedure 2-TI-438, "Watts Bar Nuclear Plant Unit 2 Power Ascension Test Program," Rev. 5. This completes the test results evaluation of test procedure 2-PAT-5.0 and the applicable sections of 2-PET-301 for the 50% and 75% plateau.

IV. OTHER ACTIVITIES

OA.1.1 (Closed) Final Corrective Action Program/ Special Program Inspection (Temporary Instructions 2512/016, 2512/017, 2512/018, 2512/020, 2512/021, 2512/022, 2512/023, 2512/025, 2512/026, 2512/032, 2512/034, 2512/035, 2512/036, 2512/038, 2512/040, and 2512/041)

a. Inspection Scope

Background: The Corrective Action Programs (CAPs) and Special Programs (SPs) were developed in 1986 by TVA to identify, document, investigate, and correct quality problems at Watts Bar Nuclear Plant. There were a total of 18 CAPs and 11 SPs. NRC reviewed TVA's resolution to the CAPs and SPs as part of the construction inspection program for Watts Bar Unit 2. Each of the CAPs and SPs for Watts Bar was assigned as a Temporary Instruction (TI) that contained two inspection sections: 03.01) interim inspections which sampled corrective actions and verified proper program implementation; and 03.02) a final inspection which was performed after TVA certified the CAP/SP was completed. All of the CAPs and SPs that were reviewed as part of this final inspection had been previously inspected through interim inspections and it was determined by the NRC that the program implementation was adequate to resolve the issue for all CAPs and SPs. These previous inspections satisfied Section 03.01 of the CAP or SP Temporary Instruction (TI). This report documents completion of the final inspections required by Section 03.02 of each of the TIs for the remaining CAPs and SPs.

The following SPs were reviewed and closed by the NRC during the Unit 1 review. These programs applied to the Watts Bar Nuclear Plant site, and a subsequent letter (ADAMS Accession No. ML090210107) was issued closing these programs with no inspection needed for Watts Bar Unit 2.

- TI 2512/033: Concrete Quality SP
- TI 2512/042: Soil Liquefaction SP

The following CAP was withdrawn with the resubmittal of Chapter 14 of the final safety analysis report (FSAR) to conform to the requirements of RG 1.68 as documented in a letter to TVA (ADAMS Accession No. ML090210107). Therefore, no TI was created for this CAP. The entire program is described in Chapter 14 of Amendment 91 to the FSAR. Therefore, these activities were not inspected under a CAP, rather they were assessed as part of the FSAR review and inspected as part of the IMC 2513, Preoperational Testing and Operational Preparedness Phase.

- Prestart Testing Program CAP

This item was previously discussed in Section OA.1.2 of IIR 05000391/2015607 (ADAMS Accession No. ML15273A452).

Inspection Activities: The inspectors reviewed the remaining portion of the 18 CAPs and 11 SPs that TVA completed. The inspectors reviewed documents that were required to be completed as part of the CAP or SP to verify the programs were completed. The documents reviewed included the final completion packages, and a sample of other documents that were required to be closed or completed in order to close the item, such as: commitment packages, calculations, WOs, and procedures. The inspectors reviewed these documents to verify that they were completed and signed.

The list of CAPs and SPs that were reviewed for completion to satisfy Section 03.02 of the TIs were:

- TI 2512/016: Cable Issue CAP, Sub-issue – Supports in Vertical Conduits
- TI 2512/016: Cable Issue CAP, Sub-issue – Supports in Vertical Trays
- TI 2512/016: Cable Issue CAP, Sub-issue – Cable Proximity to Hot Pipes
- TI 2512/016: Cable Issue CAP, Sub-issue – Cable Pull-bys
- TI 2512/016: Cable Issue CAP, Sub-issue – Bend Radius
- TI 2512/016: Cable Issue CAP, Sub-issue – Splices
- TI 2512/017: Cable Tray and Cable Tray Supports CAP
- TI 2512/018: Electrical Conduits and Supports CAP
- TI 2512/020: Electrical Issues CAP, Sub-issue – Flex Conduit
- TI 2512/020: Electrical Issues CAP, Sub-issue – Cable Separation and Electrical Isolation
- TI 2512/020: Electrical Issues CAP, Sub-issue – Torque Switch and Overload Relay Bypass Capability
- TI 2512/020, Electrical Issues CAP, Sub-issue – Adhesive-backed Cable Support Mount
- TI 2512/021: Equipment Seismic Qualification CAP
- TI 2512/022: Fire Protection CAP
- TI 2512/023: Hanger Update and Analysis Program CAP
- TI 2512/025: HVAC Duct Supports CAP
- TI 2512/026: Instrument Sensing Lines CAP
- TI 2512/032: Welding CAP
- TI 2512/034: Containment Cooling SP
- TI 2512/035: Control Room Design Review SP
- TI 2512/036: Environmental Qualification SP
- TI 2512/038: Mechanical Equipment Qualification SP
- TI 2512/040: Moderate Energy Line Break SP
- TI 2512/041: Radiation Monitoring System SP

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on a review of the completed CAP/SPs, the inspectors determined that the licensee has adequately addressed the concerns in the CAP/SPs. This item is closed.

OA.1.2 (Closed) Light Water Reactor Inspection Program - Construction Phase (Inspection Manual Chapter 2512)

a. Inspection Scope

Background: The NRC inspection program for WBN Unit 2 consisted of Inspection Manual Chapters (IMC) 2517, Watts Bar Unit 2 Construction Inspection Program; IMC 2512, Light Water Reactor Inspection Program - Construction Phase; IMC 2513, Light Water Reactor Inspection Program - Preoperational Testing and Operational Preparedness Phase; and IMC 2514, Light Water Reactor Inspection Program - Startup Testing Phase. IMC 2512 was designed to provide inspection requirements and policy for implementation of the inspection program during construction and major plant modifications.

TVA actively constructed Watts Bar Unit 2 from 1973 until the utility suspended construction activities in 1985. The NRC staff inspected Watts Bar Unit 2 under IMC 2512 until construction activities were suspended. TVA resumed construction and licensing activities in 2007 in accordance with Staff Requirements Memorandum SECY-07-0096 (ADAMS Accession No. ML072060688), which determined that the licensing review approach would employ the current licensing basis for Unit 1 as the reference basis for the review and licensing of Unit 2. Due to the approximately 20 year period that construction activities were suspended at WBN Unit 2, NRC developed a new IMC to address these unique circumstances that arose from the resumption of construction and licensing activities. Therefore, IMC 2517 was developed and used to provide the overall policies and requirements for the WBN Unit 2 inspection program, including construction, preoperational testing, and startup testing inspections.

The NRC used historical inspection results and inspections that were performed after the resumption of construction activities to complete all of the inspections described in IMC 2512. As part of the NRC's confirmation that all issues and inspection requirements would be completed for Unit 2, a review of all NRC WBN Unit 2 inspection reports was initiated to determine the status of the required IPs, contained in NRC Manual Chapter 2512, in effect at the time construction was stopped. This effort was called the reconstitution process. The NRC used the results of the reconstitution process to identify areas which require additional inspections. This reconstitution was documented in integrated inspection report (IIR) 05000391/2009602, Section OA.1 (ADAMS Accession No. ML091210420).

The activities performed in areas covered by NRC IPs that were not inspected during original construction activities in the 1970s and 1980s were inspected as part of the new work or rework activities since 2007. To address the multiple construction QA issues identified in 1985, the NRC inspected the implementation of the TVA CAPs and SPs, partially discussed in section OA.1.1 of this report. The NRC also inspected other areas deemed a necessary part of the licensing basis for Unit 1 based on additional reviews of historical allegations, previous open items, generic issues, licensing items, generic communications, and construction deficiency reports. The sum of the items from the

reconstitution of IMC 2512, CAP/SPs, and other items discussed above resulted in 560 construction inspection items.

As part of the closure process for the 560 construction inspection items, NRC performed many inspections that spanned the spectrum of the construction activities at WBN Unit 2. Examples of the types of inspections included:

- Quality assurance program;
- Receipt and storage of components;
- Problem identification and resolution;
- Engineering activities;
- Training and qualification of key personnel;
- Procurement;
- Actual construction activities; and
- Refurbishment activities.

b. Conclusions

Section OA.1.1 of this report documents the closure of the last remaining construction inspection item, Final Corrective Action Program/ Special Program Inspection. Based on the closure of all 560 construction items, the parts of IMC 2517 that describe the policies and requirements for the WBN Unit 2 construction inspection program have been completed. Therefore, IMC 2512 has been completed and is closed.

V. MANAGEMENT MEETINGS

X1 Exit Meeting Summary

An exit meeting was conducted on August 19, 2016, to present the inspection results to Mr. Russell Stroud. The inspectors identified that no proprietary information had been received during the inspection and none would be used in the inspection report. The licensee acknowledged the observations and provided no dissenting comments.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

P. Simmons, TVA – Site Vice President
M. Skaggs, TVA – Senior Vice President
G. Arent, TVA – Licensing Manager
Terry Wilburn, Chemistry
Mahlon Tuck, Radiation Protection
Bill Jasper, Radiation Protection
Ben Kennedy, TVA Engineering
Cindy Abidi, TVA Engineering
Mathew Smith, TVA Engineering
Rusty Stroud, TVA Licensing

INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction and Pre-Construction Activities
IP 70329	Preoperational Test Result Evaluation Verification
IP 70370	Testing Piping Support and Restraint Systems
IP 71302	Preoperational Test Program Implementation Verification
IP 72302	Startup Test Witnessing and Observation
IP 72301	Startup Test Results Evaluation

TEMPORARY INSTRUCTIONS USED

TI 2512/016	Inspection of Watts Bar Nuclear Plant Cable Issues Corrective Action Program Plan
TI 2512/017	Inspection of Watts Bar Nuclear Plant Cable Tray and Supports Corrective Action Program Plan
TI 2512/018	Inspection of Watts Bar Nuclear Plant Electrical Conduit and Supports Corrective Action Program Plan
TI 2512/020	Inspection of Watts Bar Nuclear Plant Electrical Issues Corrective Action Program Plan
TI 2512/021	Inspection of Watts Bar Nuclear Plant Equipment Seismic Corrective Action Program Plan
TI 2512/022	Inspection of Watts Bar Nuclear Plant Fire Protection Corrective Action Program Plan
TI 2512/023	Inspection of Watts Bar Nuclear Plant Hanger Update Corrective Action Program Plan
TI 2512/025	Inspection of Watts Bar Nuclear Plant HVAC Duct and Supports Corrective Action Program Plan
TI 2512/026	Inspection of Watts Bar Nuclear Plant Instrument Lines Corrective Action Program Plan
TI 2512/032	Inspection of Watts Bar Nuclear Plant Welding Corrective Action Program Plan
TI 2512/034	Inspection of Watts Bar Nuclear Plant Containment Cooling Special Program
TI 2512/035	Inspection of Watts Bar Nuclear Plant Control Room Design Review Special Program
TI 2512/036	Inspection of Watts Bar Nuclear Plant Environmental Qualification Special Program
TI 2512/038	Inspection of Watts Bar Nuclear Plant Mechanical Equipment Qualification Special Program
TI 2512/040	Inspection of Watts Bar Nuclear Plant Moderate Energy Line Break Special Program
TI 2512/041	Inspection of Watts Bar Nuclear Plant Radiation Monitoring System Special Program

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

2512/016, 17, 18, 20, 21, 22, 23, 25, 26, 32, 34, 35, 36, 38, 40, 41	TI	Final Corrective Action Program/ Special Program Inspection (Section OA.1.1)
2512	IMC	Light Water Reactor Inspection Program - Construction Phase (OA.1.2)

Discussed

None

LIST OF DOCUMENTS REVIEWED

SU.1 STARTUP TESTING ACTIVITIES

SU 1.5 Startup Test Results

Condition Reports
0190206; Operations Changing Procedures to use Turbine IMP out only
1190195; Unit 2 RCS Leak Rate
1191434; 2-PAT-1.2 Load Swing Test
1191679; QA Identified – 2-PAT-5..2 Critical Steps Not Identified
1191965; 2B DG 2-PI-18-84 Leaking Fuel Oil
1192023; 2A EDG Perceived to be Slower than Expected
1192025; Solid Stream Fuel Oil Leak on 2-PI-18-84/4
1193146; NRC Question on Delayed D/G Breaker Closure and Effect on 2-PAT-5.2 Performance
1193637; PAT- 2-PAT-1.2 Failed to Meet Acceptance Criteria During the Load Swing Test

SU 1.6 Startup Test Results

Miscellaneous

Westinghouse Letter WBT-D4709; WBT-D-5146 (6.4.8) PAT Acceptance Criteria; dated May 12, 2015.

OA.1 OTHER ACTIVITIES

OA.1.1 (Closed) Final Corrective Action Program/ Special Program Inspection

Calculations
Calculation EDQ00299920090003, Rev 0, Evaluation and Disposition of U2 Class 1E Cables for Support in Vertical Conduits and Cable Trays
Calculation EDQ00299920090003, Rev 0, Evaluation and Disposition of U2 Class 1E Cables for Support in Vertical Conduits and Cable Trays
Calculation EDQ00299920090003, Rev 0.
Calculation EDQ00299920080021, Rev. 000, Cable Pullby Evaluation and Disposition of Unit 2 Class 1E Conduits for Pullby Damage Concern
Calculation EDQ00299920090005, Rev. 000, Cable Bend Radius Evaluation and Disposition of Unit 2 Class 1E Cables for Bend Radius Violations.
Calculation EDQ00299920090001, Rev. 000, Evaluation and Disposition of Unit 2 Class 1E Flexible Conduits.
WBNOSG4095 R19, “Selection Criteria for MOVs Requiring Thermal Overload Bypass and/or Torque Switch Bypass
Calculation EDQ00299920090006, Rev. 000, External Separation Evaluation for Unit 2 Raceways Containing Unit 2 Safety Related Cables
Calculation EDQ00299920090002, Rev. 000, Internal Panel Separation Evaluation for Common, Unit 1, and Unit 2 Enclosures Containing Unit 2 Safety Related Cables
Calculation WBPEVAR8807028, Rev. 007, Adequacy of Contact-to-Contact and Coil-to-Contact Isolation between Class 1E and Non-Class 1E Circuits and Class 1E and Special Circuits
Calculation EPM JSR 012286 R12, Sampling and Radiation Monitoring Line Operating Temperatures

Calculation WBPEVAR8511002 R2, Safety-Related Instr. with Field Routed Sense Lines
Calculation CEB-CAS-146 R6, Review of Instrument Supports for NCR W-334-P
Calculation SD3-023 R6, Evaluation of Excess Ovality of Pipe and Tube Bends WITEL CP-11 (Instrument Lines Project) Report

Engineering
Engineering Document Construction Relaese (EDCR) 55116, Rev. A, To Support Cables in Vertical Trays and Conduits Identified by the calculation EDQ00299920090003, Rev 0.
EDCR 55116, Rev. A, 4/28/2010
EDCR 53217, Rev. A, 5/28/2010
EDCR 53654, Rev. A, 5/28/2010
EDCR 54631, Rev. A, 12/14/2009
EDCR 54632, Rev. A, 1/29/2010
EDCR 54637, Rev. A, 1/29/2010
EDCR 55231, Rev. A, 4/12/2010
EDCR 55233, Rev. A, 5/1/2010
EDCR 55121, Rev. A, 5/9/2010
EDCR 52938, Rev. A
EDCR 53104, Rev. A
EDCR-2 55120, Rev. A, 4/22/2010
EDCR 54289, Rev. A
EDCR 53517, Rev. A
EDCR 54280, Rev. A
EDCR 54298, Rev. A
EDCR 52861, Rev. A, 3/26/2009
EDCR 57879, Rev. A
EDCR 54655, Rev. A
EDCR 53587, Rev. A
EDCR 55125, Rev. A
EDCR 55127, Rev. A

Corrective Action Documents
PER 143718
PER 144230
PER 172591
PER 172746
PER 393639
PER 144110
PER 172615

Miscellaneous
Cable Support in Vertical Conduits (CP 1.3) Closure Report, Rev. 000, 10/25/2010
Cable Support in Vertical Trays (CP 1.4) Closure Report, 1/12/2011
Cable Pullbys (CP 1.6) Closure Report, Rev. 000, 2/23/2011
Cable Bend Radius (CP 1.7) Closure Report, Rev.000, 1/14/2011
Conduit and Conduit Supports Corrective Action Closure Report, Rev. 1, 8/8/2012
Flexible Conduit Installations (CP 5.1) Closure Report, Rev. 000, 4/13/2011
Torque Switch and Overload Relay Bypass Capability for Active Safety Related Valves (CP 5.4), Rev. 000, 4/13/2011
Hanger and Analysis Update Program (HAAUP) Corrective Action Program Closure Report Unit 2 Rev. 0, 2/28/2012

Hanger and Analysis Update Program (HAAUP) Corrective Action Program Closure Report Unit 2 Rev. 01, 9/27/2012
Hanger and Analysis Update Program (HAAUP) Corrective Action Program Closure Report Unit 2 Rev. 02, 5/5/2014
HVAC Duct and Duct Supports Corrective Action Program Closure Report, 4/13/2011
Welding Corrective Action Program Welding Report, Rev. 1, 1/24/2013
Containment Cooling Special Program Closure Report, 1/31/2011
Mechanical Environmental Equipment Qualification Special Program Closure Report, 9/13/2011
Moderate Energy Line Break Special Program Closure Report, 9/12/2011
Physical Cable Separation and Electrical Isolation (CP 5.2) Closure Report, Rev. 000, 2/2/2011
Seismic Analysis Corrective Action Program Closure Report, Rev. 0, 11/19/2009
Fire Protection Corrective Action Program Engineering Design Complete Closure Report, 7/16/2015
Instrument Lines Corrective Action Program Engineering Closure Report, 11/4/2011
Control Room Design Review (CRDR) Special Program, Rev. 000, 2/21/2012
Self-Assessment 25402-SA-ENG-10-003
Self-Assessment 25402-SA-ENG-11-006
Environmental Qualification of Electrical Equipment Special Program Closure Report
Radiation Monitoring System Special Program Engineering Closure Report, 1/9/2013
WBN Unit 2 EQ Self-Assessment Report 25402-SA-ENG-10-013

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
ASME	American Society of Mechanical Engineers
CFR	*Code of Federal Regulations*
CR	Condition Report
EDCR	engineering document construction relaese
EDG	emergency diesel generator
FSAR	Final Safety Analysis Report
IIR	integrated inspection report
IMC	inspection manual chapter (NRC)
IP	inspection procedure
LCO	Limiting Condition of Operation
No.	number
NRC	Nuclear Regulatory Commission
QA	quality assurance
Rev.	revision
QPTR	quadrant power tilt ratio
TI	temporary instruction (NRC)
TS	Technical Specification
TVA	Tennessee Valley Authority
WBN	Watts Bar Nuclear Plant