



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
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October 21, 2015

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

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2015609

Dear Mr. Skaggs:

On October 15, 2015, 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 October 20, 2015, with Ms. Cooper 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 website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

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

Sincerely,

/RA/

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

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

Enclosure: Integrated Inspection Report 05000391/2015609
w/ Attachment

cc w/encl: (See next page)

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Letter to Michael D. Skaggs from Robert C. Haag dated October 21, 2015.

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 2 CONSTRUCTION - NRC INTEGRATED
INSPECTION REPORT 05000391/2015609

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PUBLIC

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 50-391

Construction Permit No.: CPPR-92

Report No.: 05000391/2015609

Applicant: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Unit 2

Location: Spring City, TN 37381

Dates: October 1, 2015 – October 15, 2015

Inspectors:

- E. Patterson, Senior (Acting) Resident Inspector, Construction Projects Branch (CPB) 3, Division of Construction Projects (DCP), Region II (RII)
- A. Wilson, Construction Project Inspector, CPB3, DCP, RII, Section OA.1.1
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Approved by: Robert C. Haag, Chief
Construction Projects Branch 3
Division of Construction 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 two-week period of inspections in the areas of quality assurance (QA), identification and resolution of construction problems, engineering and construction activities, preoperational 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 three Three Mile Island (TMI) Action Items have been appropriately addressed for WBN Unit 2.
- Other areas inspected were adequate with no findings identified. These areas included QA; preoperational testing activities; relief and safety valve testing; containment sump activities; and various NRC inspection procedures.

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REPORT DETAILS

Summary of Plant Status

During the inspection period covered by this report, Tennessee Valley Authority (TVA) performed construction completion and preoperational testing activities on safety-related systems and continued engineering design activities of the Watts Bar Nuclear (WBN) Plant, Unit 2 (U2).

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 applicant's corrective action program, to verify that issues being identified under the corrective action program were being properly identified, addressed, and resolved by the applicant. The inspectors also reviewed and followed up on the corrective actions of several CRs discussed throughout various sections of this report.

b. Observations and Findings

No findings were identified.

c. Conclusions

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

II. MANAGEMENT OVERSIGHT AND CONTROLS

P.1 Preoperational Activities

P.1.1 Engineered Safety Features and Loss of Offsite Power Test - Preoperational Test Procedure Review (Inspection Procedures 70304 and 70306)

a. Inspection Scope

Background: The purpose of the inspections of preoperational test activities 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 inspection program that supports the issuance of an Operating License. IMC 2513 requires the procedural review of the preoperational test procedures to ensure they are consistent with regulatory requirements and applicant commitments. The following inspection was performed in relation to satisfying the required procedural reviews.

Inspection Activities: The inspectors reviewed preoperational test instruction (PTI) 2-PTI-262-03, Rev. 0, "Unit 2 Systems Safeguards Test." This PTI was composed of four plant systems that were not available for testing and some components that did not work correctly during the original 2-PTI-262-01 and 02 tests. The inspectors verified that the PTI included all the components required to be tested.

The inspectors also evaluated the adequacy of:

- test scope;
- acceptance criteria;
- precautions, including considerations for interfaces with the operating unit;
- prerequisites, including identification of M&TE requirements and system alignments;
- information about expected responses during testing;
- criteria for terminating test evolutions;
- actions for restoration from test evolutions; and
- procedure structure and flow, including identification of action-critical steps.

The inspectors interviewed the responsible startup test engineer and startup program management, and reviewed the PTI to determine whether the procedure provided verifications of correct engineered safety function component operation in response to a manual initiation of the engineered safety features actuation system.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based upon the inspection, the inspectors determined that the preoperational test instruction 2-PTI-262-03 was technically adequate to accomplish its stated purpose and implemented the applicant's program guidance. This completes the procedure review of preoperational test procedure 2-PTI-262-03.

P.1.2 Engineered Safety Features Test Witnessing (Inspection Procedures 70315 and 70434B)

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 are fully tested to demonstrate that they satisfy their design requirements; and
- management controls and procedures, including QA programs, necessary for operation of the facility have been documented and implemented.

IMC 2513 defines the inspection program that supports the issuance of an operating license. IMC 2513 requires the preoperational test witnessing 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 preoperational test witnessing.

Inspection Activities: The inspectors witnessed activities associated with the performance of Preoperational Test Instruction 2-PTI-099-08, "Safeguards System Test Panel," Revision (Rev) 0, 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 following test sections were selected for inspection of this item:

- 6.1.2 Containment Spray (S820/K644)
- 6.1.3 Containment Isolation Phase B (S824/K626)
- 6.1.4 Safety Injection (S825/K602 & K647)
- 6.1.5 Safety Injection (S826/K648)
- 6.1.6 Safety Injection Unblock Pressure (S827/K628)
- 6.3 Engineered Safety Features Actuation System Slave Relay Block Test Train A (S805/K618)
- 6.4 Engineered Safety Features Actuation System Slave Relay Block Test Train B (S805/K618)

The inspectors assessed the following attributes associated with this test observation:

- all test personnel were on station and had the latest revision of the procedure;
- test prerequisites were performed;
- testing was performed in accordance with the approved procedure;
- test interruptions and continuations were handled in accordance with approved procedures and documented in the chronological test log;
- testing events and discrepancies were properly documented in the test deficiency log;
- testing was executed and coordinated properly;
- data was properly collected;
- temporary jumpers were installed and tracked appropriately;
- administrative test controls were properly followed;

The inspectors observed the tests to verify that the overall test acceptance was met. During the tests, the inspectors observed important data gathering activities to ensure the data was properly gathered and recorded.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspectors determined that the observed portions of the applicant's test procedure were performed in a manner consistent with the guidance of procedure SMP-9, Watts Bar Nuclear Plant Unit 2, "Conduct of Test," Rev. 5.

IV. OTHER ACTIVITIES

OA 1.1 (Closed) Three Mile Island Action Item II.F.1.1, Accident Monitoring System – Procedures (Inspection Procedure 92701)

a. Inspection Scope

Background: This item required, in part, accident monitoring procedures to be available to ensure adequate calibration and operation of monitoring equipment for noble gas, iodine/particulate sampling, containment high range, containment pressure, containment water level, and containment hydrogen as specified in Regulatory Guide 1.97. The NRC closed Unit 1 actions in NRC inspection report 50-390/95-65 and 50-391/95-65 (ADAMS Accession No. ML072610768).

Inspection Activities: The inspectors reviewed the applicant's final closure package to verify that Unit 2 procedures related to accident monitoring instrumentation had been developed and mimicked the Unit 1 procedures currently in use. The review included emergency operating instructions, annunciator response instructions, abnormal operating instructions, system operating instructions, and chemistry manual procedures.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

The inspectors determined that accident monitoring procedures are available to ensure adequate calibration and operation of monitoring equipment for noble gas, iodine/particulate sampling, containment high range, containment pressure, containment water level, and containment hydrogen. TMI Action Item II.F.1.1 is closed.

OA.1.2 (Closed) Three Mile Island Action Item II.F.1, Noble Gas Effluent Monitors (Inspection Procedure 35007)

a. Inspection Scope

Background: As part of the NRC response to the accident at TMI, the agency issued NUREG-0737, "Clarification of TMI Action Plan Requirements." Section II.F.1 established a requirement to install noble gas monitors that have the capability to detect and measure concentrations of noble gas fission products in plant gaseous effluents during and following an accident.

The previous inspection of this TMI action item for Unit 2 was documented in integrated inspection report (IIR) 05000391/2015608 (ADAMS Accession No. ML15287A166). That report identified that the eight radiation monitoring systems to be inspected within the scope of this requirement still required action to complete calibrations and verifications of electrical wiring and controls. In addition, as documented in non-cited violations 05000391/2015608-04 and -05, corrective actions were required to properly install three misoriented main steam line monitors.

Inspection Activities: In this inspection, the inspectors conducted followup observations of the reconfigured radiation monitors at the main steam lines, observed in progress testing activities, interviewed responsible personnel, and reviewed calibration and test records. The reviews evaluated work performed for the following radiation monitoring systems:

- 2-RE-90-119, Condenser Vacuum Exhaust Radiation Monitor (low range)
- 2-RE-90-255, Condenser Vacuum Exhaust Radiation Monitor (mid-range)
- 2-RE-90-256, Condenser Vacuum Exhaust Radiation Monitor (high-range)
- 2-RE-90-421, Main Steam Line Radiation Monitor
- 2-RE-90-422, Main Steam Line Radiation Monitor
- 2-RE-90-423, Main Steam Line Radiation Monitor
- 2-RE-90-424, Main Steam Line Radiation Monitor

The observation of testing activities and reviews of work records were performed to verify work was accomplished as prescribed by written instructions, acceptance criteria were met, deviations from specified requirements were addressed, and that records were complete, legible, and identifiable as to the activity that was performed.

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

b. Observations and Findings:

No findings were identified.

c. Conclusion:

The inspectors determined that corrective actions were sufficient to address the non-cited violations involving improperly configured main steam line radiation monitors. In addition, the calibrations and verifications of radiation monitor output functions were sufficient to show that the outstanding actions to accomplish the installations of noble gas monitoring systems have been completed. TMI Action Item II.F.1 for the noble gas effluent monitors is closed.

OA.1.3 (Closed) Three Mile Island Action Item II.F.1, Containment High Range Radiation Monitors (Inspection Procedure 35007)

a. Inspection Scope

Background: As part of the response to the TMI accident, Section II.F.1 of NUREG-0737 required applicants to install high range monitoring instrumentation with the capability to detect and measure the radiation level within containment during and following an accident.

The previous inspection of this TMI action item was documented in IIR 05000391/2015608 (ADAMS Accession No. ML15287A166). That report identified that the four radiation monitoring systems to be inspected within the scope of this requirement still required action to complete calibrations and verifications of electrical wiring and controls.

Inspection Activities: The inspectors interviewed the responsible system test and calibration personnel and reviewed calibration and test records. The reviews evaluated work performed for the following radiation monitoring systems:

- 2-RE-90-271, Upper Containment High Range Radiation Monitor
- 2-RE-90-272, Upper Containment High Range Radiation Monitor
- 2-RE-90-273, Lower Containment High Range Radiation Monitor
- 2-RE-90-274, Lower Containment High Range Radiation Monitor

The observation of testing activities and reviews of work records were performed to verify work was accomplished as prescribed by written instructions, acceptance criteria were met, deviations from specified requirements were addressed, and that records were complete, legible, and identifiable as to the activity that was performed.

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

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspectors determined that the calibrations and verifications of radiation monitor output functions were sufficient to show that the outstanding actions to accomplish the installations of containment high range monitoring systems have been completed. TMI Action Item II.F.1 for containment high range radiation monitors is closed.

OA.1.4 (Discussed) Three Mile Island Action Item II.D.1, Relief and Safety Valve Test Requirements (Inspection Procedure 50071)

a. Inspection Scope

Background: Following the 1979 event at Three Mile Island Unit 2, the NRC formed a Lessons Learned Task Force to provide recommendations from the accident. These recommendations were released in NUREG-0578 (ADAMS Accession No.

ML090060030). Section 2.1.2 of NUREG-0578 described the short term recommendation for the performance testing for boiling water reactor and pressurized water reactor (PWR) relief and safety valves. TMI Action Items were developed as a result of these recommendations and published in NUREG-0660 Volumes 1 and 2, NRC Action Plan Developed as a Result of the TMI-2 Accident (ADAMS Accession Nos. ML072470526 and ML0727470524).

TMI Action Item II.D.1 established the requirements for reactor coolant system relief and safety valves testing. This action item states that licensees and applicants shall conduct testing to qualify reactor coolant system relief and safety valves under expected operating conditions for design basis transients and accidents, including under Anticipated Transient without SCRAM (ATWS) conditions. NUREG-0737 (ADAMS Accession No. ML051400209) clarified this statement, adding the qualification of PWR block valves as a new requirement.

Previously, the inspectors interviewed the TVA Pre-Service/In-Service Testing (PST/IST) lead engineer to determine the scope of the PST/IST program and to ensure the relief and safety valves were contained within the PST/IST program. The inspectors reviewed the in-service testing program documentation to verify that it contained the reactor coolant system relief and safety valves, as required, and to determine the frequency and type of testing to be performed. The inspectors also reviewed the technical specifications for the testing of the relief and safety valves to determine when the valves would be required during startup testing. The inspectors verified that the IST program combined the approved and in-use Unit 1 program with the Unit 2 program and would become effective prior to operation of Unit 2. This was documented in IIR 05000391/2014604 (ADAMS Accession No. ML14177A214).

Inspection Activities: For TMI Action Item II.D.1, Section A.1, the inspectors reviewed the applicant's evidence supported by test of safety and relief valve functionality for expected and accident (non-ATWS) conditions. Specifically, the inspectors reviewed the results of power operated relief valve (PORV) testing performed during the applicant's hot functional testing (HFT). The applicant identified performance issues with the PORVs during HFT, and as a result, the PORVs were sent to an offsite testing facility for retesting and refurbishment if needed. The inspectors reviewed the applicant's test plan for the PORVs at the testing facility and verified that the test plan contained sufficient testing to show functionality of the valves at all possible operating and accident conditions.

For pre-operational testing of the safety valves, the inspectors noted that TVA submitted relief request IST-RR-4 to the NRC in a letter dated December 12, 2013 (ADAMS Accession No. ML13358A066). This relief request would allow TVA to have the safety valves tested at a vendor facility rather than testing the safety valves in-place. The inspectors reviewed the approval of relief request IST-RR-4 in a letter dated October 21, 2014 (ADAMS Accession No. ML 14289A222). The inspectors will review the results of safety valve testing prior to closure of the item.

For II.D.1, Section A.2, the inspectors reviewed the applicant's evidence to substantiate that valves tested at Electric Power Research Institute or other generic test programs demonstrate the functionality of as-installed primary relief and safety valves. Specifically, the inspectors reviewed the approved relief request for the safety valves and verified that the applicant had a program in place to test the valves as required. The

inspectors reviewed the test plan for the relief and safety valves to ensure that it covered the proper testing required by the American Society of Mechanical Engineers (ASME) code and the FSAR.

For II.D.1, Section A.3, the inspectors reviewed the applicant's test data including criteria for success and failure of valves. Specifically, the inspectors reviewed the commitments made by the applicant for PORV and safety valves, including plant-specific evaluation of discharge piping and supports not directly tested. The inspectors reviewed the following documents to verify that the criteria for success and failure of the PORVs and PORV were adequately identified:

- Watts Bar Unit 2 Technical Specifications, Section 3.4.10, 3.4.11, 3.4.12, Rev. J
- 2-PTI-068-15, "Pressure and Level Control," Rev. 1
- 2-SI-68-904-A, "Reactor Coolant System Valve Position Indication Verification (Train A)," Rev. 2
- 2-SI-68-904-B, "Reactor Coolant System Valve Position Indication Verification (Train B)," Rev. 2
- 2-SI-68-92, "18 Month Channel Calibration of PORV 2-PCV-68-340A Cold Overpressure Mitigation System (COMS) Actuation Channel," Rev. 5
- 2-SI-68-93, "18 Month Channel Calibration of PORV 2-PCV-68-334A COMS Actuation Channel," Rev. 4
- Report No. 9766, Test Procedure for TVA PORV Target Rock Valve Model 82UU-001-12BB, Project FS-15318, Rev. 0, dated 10/02/15

For II.D.1 Section B, the inspectors verified that the pressurizer PORV block valves were placed within the applicant's Generic Letter 1989-10 and 1996-05 programs and would be tested or analyzed to ensure proper function and capacity.

b. Observations and Findings

No findings were identified.

c. Conclusion

The inspectors concluded that the work performed by the licensee was adequate to complete TMI Action Item II.D.1, Section A.3. This section is considered closed.

For Section A.1, the inspectors will continue to inspect these activities and this section will remain open until the testing deficiencies have been completely addressed. The inspectors will also inspect the vendor-supplied test results for the safety valves. For Section A.2, the inspectors will review the plant specific evaluation for the discharge piping to verify that the effect of the as-built piping in the plant versus the piping in the test configuration was taken into account. Section A.1 and A.2 will remain open until the inspection of licensee's supporting documentation is completed.

For Section B, the inspectors will review the resolution of test deficiencies identified by the applicant during testing for the PORV block valves. This section will remain open until the testing deficiencies have been completely addressed. For Section C, this section will remain open until the inspection of licensee's supporting documentation is completed.

Based on the work remaining to be completed, this item will remain open.

OA 1.5 (Discussed) Generic Letter 2004-02 - Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors and Pressurized Water Reactor Containment Sump Blockage (Temporary Instruction 2515/166)

a. Inspection Scope

Background: Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors", requested licensees to evaluate the emergency core cooling system (ECCS) and containment spray systems (CSS) recirculation functions and take actions, if appropriate. Pressurized water reactor recirculation sump screens had been identified to be potentially susceptible to debris blockage during design basis accidents requiring recirculation operation of ECCS or CSS and on the potential for additional adverse effects due to debris blockage of flow paths necessary for ECCS and CSS recirculation and containment drainage.

In response to the generic letter mentioned above, WBN determined that they would remove the outer trash racks provided on each side of the sump and install a new strainer. The new strainer has an available flow area of 4600 ft² compared to the original screen area of approximately 200 ft². The new strainer openings are 0.085 inches in diameter compared to the 0.25 inch mesh that cover the outer trash racks. The strainer has an advanced configuration intended to be much more resistant to potential sump blockage.

Unit 2 containment is a mirror image to the Unit 1 containment. Therefore, the results of debris generation, transport analyses, and downstream effects will be the same for Unit 2 as for Unit 1. The WBN Unit 2 letter to the NRC dated March, 4, 2011 (ADAMS Accession No. ML110680248) stated that Unit 2 actions are to replace containment sump intake screens with an advanced design containment sump strainer arrangement under Engineering Document Construction Release (EDCR) 53580. The design is the same as that used for Unit 1 except that the strainer stack to plenum opening was increased in size. This change reduces the strainer pressure drop, thus increasing the margin to plugging the strainer when compared to Unit 1.

As stated in the NRC closeout letter dated September 18, 2014 (ADAMS Accession No. ML14163A658), it was identified that three actions needed to be accomplished prior to closeout for the GL 04-02. Those items included: (1) install sump modifications per the requirements of GL 2004-02 prior to Unit 2 fuel load, (2) complete a confirmatory walkdown for loose debris after containment work is complete, prior to start-up, to ensure that potential quantities of post-accident debris are maintained within the bounds of the analyses and design-bases that support ECCS and CSS recirculation functions, and (3) install new throttle valves in the chemical volume control system and safety injection system lines to the reactor coolant system, opened sufficiently to preclude downstream blockage.

Inspection Activities: As documented in NRC Inspection Report 05000391/2015604 (ADAMS Accession No. ML 15181A446), it was concluded that the installation of the containment sump strainer assembly was completed in accordance with the as-built

configurations reflected in construction drawings and specifications. Based on those inspection efforts, Item 1: Installation of Sump Modifications, has been completed.

As part of the current inspection efforts, inspectors reviewed the completed work orders for the following valves:

- 2-THV-063-0542-A
- 2-THV-063-0544-A
- 2-THV-063-0546-B
- 2-THV-063-0548-B
- 2-THV-063-0550-S
- 2-THV-063-0552-S
- 2-THV-063-0554-S
- 2-THV-063-0556-S
- 2-THV-063-0582-S
- 2-THV-063-0583-S
- 2-THV-063-0584-S
- 2-THV-063-0585-S

From the review it was determined that the previously identified valves had been removed and replaced. Item 3: Install New Throttle Valves, has been completed.

Item 2: Containment Loose Debris Walkdown has not been completed and will be reviewed during a future inspection.

Additional items reviewed during this inspection included:

- TVA's GSI 191 response;
- TVA's response to GL 04-02, along with supplements;
- the NRC's Letter to TVA for the closeout of GL 2004-02 (ML14163A658);
- calibration records for two of the Sump Level Indicators;
- coating walkdown procedures and the summary report;
- sump strainer debris blockage head loss test report;
- containment walkdown procedure for latent debris evaluation; and
- PWR Owner's Group Report for the Evaluation of Downstream Sump Debris Effects

It was identified in NRC Inspection Report 05000391/2015604 that inspectors would review calibration records for the radiation monitors in the proximity of the sump. It should be noted that these monitors were reviewed under TMI Action Item II.F.1, Containment High Range Radiation Monitors (Section OA.1.3), and were not covered by this inspection.

Documents reviewed are listed in the Attachment.

b. Observations and Findings

No findings were identified.

c. Conclusions

Based on inspection activities, the inspectors concluded that two of the three actions identified in the NRC closeout letter dated September 18, 2014 have been completed. This item will remain open pending review of Item 2: Containment Loose Debris Walkdown, review of additional coatings information, and a final walkdown of the sump once ongoing work within the containment sump has been completed.

V. MANAGEMENT MEETINGS

X1 Exit Meeting Summary

An exit meeting was conducted on October 20, 2015, to present inspection results to Ms. Cooper and other members of your 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

M. Cooper, TVA – Unit 2 Project Director
L. Crye, TVA – Maintenance
P. Harless, TVA – Startup
F. Koontz, TVA - Engineering
J. Newton, TVA – Startup
R. Poole, TVA – Maintenance
J. Proffitt, TVA – Licensing
M. Runion, TVA - Startup
M. Skaggs, TVA – Senior Vice President
G. Scott, TVA - Licensing
C. Six, TVA - Engineering
N. Stranglewicz, Bechtel - Field Engineer
D. Wade, TVA - Startup
T. Washburn, TVA – Startup

INSPECTION PROCEDURES USED

IP 35007	Quality Assurance Program Implementation During Construction and Pre-Construction Activities
IP 50071	Safety-Related Components – Procedure Review
IP 70304	Engineered Safety Features Test - Preoperational Test Procedure Review
IP 70306	Loss of Offsite Power Test - Preoperational Test Procedure Review
IP 70315	Engineered Safety Features Test Preoperational Test Witnessing
IP 70434	Engineered Safety Features Act. Sys. Test - Preoperational Test Witnessing
IP 92701	Followup
TI 2515/166	Pressurized Water Reactor Containment Sump Blockage (NRC Generic Letter 2004-02)

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened and Closed

None

Closed

II.F.1.1	TMI Action Item	Accident Monitoring System – Procedures (Section OA.1.1)
II.F.1	TMI Action Item	Noble Gas Effluent Monitors (Section OA.1.2)
II.F.1	TMI Action Item	Containment High Range Radiation Monitors (Section OA.1.3)

Discussed

II.D.1	TMI Action Item	Relief and Safety Valve Test Requirements (Section OA.1.4)
2004-02	GL	Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors (Section OA.1.5)
2515/166	TI	Pressurized Water Reactor Containment Sump Blockage (Section OA.1.5)

LIST OF DOCUMENTS REVIEWED

II. MANAGEMENT OVERSIGHT AND CONTROLS

P.1.2 Engineered Safety Features Test Witnessing

Procedures

2-SI-99-300-A, Rev. 01, Engineered Safety Features Actuation System Slave Relay Go Test
Train A

2-SI-99-301-A, Rev. 01 Engineered Safety Features Actuation System Slave Relay Block Test
Train A

2-SI-99-301-B, Rev. 01, Engineered Safety Features Actuation System Slave Relay Block Test
Train B

Work Orders

110807203, 2TS1027, Westinghouse SSPS Train A Output Slave Relay Tests

1108073162, TS1028, Westinghouse SSPS Train B Output Slave Relay Tests

Other

Westinghouse Report 25402-011-V1A-MG00-02644-002, "SSPS train A Output Slave Relay Tests." Dated 12/10/2010

2-54114-8756D77, sheets 1-12, Rev 0, Westinghouse Electric Corporation for Tennessee Valley Authority Watts Bar Nuclear Plant 1&2 Safeguards Test Cabinet

IV. OTHER ACTIVITIES

OA 1.1 (Closed) Three Mile Island Action Item II.F.1.1, Accident Monitoring System – Procedures

Procedures

2-E-0, Reactor Trip or Safety Injection, Rev. 0

2-E-1, Loss of Reactor or Secondary Coolant, Rev. 0

2-E-2, Faulted Steam Generator Isolation, Rev. 0

2-E-3, Steam Generator Tube Rupture, Rev. 0

2-ES-0.1, Reactor Trip Response, Rev. 0

2-ECA-0.0, Loss of Shutdown Power, Rev. 0

2-ECA-0.2, Recovery from Loss of Shutdown Power with SI Required, Rev. 0

2-ECA-1.1, Loss of RHR Sump Recirculation, Rev. 0

2-ECA-2.1, Uncontrolled Depressurization of all Steam Generators, Rev. 0

2-ECA-3.1, SGTR and LOCA – Subcooled Recovery, Rev. 0

2-ECA-3.2, SGTR and LOCA – Saturated Recovery, Rev. 0

2-ECA-3.3, SGTR without PZR Pressure Control, Rev. 0

2-ES-0.1, Reactor Trip Response, Rev. 0

2-ES-0.2, Natural Circulation Cooldown, Rev. 0

2-ES-0.3, Natural Circulation Cooldown with Steam Void in Vessel (with RVLIS) , Rev. 0

2-ES-0.4, Natural Circulation Cooldown with Steam Void in Vessel (without RVLIS) , Rev. 0

2-ES-1.1, SI Termination, Rev. 0

2-ES-1.2, Post LOCA Cooldown and Depressurization, Rev. 0

2-ES-1.3, Transfer to RHR Containment Sump, Rev. 0

2-ES-1.4, Transfer to Hot Leg Recirculation, Rev. 0

2-ES-3.1, Post-SGTR Cooldown Using Backfill, Rev. 0

2-ES-3.2, Post-SGTR Cooldown Using Blowdown, Rev. 0

2-ES-3.3, Post-SGTR Cooldown Using Steam Dump, Rev. 0

2-FR-H.3, Steam Generator High Level, Rev. 0
 2-ARI-102-108, HVAC & CVCS, Rev. 005U2
 2-ARI-188-194, U-2 Radiation Detectors, Rev. 8
 2-ARI-265-268, Post Accident Radiation, Rev. 001U2
 ARI 180-187, Common Radiation Detectors, Rev. 0034
 2-AOI-33, Steam Generator Tube Leak, Rev. 000U2
 2-AOI-6, Small Reactor Coolant System Leak, Rev. 000U2
 0-SOI-90.02, Gaseous Process Radiation Monitors, Rev. 3
 0-SOI-90.05, Post-Accident Radiation Monitors, Rev. 0
 2-SOI-43.01, Containment Hydrogen Analyzer, Rev. 0
 CM-13.0, Post-Accident Sampling and Analysis Chapter Administration, Rev. 0016
 2-CM-13.12, Obtaining Post Accident Shield Building Vent Iodine and Particulate Sample, Rev. 0001
 0-CM-13.13, Transport of Post-Accident Samples, Rev. 0
 2-CM-9.7.400, U2 Shield Building Exhaust Effluent Monitor Grab Sampling and Filter Replacement, Rev. 0007
 2-FR-0, Status Trees, Rev. 0
 2-FR-C.1, Inadequate Core Cooling, Rev. 0
 2-FR-C.2, Degraded Core Cooling, Rev. 0
 2-FR-C.3, Saturated Core Cooling, Rev. 0
 2-FR-H.1, Loss of Secondary Heat Sink, Rev. 0
 2-FR-I.3, Voids in Reactor Vessel, Rev. 0
 2-FR-Z.1, High Containment Pressure, Rev. 0
 2-FR-Z.2, Containment Flooding, Rev. 0
 2-FR-Z.3, High Containment Radiation, Rev. 0

OA.1.2 Three Mile Island Action Item II.F.1, Noble Gas Effluent Monitors

Miscellaneous

Calibration Data Sheets from 2-ODI-90-53, Rev. 1, "18 Month Channel Calibration (Source Cal) of Condenser Vacuum Exhaust Noble Gas Radiation Monitor 2-LPR-90-119," dated 9/26/2015
 Calibration Data Sheets from IMI-90.255, Rev. 1, "18 Month Channel Calibration Condenser Vacuum Pump Exhaust Mid-Range Post Accident Radiation Monitor 2-LPR-90-255," dated 9/10/2015
 Calibration Data Sheets from 2-IMI-90.256, Rev. 2, "18 Month Channel Calibration Condenser Vacuum Pump Exhaust High Range Post Accident Radiation Monitor 2-LPR-90-256," dated 9/12/2015
 Calibration Data Sheets from 2-IMI-90.098, Rev. 0, "18 Month Channel Calibration of Steam Line Radiation Monitor Loop 2-LPR-90-421," dated 9/28/2015
 Calibration Data Sheets from 2-IMI-90.100, Rev. 0, "18 Month Channel Calibration of Steam Line Radiation Monitor 2-LPR-90-423," dated 10/3/2015
 Calibration Data Sheets from 2-IMI-90.101, Rev. 0, "18 Month Channel Calibration of Steam Line Radiation Monitor Loop 2-LPR-90-424," dated 10/2/2015
 Test Data Sheets from 2-PTI-090-04, Rev. 0, CN-01, "2-RE-90-119, 255, 256 Condenser Vacuum Exhaust Low, Mid and High Range Radiation Monitors," dated 10/9/2015
 Test Data Sheets from 2-PTI-090-07, Rev. 0, CN-02, "2-RE-90-421B, 422B, 423B, and 423B Main Steam Line Radiation Monitors," dated 10/13/2015
 TDN 15-1921, As Left Data Out of Tolerance for PTI of Main Steam Line Radiation Monitor 90-424, dated 10/12/2015
 TDN 15-1878, Signal Tolerances Not Met for Circuit Components of Condenser Vacuum Exhaust Radiation Monitor 90-119, dated 10/9/2015
 TDN 15-1928, (NRC Identified) Computer Point for Condenser Vacuum Exhaust Radiation Monitor 90-119 Found Out of Tolerance, dated 10/14/2015

TDN 15-1929, (NRC Identified) Incorrect Value Specified for Discriminator Setpoint on Condenser Vacuum Exhaust Radiation Monitor 90-255, dated 10/14/2015

OA.1.3 Three Mile Island Action Item II.F.1, Containment High Range Radiation Monitors

Miscellaneous

Calibration Data Sheets from 2-SI-90-1, Rev. 1, "18 Month Channel Calibration Upper Containment High Range Post Accident Area Radiation Monitor 2-LPR-90-271-A," dated 9/28/2015

Calibration Data Sheets from 2-SI-90-2, Rev. 1, "18 Month Channel Calibration Upper Containment High Range Post Accident Area Radiation Monitor 2-LPR-90-272-A," dated 9/28/2015

Calibration Data Sheets from 2-SI-90-2, Rev. 1, "18 Month Channel Calibration Lower Containment High Range Post Accident Area Radiation Monitor 2-LPR-90-273-A," dated 9/26/2015

Calibration Data Sheets from 2-SI-90-4, Rev. 1, "18 Month Channel Calibration Lower Containment High Range Post Accident Area Radiation Monitor 2-LPR-90-274-A," dated 9/26/2015

Test Data Sheets from 2-PTI-090-01, Rev. 1, CN-03, "Low and High Range Area Radiation Monitors", dated 10/11/2015

OA.1.4 Three Mile Island Action Item II.D.1, Relief and Safety Valve Test Requirements

Calculations

- WBNAP2035, "Fluid Transient Analysis of the PZR Safety and Relief Valve Piping due to the Actuation of Safety and Relief Valves," Revision 9 dated 06/16/2015

Procedures

- 2-SI-68-904-A, "Reactor Coolant System Valve Position Indication Verification (Train A)", Revision 002 dated 12/11/2014
- 2-SI-68-904-B, "Reactor Coolant System Valve Position Indication Verification (Train B)", Revision 002 dated 12/11/2014
- 2-SI-68-92, "18 Month Channel Calibration of PORV 2-PCV-68-340A Cold Overpressure Mitigation System Actuation Channel," Revision 005 dated 09/22/2015
- 2-SI-68-92, "18 Month Channel Calibration of PORV 2-PCV-68-334A Cold Overpressure Mitigation System Actuation Channel," Revision 004 dated 09/22/2015

Miscellaneous

- Curtiss-Wright Report 9390, "PORV Flow Data Analysis Model 82UU-001-12BB," dated 08/26/2014
- Curtiss-Wright Report 9766, "Test Procedure for Tennessee Valley Authority Power Operated Relief Valve Target Rock Valve Model 82UU-001-12BB," dated 10/02/2015
- Test Report Summary for PTI-068-15 "Pressurizer and Level Control," Revision 0 including Supplement 1
- TVA Letter CNL-15-137, "Watts Bar Nuclear Plant (WBN) Unit 2- Status of Regulatory Framework for the Completion of Construction and Licensing for Unit 2- Revision 13 (TAC No. MD6311), and Status of Generic Communications for Unit 2- Revision 13 (TAC No. MD8314)," dated July 27, 2015

OA 1.5 Generic Letter 2004-02 - Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors and Pressurized Water Reactor Containment Sump Blockage

Project Correspondence

TVA Correspondence to the NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 - Response to Generic Letter (GL) 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," March 4, 2011

TVA Correspondence to the NRC, "TVA 2004-02 Response to the NRC Watts Bar Nuclear Plant (WBN) Unit 2 – Response to Requests for Additional Information (RAIs) Regarding Generic Letter 2004-02, Potential Impact of Debris Blockage of Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (TAC No. MD6726)," April 29, 2011

TVA Correspondence to the NRC, "Watts Bar Nuclear Plant (WBN) Unit 2 – Additional Information Regarding Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (TAC No. MD6726)," September 16, 2013

NRC Correspondence to the TVA, Watts Bar Nuclear Station, Unit 2, Closeout of Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (TAC No. MD5560)," September 18, 2014

Engineering Reports

TVA Watts Bar Unit 2 Coatings Installation Summary report, "Watts Bar Unit 2 Coatings Service Level I Installation Summary Report," September 29, 2015

WCAP-16406-P-A, "Evaluation of Downstream Sump Debris Effects in Support of GSI-191," Rev. 1, March 2008

ALION-CAL-TVA-2739-03, "ALION – Watts Bar Reactor Building GSI-101 Debris Generation Calculation," Rev. 07

"Emergency Core Cooling System Sump Strainer Debris Blockage Test Report, Watts Bar Unit 1," Document No. 66-9144025, Rev. 0

Work Orders

WO#111344923, Component Test Data Record, Instrument Calibration Containment Sump Level, WBN-2-LPL-0181-E, 6/27/2015

WO#111344950, Component Test Data Record, Instrument Calibration Containment Sump Level, WBN-2-LPL-0183-G, 12/5/2014

WO#111083539, Containment Sump Strainer, CCM EDCR2 53580 SYS 063 2-STN-063-0200

WO#111606951, Containment Sump Strainer, CCM PER 311396 EDCR2 53580 SYS 063 2-STN-063-0200

WO#111627598, Containment Sump Strainer, CCM EDCR2 53580 Work Scope 2 SYS 063 2-STN-063-0200

WO#110959224, SIS L2 HL INJ Valve, CCM EDCR 54783 53580 PERS 143891 145173 250870 253186 562286 635007 739594 747957 SYS 63

WO#110959229, SIS L1 HL INJ VLV, CCM EDCR 54783 PER 145173 143872 143891 232065 262184 411275 680198 722497 SYS 063 2-THV-63-542-A

WO#112944059, Boron INJ Valve CL L3, CCM EDCR 54783 SYS 063 PER 145173 WBN-2-THV-063-0584-S

WO#113518405, Boron INJ Valve CL L4, CCM EDCR 54783 SYS 063 WBN-2-THV-063-0585-S ASME Section III

Engineering Design Change Request

EDCR 53580, Administrative EDCR for System 063, 6/14/2010

EDCR 54783, Install the Westinghouse redesigned ECCS throttle valves for the Safety Injection System (System 063), 4/30/2010

Procedures, Standards and Specifications

Engineering Department Procedure Instruction Engineering Evaluation for Commodity Refurbishment, 25402-3DP-G04G-G0090, Rev. 9, 6/30/2013

TVA/WBN-CWD-Proc-02, "Containment Walkdown Procedure for Containment Latent Debris
Evaluation at TVA Watts Bar Nuclear Plant – Unit 2," Rev 0

LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
ATWS	Anticipated Transient Without SCRAM
ASME	American Society of Mechanical Engineers
COMS	Cold Overpressure Mitigation System
CR	Condition Report
CSS	Containment Spray System
ECCS	Emergency Core Cooling System
EDCR	Engineering Document Construction Releases
GL	Generic Letter
HFT	Hot Functional Test
IIR	Integrated Inspection Report
IMC	Inspection Manual Chapter (NRC)
NRC	Nuclear Regulatory Commission
PST/IST	Pre-Service Test/ In-Service Test
PTI	Preoperational Test Instruction
PORV	Power Operated Relief Valve
PWR	Pressurized Water Reactor
QA	Quality Assurance
Rev.	Revision
TMI	Three Mile Island
TVA	Tennessee Valley Authority
U2	Unit 2
WBN	Watts Bar Nuclear Plant
WO	Work Order
ft ²	Square Feet