



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8931

July 29, 2005

Tennessee Valley Authority  
ATTN: Mr. K. W. Singer  
Chief Nuclear Officer and  
Executive Vice President  
6A Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NRC INTEGRATED INSPECTION REPORT 05000390/2005003  
AND 05000391/2005003

Dear Mr. Singer:

On June 30, 2005, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Watts Bar Nuclear Plant, Units 1 and 2. The enclosed integrated inspection report documents the inspection results which were discussed on July 8, 2005, with Mr. G. Laughlin and other members of your staff.

This report documents one NRC-identified finding concerning inadequate procedures for restoring containment availability following a loss of shutdown cooling. This finding has potential significance of greater than very low safety significance. The finding does not present an immediate safety concern because the temporary seals installed by the procedures were removed and containment integrity was restored at the end of the refueling outage. In addition, a licensee-identified non-cited violation (NCV) which was determined to be of very low safety significance is listed in this report. If you contest this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Watts Bar facility.

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Sincerely,

*/RA/*

Stephen J. Cahill, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Docket Nos. 50-390, 50-391  
License No. NPF-90 and Construction  
Permit No. CPPR-92

Enclosure: NRC Inspection Report 05000390/2005003, 05000391/2005003  
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-390, 50-391

License Nos: NPF-90 and Construction Permit CPPR-92

Report Nos: 05000390/2005003, 05000391/2005003

Licensee: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Units 1 and 2

Location: 1260 Nuclear Plant Road  
Spring City TN 37381

Dates: April 1 - June 30, 2005

Inspectors: J. Bartley, Senior Resident Inspector  
J. Reece, Resident Inspector  
M. Pribish, Resident Inspector  
R. Carrion, Project Engineer  
K. VanDoorn, Senior Reactor Inspector (Sections 1R02, 1R17)  
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D. Jones, Resident Inspector, Robinson(Sections 1R02, 1R17)

Approved by: Stephen J. Cahill, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000390/2005003, 05000391/2005003, 04/01/2005 - 06/30/2005, Watts Bar, Units 1 & 2; Event Followup

The report covered a three-month period of routine inspection by resident inspectors and an announced inspection by regional reactor inspectors. One apparent violation with potential safety significance greater than Green was identified. The significance of most findings is indicated by the color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, Significance Determination Process (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 3, dated July 2000.

### A. NRC-Identified Findings and Self-Revealing Findings

#### **Cornerstone: Barrier Integrity**

- TBD. The inspectors identified an apparent violation of Technical Specification 5.7.1.1, having a potential safety significance greater than very low safety significance. The licensee's procedure for containment closure during loss of shutdown cooling events could have resulted in not being able to restore containment availability due to the use of a seal which was not rated for containment pressure.

This finding is an apparent violation pending completion of a significance determination. The finding is more than minor because it affected the configuration control attribute of the Barrier Integrity Cornerstone for the reactor containment. The cause of this finding impacts the human performance cross-cutting area. (Section 4OA3)

### B. Licensee-Identified Violations

A violation of very low safety significance, which was identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective actions are listed in Section 4OA7 of this report.

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## Report Details

### Summary of Plant Status

Unit 1 started the inspection period performing low power physics testing following the cycle 6 refueling outage. The unit reached full power on April 4, 2005, and operated at or near 100 percent power for the remainder of the inspection period. Unit 2 remained in a suspended construction status.

## **1. REACTOR SAFETY**

### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

#### 1R02 Evaluations of Changes, Tests, or Experiments

##### a. Inspection Scope

The inspectors reviewed six selected samples of evaluations to confirm that the licensee had appropriately considered the conditions under which changes to the facility, Updated Final Safety Analysis Report (UFSAR), or procedures may be made, and tests conducted, without prior NRC approval. The inspectors reviewed evaluations for six changes and additional information, such as calculations, supporting analyses, the UFSAR, and drawings, to confirm that the licensee had appropriately concluded that the changes could be accomplished without obtaining a license amendment. The six evaluations reviewed are listed in the Attachment.

The inspectors also reviewed 16 samples of changes for which the licensee had determined that evaluations were not required to confirm that the licensee's conclusions to screen out these changes were correct and consistent with 10 CFR 50.59. The 16 screened out changes reviewed are listed in the Attachment.

The inspector also reviewed problem evaluation reports (PERs) to confirm that problems were identified at an appropriate threshold, were entered into the corrective action process, and appropriate corrective actions had been initiated. The documents reviewed are listed in the Attachment.

##### b. Findings

No findings of significance were identified.

#### 1R04 Equipment Alignment

##### a. Inspection Scope

Partial System Walkdown: The inspectors conducted three equipment alignment partial walkdowns to evaluate the operability of selected redundant trains or backup systems, listed below, with the other train or system inoperable or out of service. The inspectors reviewed the functional system descriptions, UFSAR, system operating procedures, and

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Technical Specifications (TS) to determine correct system lineups for the current plant conditions. In addition, the inspectors reviewed associated corrective action documents. The inspectors performed walkdowns of the systems to verify that critical components were properly aligned and to identify any discrepancies which could affect operability of the redundant train or backup system.

- “A” Train emergency gas treatment system (EGTS) with “B” Train EGTS out of service for maintenance
- 1B-B diesel generator (DG) during the 1A-A DG 72-hour component outage
- 1B-B safety injection pump (SIP) and 1B-B centrifugal charging pump (CCP) during 1A-A SIP emergent work

Complete System Walkdown: The inspectors performed a complete system walkdown of the residual heat removal (RHR) system to verify proper equipment alignment and identify any discrepancies that could impact the function of the system and increase risk. The inspectors reviewed the UFSAR, system procedures, system drawings, and system design documents to determine the correct lineup and then examined system components and their configuration to identify any discrepancies between the existing lineup and the correct lineup. The inspectors reviewed the licensee’s corrective action system documents, work orders (WOs), and the respective engineering system health report cards to determine whether issues related to the systems were being appropriately addressed. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors conducted tours of nine areas important to reactor safety, listed below, to verify the licensee’s implementation of fire protection requirements as described in the Fire Protection Program; Standard Programs and Processes (SPP)-10.0, Control of Fire Protection Impairments; SPP-10.10, Control of Transient Combustibles; and SPP-10.11, Control of Ignition Sources (Hot Work). The inspectors evaluated, as appropriate, conditions related to: (1) licensee control of transient combustibles and ignition sources; (2) the material condition, operational status, and operational lineup of fire protection systems, equipment, and features; and (3) the fire barriers used to prevent fire damage or fire propagation.

- Turbine-driven auxiliary feedwater (AFW) pump room
- 1A-A and 1B-B RHR pump rooms
- 1A-A and 1B-B containment spray pump rooms
- 1A-A and 1B-B CCP rooms
- 1A-A and 1B-B SIP rooms



b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

a. Inspection Scope

The inspectors reviewed internal flood protection barriers associated with a refueling water storage tank (RWST) or essential raw cooling water (ERCW) pipe break in the auxiliary building to verify that the flood protection barriers and equipment were being maintained consistent with the UFSAR. The licensee's corrective action documents and open WOs were reviewed to verify that flood-related items in the auxiliary building were being corrected. The inspectors walked down the auxiliary building 676' elevation, which contains risk-important equipment located below design flood levels, to evaluate the adequacy of flood barriers, doors, floor drains, sump level switches, and sump pumps to protect the equipment, as well as their overall material condition. Additional documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

On May 27, 2005, the inspectors observed operators in the plant's simulator during licensed operator annual requalification examinations to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with procedures TRN-1, Administering Training, and TRN-11.4, Continuing Training for Licensed Personnel. In addition, the inspectors verified that the training program included risk-significant operator actions, emergency plan implementation, and lessons learned from previous plant experiences. The inspectors observed a shift crew's response to Scenario 3-OT-SRT0140, Inadvertent SI. The session was a re-examination following an unsatisfactory as-found evaluation performed on May 24, 2005. The inspectors reviewed the adequacy of the crew's remedial training to ensure that it addressed weaknesses identified during the training session on May 24, 2005.

b. Findings

No findings of significance were identified.

## 1R12 Maintenance Effectiveness

### a. Inspection Scope

The inspectors reviewed the two performance-based problems listed below. The focus of the reviews was to assess the effectiveness of maintenance efforts that apply to scoped structures, systems, or components (SSCs) and to verify that the licensee was following the requirements of Technical Instruction (TI)-119, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting 10 CFR 50.65, and SPP-6.6, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting 10 CFR 50.65. Reviews focused, as appropriate, on: (1) appropriate work practices; (2) identification and resolution of common cause failures; (3) scoping in accordance with 10 CFR 50.65; (4) characterization of reliability issues; (5) charging unavailability time; (6) trending key parameters; (7) 10 CFR 50.65 (a) (1) or (a) (2) classification and re-classification; and (8) the appropriateness of performance criteria for SSCs classified as (a)(2) or goals and corrective actions for SSCs classified as (a)(1). Additional documents reviewed are listed in the Attachment.

- PER 81119, 2A 480V Boardroom chiller found not running with no refrigerant charge
- PER 72673, During 1A-A CCP PMT, the room cooler breaker tripped

### b. Findings

No findings of significance were identified.

## 1R13 Maintenance Risk Assessments and Emergent Work Evaluation

### a. Inspection Scope

The inspectors evaluated, as appropriate for the five work activities listed below: (1) the effectiveness of the risk assessments performed before maintenance activities were conducted; (2) the management of risk; (3) that, upon identification of an unforeseen situation, necessary steps were taken to plan and control the resulting emergent work activities; and (4) that maintenance risk assessments and emergent work problems were adequately identified and resolved. The inspectors verified that the licensee was complying with the requirements of 10 CFR 50.65 (a)(4); SPP-7.0, Work Control and Outage Management; SPP-7.1, Work Control Process; and TI-124, Equipment to Plant Risk Matrix. Additional documents reviewed are listed in the Attachment.

- Emergent work to verify 1B-B and 2B-B DG batteries during "A" Train workweek
- 1A-A DG component outage and ground on vital battery board II
- Emergent work on 1A-A SIP to replace casing vent
- Emergent work on turbine-driven AFW pump with 2A-A DG out of service for planned maintenance
- Maintenance risk for 1B-B motor-driven AFW pump outage and 31-day functional test of SSPS Train B and Reactor Trip Breaker B

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b. Findings

No findings of significance were identified.

1R15 Operability Evaluationsa. Inspection Scope

The inspectors reviewed five operability evaluations affecting risk-significant mitigating systems, listed below, to assess, as appropriate: (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether other existing degraded conditions were considered as compensating measures; (4) whether the compensatory measures, if involved, were in place, would work as intended, and were appropriately controlled; and (5) where continued operability was considered unjustified, the impact on TS Limiting Conditions for Operation (LCOs) and the risk significance in accordance with the Significance Determination Process (SDP). The inspectors verified that the operability evaluations were performed in accordance with SPP-3.1, Corrective Action Program. Additional documents reviewed are listed in the Attachment.

- PER 80873, C-A ERCW pump failed acceptance criteria during surveillance test; surveillance acceptance criteria revised.
- PER 80960, Oil leak on TDAFW pump inboard bearing
- PER 82215, 1A-A DG battery voltage low on cells 13 and 52
- PER 81935, RHR discharge headers pressure increasing at approximately 20 psig/hour necessitating frequent venting
- PER 82775, High moisture content in TDAFW pump turbine oil system

b. Findings

No findings of significance were identified.

1R16 Operator Workaroundsa. Inspection ScopeReview of Risk Significant Operator Workaround

The inspectors reviewed operator workaround 05-02-003 for RHR discharge pressure rising due to in-leakage and required frequent venting. The inspectors verified that the functional capability of the RHR system was not affected and that the condition would not increase the probability of human error while operating the system. In addition, the inspectors verified that the condition would not affect the operators' ability to implement abnormal or emergency operating procedures.

### Review of Cumulative Effects

The inspectors reviewed the cumulative effects of operator workarounds to assess: (1) the effect on the reliability, availability, and potential for mis-operation of a system; (2) the potential for increasing an initiating event frequency or affecting multiple mitigating systems; and (3) the cumulative effects on the ability of the operators to respond in a correct and timely manner to plant transients and accidents. The inspectors reviewed the current operator workarounds, listed below, as defined by Operations Department Procedure (OPDP)-1, Conduct of Operations, and interviewed operators to determine if there were other conditions which would require actions to compensate for equipment problems or deficiencies.

- 05-02-001, Primary water storage tank dissolved oxygen is above limit and requires frequent draining and refilling
- 05-02-002, #2 reactor coolant pump standpipe requires frequent refilling
- 05-02-003, RHR discharge pressure increases due to in-leakage and requires frequent venting

#### b. Findings

No findings of significance were identified.

### 1R17 Permanent Plant Modifications

#### a. Inspection Scope

The inspectors evaluated design change packages for ten modifications in the Initiating Events, Mitigating Systems, and Barrier Integrity cornerstone areas to evaluate the modifications for adverse effects on system availability, reliability, and functional capability. The modifications and the associated attributes reviewed are as follows:

51522, Add New High Point Vents to Chemical and Volume Control (CVCS), SI, and RHR Systems (Mitigating Systems)

- Seismic Evaluation
- Materials/Replacement Components (material compatibility, traceability, certification)
- Plant Document Updating (drawings, UFSAR, TS Basis, procedures)
- Post-Installation Testing
- Installation Records (welding, nondestructive examinations, cleanliness)

51390, Add ERCW Clean-Out Connections for the 1A-A and 1B-B Containment Spray Heat Exchangers (Mitigating Systems)

- Seismic and Vibration Evaluation
- Materials/Replacement Components (material compatibility, traceability, certification)

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- Plant Document Updating (drawings, UFSAR)
- Post-Installation Testing
- Installation Records (welding, nondestructive examination, cleanliness)

51683, Add Hatch Openings in Containment Shield Building Dome (Barrier Integrity)

- Seismic Evaluation
- Materials/Replacement Components (environmental)
- Structural Requirements (barrier)
- Post-Modification Testing

51815, Change Valve Setup for AFW Air-Operated Valve (AOV) Level Control Valves (Mitigating Systems)

- Energy Needs
- Timing (valve closure)
- Control Signal

51256, Replace Breaker for DG Lube Oil Circulation Pump (Mitigating Systems)

- Control Signal
- Timing

50189-A, Tobar Transmitters PT-30-310 and 311 Replacement (Mitigating Systems)

- Materials/Replacement Components (functional properties, environmental)
- Failure Modes
- Post-Modification Testing
- Plant Document Updating (drawings, operating procedures)

51274-A, Modify the Main Steam Isolation Valve (MSIV) Internals to Reduce the Internal Wear Caused by Vibration (Mitigating Systems, Initiating Events)

- Materials/Replacement Components (functional properties, material compatibility)
- Pressure Boundary
- Failure Modes
- Post-Modification Testing
- Plant Document Updating (drawings)

51465, Replace 8 Obsolete Agastat DG Sequence Timers (Mitigating Systems)

- Materials/Replacement Components (functional properties, material compatibility)
- Failure Modes
- Energy Needs
- Post-Modification Testing

- Plant Document Updating (drawings)

51540-A, Replace Oversized 350VA Control Power Transformers to Prevent Valve Motor Tripping (Mitigating Systems)

- Materials/Replacement Components (functional properties, material compatibility)
- Failure Modes
- Energy Needs
- Post-Modification Testing
- Plant Document Updating (drawings)

51393-A, Revise Minimum Stroke Time for Control Room Ventilation Damper (Mitigating Systems)

- Failure Modes
- Post-Modification Testing
- Control Signals
- Flowpaths
- Ventilation Boundary
- Plant Document Updating (drawings, operating procedures)

For selected modification packages, the inspectors observed the as-built configuration. Documents reviewed included procedures, engineering calculations, modification design and implementation packages, work orders, site drawings, corrective action documents, applicable sections of the living UFSAR, supporting analyses, TS, and design basis information.

The inspectors also reviewed selected PERs associated with modifications to confirm that problems were identified at an appropriate threshold, were entered into the corrective action process, and appropriate corrective actions had been initiated. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

The inspectors reviewed six post-maintenance test (PMT) procedures and/or test activities, as appropriate, for selected risk-significant mitigating systems to assess whether: (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation

had current calibrations, range, and accuracy consistent with the application; (5) tests were performed as written with applicable prerequisites satisfied; (6) jumpers installed or leads lifted were properly controlled; (7) test equipment was removed following testing; and (8) equipment was returned to the status required to perform its safety function. The inspectors verified that these activities were performed in accordance with SPP-8.0, Testing Programs; SPP-6.3, Pre-/Post-Maintenance Testing; and SPP-7.1, Work Control Process. Additional documents reviewed are listed in the Attachment.

- 05-814254-000, Repair no-flow indication on 1-FI-3-155A with AFW pumps in service
- 03-008374-000, Replace Barksdale pressure switches on 1A-A DG air start system
- 04-010574-000, Perform time delay calibration of 34V and 120V DC coil TDPU and TDDO Agastat relay
- 05-814969-000, Replace 1A-A SIP vent valve
- 05-816911-000, Repair steam leaks on TDAFW pump
- 05-817048-000, Troubleshoot/repair 1B-B DG exhaust fan start circuit

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities

a. Inspection Scope

The inspectors observed low power physics testing following completion of the Unit 1 Cycle 6 (U1C6) refueling outage. Other inspection activities associated with the U1C6 outage were documented in Inspection Report 05000390/2005002, 05000391/2005002. The inspectors verified that the testing was accomplished in accordance with Power Escalation Test (PET)-201, Initial Criticality and Low Power Physics Testing, and that the results were within the TS-required values.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors witnessed three surveillance tests and/or reviewed test data of selected risk-significant SSCs, listed below, to assess, as appropriate, whether the SSCs met the requirements of the TS; the UFSAR; SPP-8.0, Testing Programs; SPP-8.2, Surveillance Test Program; and SPP-9.1, ASME Section XI. The inspectors also determined whether the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions.

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- WO 04-824331-000, Perform 1-SI-3-901-A, MDAFW pump 1A-A quarterly performance test
- WO 04-826119-000, Perform 1-SI-68-39, 18-month reactor coolant pump 4 underfrequency relay calibration
- WO 04-816107-000, Perform 1-SI-82-14, 24-hour load run - DG 1B-B

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed Temporary Alteration 1-05-001-304, Install video cables through electrical penetration from auxiliary building to Unit 1 annulus. The inspectors verified that the temporary alteration was performed in accordance with SPP-9.5, Temporary Alterations, and SPP-9.4, 10 CFR 50.59 Evaluation of Changes, Test, and Experiments, and verified that the modification did not affect system operability or availability as described by the TS and UFSAR. In addition, the inspectors verified that the installation of the temporary modification was in accordance with the work package, that adequate configuration control was in place, procedures and drawings were updated, and post-installation tests verified operability of the affected systems.

b. Findings

No findings of significance were identified.

**Cornerstone: Emergency Preparedness**

1EP6 Drill Evaluation

a. Inspection Scope

On June 2, 2005, the inspectors observed a licensee-evaluated emergency preparedness drill to verify that the emergency response organization was properly classifying the event in accordance with Emergency Plan Implementing Procedure (EPIP)-1, Emergency Plan Classification Flowchart, and making accurate and timely notifications and protective action recommendations in accordance with EPIP-2, Notification of Unusual Event; EPIP-3, Alert; EPIP-4, Site Area Emergency; EPIP-5, General Emergency; and the Radiological Emergency Plan. In addition, the inspectors reviewed the WBN 2005 Blue Team Training Drill Report, dated June 29, 2005, to verify that licensee evaluators were identifying deficiencies and properly dispositioning performance against the performance indicator criteria in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline.



b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA2 Identification & Resolution of Problems

.1 Daily Reviews

As required by Inspection Procedure 71152, Identification and Resolution of Problems, and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's corrective action program (CAP). This review was accomplished by reviewing daily PER summary reports and attending daily PER review meetings.

.2 Semi-Annual Review to Identify Trends

a. Inspection Scope

As required by Inspection Procedure 71152, the inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repeat and corrective maintenance issues but also considered the results of daily inspector CAP item screening discussed in Section 4OA2.1. The review also included issues documented outside the normal CAP in system health reports, corrective maintenance WOs, component status reports, site monthly meeting reports, and maintenance rule assessments. The inspectors' review nominally considered the six-month period of January through June 2005, although some examples expanded beyond those dates when the scope of the trend warranted. The inspectors reviewed the licensee's most recent integrated review (trend review) which was for the period July 2004 through December 2004. The inspectors compared and contrasted their results with the results contained in the licensee's latest integrated quarterly assessment report. Corrective actions associated with a sample of the issues identified in the licensee's trend report were reviewed for adequacy. The inspectors also evaluated the trend report against the requirements of the licensee's CAP as specified in SPP-3.1, Corrective Action Program, and 10 CFR 50, Appendix B.

b. Assessment and Observations

No findings of significance were identified. The licensee's trending methodology, scope, and implementation were, in general, broad-based and thorough. The licensee site support organization monitored for trends on a monthly and semi-annual basis using PER reports sorted on standardized cause codes, systems, organizations, and key words. Site support also reviewed each PER generated during the six-month period to identify potential trends that may not be identified using the reports. Potentially negative trends were brought to the attention of the responsible organization and site

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management. The Management Review Committee (MRC), which is responsible for reviewing all PERs, developed a lower threshold during this semiannual period for identifying and directing actions for emerging trends. Several trends this period were identified by the MRC prior to the trending program. The engineering organization trended repetitive equipment issues under the maintenance rule program. Equipment issue trends were monitored by trending component/system failures and unavailability time. The inspectors compared the licensee process results with the results of the inspectors' daily screening and did not identify any discrepancies or potential trends in the CAP data that the licensee had failed to identify.

#### 4OA3 Event Followup

(Closed) Unresolved Item (URI) 05000390/2005002-04: Inadequate Procedures for Containment Closure

Introduction: The inspectors identified a finding for inadequate procedures for restoring containment availability following a loss of shutdown cooling. The inadequate procedures incorrectly stated emergency closure was not required for Penetration X-117 and allowed up to four hours to restore other temporary containment penetrations following a loss of shutdown cooling. This finding has a potential safety significance of greater than very low significance and is an apparent violation (AV) pending completion of the SDP.

Description: URI 05000390/2005002-04 documented the inspector's determination that the procedures for restoring containment following a loss of shutdown were inadequate. The URI was opened pending completion of full-scale testing to determine if there was a loss of function, i.e., would the temporary room temperature vulcanizing (RTV) silicon foam seals remain leak-tight during expected containment conditions following a loss of shutdown cooling.

On May 22, 2005, the licensee performed testing on a full-scale mockup of penetration X-117 including the same cable configuration as installed during the recent outage. The inspectors witnessed the construction of the mockup, including installation of the foam seal to verify that the licensee's procedures were followed. The inspectors also witnessed the testing which was conducted at TVA's Central Lab in Chattanooga. The seal leaked from the start of the test at a test air pressure of 0.5 pounds per square inch gage (psig). The amount was too low to be measured with the test instruments (less than 10 cubic feet per minute (cfm)); however, it could be felt and clearly heard. Water that was put in the "containment side" of the mockup was also blown past the seal. At 2 psig, the test air flow increased noticeably and the center of the seal bulged. At 3 psig, the test air flow increased more and at 25 minutes the seal popped out about 0.75 inches and the test air flow increased to approximately 30 cfm. The seal failed by extruding from the pipe at 3.2 psig. The inspectors concluded that the RTV silicon foam seals would not remain leak-tight during anticipated containment conditions following a loss of shutdown cooling and therefore would not perform their safety function.

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Assessment: The finding adversely affected the containment availability during loss of shutdown cooling events. The inspectors referred to Manual Chapter (MC) 0612 and determined that the finding is more than minor because it affected the configuration control attribute of the Barrier Integrity Cornerstone for the reactor containment. The inspectors used MC 0609, Appendix H, Containment Integrity SDP, to perform the Phase 1 and 2 analysis. The finding is a type B finding because it only affected containment integrity and did not influence the likelihood of an accident leading to core damage. Using Figure 4.1 and Table 4.1, the inspectors determined that the affected SSC, containment penetration seals that form a barrier between the containment and the environment, impact large early release frequency (LERF) which required further evaluation using Section 6.0 of Appendix H. The inspectors referred to Section 6.2, Approach for Assessing Type B Findings at Shutdown for the Phase 2. The seals in question were installed on days 1 and 2 of the outage right after the unit entered into Mode 5. Therefore, in accordance with section 6.2 of Appendix H, the condition existed while the plant was in plant operating state 2 (POS 2) and early time window before refueling operation (TW-E) and within eight days of the start of the outage. Using Table 6.3, the inspectors determined that a Phase 2 analysis was required because the finding was associated with a PWR Ice Condenser containment, containment status intact, and the SSC affected by the finding was containment penetration seals. The Phase 2 analysis was performed using Table 6.4, Phase 2 Risk Significance - Type B Findings at Shutdown. The inspectors calculated that a hole of 0.1 ft<sup>2</sup> with a differential pressure of 3 psig would result in an air flow rate of approximately 1 E6 cubic feet per day (1 containment volume). Penetration X-117 had a surface area of 1.396 ft<sup>2</sup>. Subtracting the total surface area of the cables (0.09 ft<sup>2</sup>) leaves a potential area of 1.3 ft<sup>2</sup> which is much greater than 0.1 ft<sup>2</sup>. Therefore, the inspectors concluded that the failure of Penetration X-117 at approximately 3 psig would result in leakage of greater than 100% containment volume per day and that the finding was potentially greater than Green. This finding affects the human performance cross-cutting area in that the evaluations performed to allow the use of these seals and not provide for emergency closure of penetration X-117 were inadequate.

Enforcement: TS 5.7.1.1 requires that written procedures be established, implemented, and maintained for the activities specified in Regulatory Guide (RG) 1.33, Revision 2, Appendix A. Item 6.h. of RG 1.33 states that implementing procedures are required for combating the loss of shutdown cooling. Abnormal Operating Instruction (AOI)-14, Loss of RHR Shutdown Cooling, was established and implemented to combat the loss of shutdown cooling. AOI-14 directed establishing containment closure using TI-68.002. Contrary to this, AOI-14 and TI-68.002 were not adequately established to assure that containment closure would be achieved prior to the time at which a core uncover and fission product release could result from a loss of shutdown cooling. Specifically, there were no emergency closure actions for penetration X-117, and four hours were allowed for emergency closure of the blind flanges for penetrations X-54, X-108, X-109, and X-118. This finding does not present an immediate safety concern because these penetrations have been restored to their required condition for containment integrity. Pending determination of the finding's safety significance, this finding is identified as AV 05000390/2005003-01, Inadequate Procedures for Containment Closure.

#### 4OA4 Cross-cutting Issues

Section 4OA3 describes a finding associated with an inadequate procedure for restoring containment availability after a loss of shutdown cooling. The inspectors identified that a human performance error resulted in not requiring emergency closure actions for one temporary penetration and up to four hours to perform emergency closure actions on other temporary penetrations. The preparer and reviewer of the procedure incorrectly interpreted test results and containment pressure response calculations.

#### 4OA5 Other

##### (Closed) Temporary Instruction 2515/163, Operational Readiness of Offsite Power

##### a. Inspection Scope

The inspectors collected data from licensee maintenance records, event reports, corrective action documents and procedures and through interviews of station engineering, maintenance, and operations staff, as required by the TI 2515/163. The data was gathered to assess the operational readiness of the offsite power systems in accordance with NRC requirements such as Appendix A to 10 CFR Part 50; General Design Criterion (GDC) 17; Criterion XVI of Appendix B to 10 CFR Part 50, Plant Technical Specifications (TS) for Offsite Power Systems; 10 CFR 50.63; 10 CFR 50.65(a)(4); and licensee procedures. Documents reviewed for this TI are listed in the Attachment.

##### b. Findings and Observations

No findings of significance were identified. Based on the inspection, no immediate operability issues were identified. In accordance with TI 2515/163 reporting requirements, the inspectors provided the required data to the headquarters staff for further analysis.

#### 4OA6 Meetings, including Exit

The inspectors presented the inspection results to Mr. G. Laughlin and other members of licensee management at the conclusion of the inspection on July 8, 2005. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

#### 4OA7 Licensee-Identified Violations

The following violation of very low safety significance was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600 for being dispositioned as an NCV:

- TS 5.2.2, Unit Staff, requires that deviation from the overtime guidelines for personnel performing safety-related functions be authorized in advance by the

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plant manager or his designee. Contrary to this, between January 3, 2005, and March 30, 2005, 50 personnel in multi-skill team B performing safety-related functions exceeded the overtime guidelines without advance authorization. This issue is in the corrective action program as PER 80898 (Level B). This finding is only of very low safety significance because no significant personnel errors occurred and no equipment failures resulted from the work that was performed during the overtime period.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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**SUPPLEMENTAL INFORMATION**  
**PARTIAL LIST OF PERSONS CONTACTED**

Licensee

M. DeRoche, Site Nuclear Assurance Manager  
R. Evans, Acting Training Manager  
A. Hinson, Maintenance and Modifications Manager  
W. Justice, Engineering and Site Support Manager  
W. Lagergren, Site Vice President  
G. Laughlin, Plant Manager  
D. Nelson, Business and Work Performance Manager  
R. O'Rear, Operations Superintendent  
P. Pace, Licensing and Industry Affairs Manager  
T. Wallace, Operations Manager

**ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

50-390/2005003-01 AV Inadequate Procedures for Containment Closure (Section 4OA3)

Closed

50-390/2005002-04 URI Inadequate Procedures for Containment Closure (Section 4OA3)

2515/163 TI Operational Readiness of Offsite Power (Section 4OA5)

Opened and Closed

None

## LIST OF DOCUMENTS REVIEWED

### Section 1R02

#### Full Evaluations

- 51488-A, Re-Gearing of GL 89-10 Valves
- System Operating Instruction (SOI) - 15.01, Rev 41, UIC-1, Increase Steam Generator blowdown from 262 gpm to 329 gpm
- SOI - 15.01, Rev 44, Steam Generator Blowdown Isolation Valves will not Close when an [Auxiliary Feedwater] Pump Start has been Generated
- Temporary Alteration Change Form (TACF) 1-04-003-027, Rev. 1, Add an Alternate [cooling tower blowdown] Flow Signal to [steam generator blowdown] Isolation Valve
- TACF 1-03-011-030, Disabling of CRDM Cooler Motor
- 50965-A, Set Point Changes for Upper and Lower Containment Radiation Monitors

#### Screened Out Items

- 51522, Add New High Point Vents to CVCS [Chemical and Volume Control], SI [Safety Injection], and RHR [Residual Heat Removal] Systems
- 51390, Add ERCW [Essential Raw Cooling Water] Clean-Out Connections for the 1A-A and 1B-B Containment Spray Heat Exchangers
- 51683, Add Hatch Openings in Containment Shield Building Dome
- 51815, Change Valve Setup for AFW AOV Level Control Valves
- 51256, Replace Breaker for DG Lube Oil Circulation Pump
- 51368-A, System 235, 1(2)- INV-235-1D to 4G
- 51075-A, CCS Heat Exchanger Temperature Instruments
- 50189-A, Tobar Transmitters PT-30-310 and 311 Replacement
- 51274-A, Modify the MSIV [Main Steam Isolation Valve] Internals to Reduce the Internal Wear Caused by Vibration
- 51465, Replace 8 Obsolete Agastat Diesel Generator Sequence Timers
- 51540-A, Replace Oversized 350va Control Power Transformers to Prevent Valve Motor Tripping
- 51393-A, Revise Minimum Stroke Time for Control Room Ventilation Damper
- 51749-A, Addition of High Pressure Fire Pump Connections in Diesel Building
- FSAR Change Package 5-1857, Allow the Nozzle Inspection Covers to be Bolted in Place During all Modes
- Equivalency No. MR563845A, Fisher Pressure Regulator Replacement
- Equivalency No. MR545802A, Crosby Relief Valve Parts

#### Self-Assessment Documents

- Self-Assessment, WBN-ENG-04-018, DCN Quality
- PER 8251, Maintenance procedure discrepancy for 50.59 evaluations
- PER 9273, Seven 50.59 records required correction or enhancement
- PER 66708, Procedure revisions found with no 50.59 review

Section 1R04

- SOI-74.01, Residual Heat Removal System
- 0-PI-OPS-17.0, 18-Month Locked Valve Verification
- 0-PI-OPS-17.1, 18-Month Locked Breaker Verification
- WO 04-826401-000, 1-SI-74-901-A, RHR pump 1A-A Quarterly Performance Test
- WO 04-822970-000, 1-SI-74-902-A, Quarterly Valve Full Stroke Exercising - RHR System (Train A)

Section 1R06

- WO 03-022366-000, 0-SI-77-1, 18-Month Channel Calibration Auxiliary Building Passive Sump Loop 0-LPL-77-134
- WO 03-022294-000, 0-SI-77-2, 18-Month Channel Calibration Auxiliary Building Passive Sump Loop 0-LPL-77-135

Section 1R12

- PER 81164, 2A 480V boardroom condensing unit exhaust damper was not oriented correctly under WO 03-14386-000 causing damper to operate backwards

Section 1R13

- Work Week Risk Evaluation - WW05-704-01 R0
- Work Week Risk Evaluation - WW05-610-01 R0
- Work Week Risk Evaluation - WW05-702-02 R0

Section 1R15

- PER 9505, Moisture identified in TDAFW turbine lubricating oil system, December 2003
- PER 76841, NRC identified that PER 9505 did not have corrective action to prevent recurrence, February 2005
- PER 82869, Moisture intrusion into TDAFW turbine lubricating oil system had been previously identified and scheduled for work during the U1C6 refueling outage
- PER 81595, Initial response for trend PER 80960 identifying potential excessive oil leakage from the TDAFW pump bearing was inadequate

Section 1R17Self-Assessment Documents

- Self-Assessment, WBN-ENG-04-12, Post-Modification Testing
- PER 8942, Motor thermal opened after replacement
- PER 9780, Wrong AFW pressure gauges
- PER 70619, Temperature Increase in steam generator blowdown flow rate
- PER 9819, Differential pressure indicators attached to wall without approval
- PER 7246, Post maintenance test specified by the system engineer failed
- PER 66215, Modifications procedure weakness
- PER 66217, Weakness in modifications procedure



- PER 66220, Weaknesses in modifications program knowledge
- PER 14726, Primary/critical drawings inappropriately marked N/A

#### Section 1R19

- PER 82568, NRC identified that MSB employees had NA'd steps in the work instructions with no explanation given
- PER 82583, The PMT for WO 03-008374-000 did not provide detailed guidance on how to establish test conditions and the PMT steps were not clearly identified as PMT.
- PER 82668, The PMT for WO 05-814969-000 did not specify the system alignment to establish test conditions

#### Section 4OA5

- SPP-7.1, On Line Work Management
- AOI-35, Loss of Offsite Power
- AOI-40, Station Blackout
- TI-124, Equipment to Plant Risk Matrix
- TI-12.15, 161-kV Offsite Power Requirements