



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

January 30, 2008

Tennessee Valley Authority
ATTN: Mr. William R. Campbell, Jr.
Chief Nuclear Officer and
Executive Vice President
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT
05000390/2007005 AND 05000391/2007005

Dear Mr. Campbell:

On December 31, 2007, the United States 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 January 3, 2008, with Mr. M. Skaggs and other members of your staff.

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

This report documents two NRC-identified findings of very low safety significance (Green) which were determined to involve violations of NRC requirements. Additionally, a licensee-identified violation which was determined to be of very low safety significance (Green) is listed in this report. Because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these three findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, 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.

TVA

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

Sincerely,

/RA/

Rebecca L. Nease, 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 05000390/2007005, 05000391/2007005
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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Letter to W. R. Campbell from Rebecca L. Nease dated January 30, 2008

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT
05000390/2007005 AND 05000391/2007005

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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: 05000390/2007005, 05000391/2007005

Licensee: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Units 1 and 2

Location: Spring City, TN 37381

Dates: October 1- December 31, 2007

Inspectors: R. Monk, Senior Resident Inspector
M. Pribish, Resident Inspector
R. Baldwin, Senior Operator Examiner (Section 40A5.2)
P. Fillion, Senior Reactor Inspector (Section 40A5.3)
R. Moore, Senior Reactor Inspector (Sections 1R02, 1R17)

Approved by: Rebecca L. Nease, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000390/2007-005, 05000391/2007-005; 10/01/2007 - 12/31/2007; Watts Bar, Units 1 & 2; Licensed Operator Requalification and Fire Protection

The report covered a three-month period of routine inspection by resident inspectors and announced inspections by two regional reactor inspectors and one senior operator examiner. Two NRC-identified Green findings, which are non-cited violations (NCVs), were identified. The significance of an issue is indicated by its color (Green, White, Yellow, Red) using the Significance Determination Process in Inspection Manual Chapter 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 4, dated December 2006.

A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation of Technical Specification 5.7.1.1(a) for the procedure adherence to OPDP-1, "Conduct of Operations," and 10 CFR 55, Part 55.53 f(2), Conditions of Licenses, which resulted in two licensee employees failing to properly reactivate reactor operator/senior reactor operator licenses. The licensee entered the procedure adherence issues into their corrective action program for resolution.

This finding is more than minor because it affected the human performance attribute of the Mitigating System Cornerstone to ensure that licensed operators are available, reliable, and capable to respond to initiating events in order to prevent undesirable consequences. The inspectors evaluated this finding using IMC 0609, Appendix I, and determined the finding to be of very low safety significance. The finding is directly related to the cross-cutting area of human performance under the aspect of procedural compliance and personnel following procedures (H.4(b)). (Section 4OA5.2)

- Green. The Triennial Fire Inspection Team identified a non-cited violation of Unit 1 License Condition 2F and 10 CFR 50, Appendix R, Section III.J, Emergency Lighting, for having a fire protection program which failed to demonstrate that the emergency lighting units had eight-hour capacity.

This finding is more than minor because it is associated with the reactor safety attribute of the Mitigating Systems Cornerstone for protection against external factors (i.e., fire) and it affects the objective of ensuring reliability and capability of systems that respond to initiating events. The finding was of very low safety significance because safe shutdown would likely have been achieved with nearly the same level of effectiveness and reliability as it would have been had the degradation not been present. Prompt corrective action taken by the licensee was to replace the affected emergency light batteries. The finding had no cross-cutting aspects. (Section 4OA5.3)

Enclosure

B. Licensee-Identified Violations

One 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 the corrective actions are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near 100 percent power for the entire inspection period. Unit 2 remained in a suspended construction status.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection

a. Inspection Scope

The inspectors reviewed licensee actions taken in preparation for low temperature weather conditions to limit the risk of freeze-related initiating events and to adequately protect mitigating systems from its effects.

- Cold weather preparations - intake pumping station, refueling water storage tank, main feedwater flow transmitters
- Actual freezing conditions on November 16 and 17, 2007

b. Findings

No findings of significance were identified.

1R02 Evaluations of Changes, Tests, or Experiments

a. Inspection Scope

The inspectors reviewed 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 10 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 evaluations reviewed are listed in the Attachment.

The inspectors also reviewed 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 12 "screened out" changes reviewed are listed in the Attachment.

The inspectors also reviewed self-assessments and problem evaluation reports (PERs) to verify that problems were identified at an appropriate threshold, were entered into the corrective action program, and appropriate corrective actions had been initiated.

Enclosure

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

a. Inspection Scope

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 Technical Specifications (TS) to determine correct system lineups for the current plant conditions. 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.

- Walkdown of 1A-A emergency diesel generator (EDG) during emergent work on 2A-A EDG
- Walkdown of A and B-train motor-driven auxiliary feedwater (MDAFW) trains while the turbine-driven auxiliary feedwater (TDAFW) pump removed from service
- Walkdown of B-train emergency gas treatment system (EGTS) while A-train EGTS removed from service

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors conducted tours of 10 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, 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.

- Cable spreading room
- 480 V RX motor-operated valve (MOV) board room 1A
- 480 V RX MOV board room 1B
- 480 V RX MOV board room 2A
- 480 V RX MOV board room 2B

- Vital battery rooms I, II, III, IV, V

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification

a. Inspection Scope

On October 19, 2007, the inspectors observed the annual simulator evaluations for Group 5 per 3-OT-SRE0021, Feedwater Break/Loss of 6.9 KV SD BD/Loss of Secondary Heat Sink, Revision 4, and 3-OT-SRE0003, Loss of Coolant Accident, Revision 12. The plant conditions led to site area emergency and alert action level classifications, respectively.

The inspectors specifically evaluated the following attributes related to the operating crews' performance:

- Clarity and formality of communication
- Ability to take timely action to safely control the unit
- Prioritization, interpretation, and verification of alarms
- Correct use and implementation of abnormal operating instructions and emergency operating instructions
- Timely and appropriate emergency action level declarations per Emergency Plan Implementing Procedures (EPIP)
- Control board operation and manipulation, including high-risk operator actions
- Command and control provided by the unit supervisor and shift manager

The inspectors also attended the critique to assess the effectiveness of the licensee evaluators and to verify that licensee-identified issues were comparable to issues identified by the inspector.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the two samples listed below for items such as: (1) appropriate work practices; (2) identifying and addressing common cause failures; (3) scoping in accordance with 10 CFR 50.65(b) of the maintenance rule (MR); (4) characterizing reliability issues for performance; (5) trending key parameters for condition monitoring; (6) charging unavailability for performance; (7) classification and reclassification in accordance with 10 CFR 50.65(a)(1) or (a)(2); and (8) appropriateness of performance

criteria for structures, systems, and components (SSCs)/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified as (a)(1). Documents reviewed are listed in the attachment to this report.

- Repetitive failures of control air system dryer control valves
- Repetitive failures of emergency raw cooling water (ERCW) flow control valves to various safety-related coolers

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 three 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 Technical Instruction (TI)-124, Equipment to Plant Risk Matrix.

- Maintenance risk associated with A-train EGTS out of service (OOS)
- Maintenance risk associated with missed surveillance requirement on the component cooling water surge tank relief valves
- Maintenance risk associated with the 2A-A EDG out of service with the block valve closed for one pressurizer power-operated relief valve

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed four 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 the compensatory measures, if involved, were in place, would work as intended, and were appropriately controlled; (4) 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.

- PER 131984, Eagle 21 system recurring failure of the test sequence processor (TSP) board
- PER 131479, B-train shutdown board room chiller temperature control valve (TCV) not fully closed
- PER 127210, ERCW supply flow control valve to U1 elevation 737 penetration room cooler 1A-A failed closed
- PER 133796, Turbine driven auxiliary feedwater pump electrical overspeed failure

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

The inspectors evaluated engineering change packages for eight modifications to evaluate the modifications for adverse effects on system availability, reliability, and functional capability. The eight modifications and the associated attributes reviewed are as follows:

DCN 51358: Replace Kerotest Pressurizer Spray Bypass Valve (Barrier Integrity)

- Energy Needs
- Material/Replacement Components
- Control Signals
- Operations
- Pressure Boundary
- Licensing Basis
- Failure Modes
- Implementation

DCN 51459: Replace Valves 1-RTV-68-454A, -445A, and 1-DRV-68-581 (Mitigating Systems)

- Materials/Replacement Components
- Post Modification Testing
- Plant Document Updating
- Failure Modes
- Operations
- Implementation

DCN 51475: Replace Temperature Control Valves (TCVs) for the Shutdown Boardroom, Main Control room and Electrical Board Room Chillers (Mitigating Systems)

- Materials/Replacement Components
- Post Modification Testing
- Plant Document Updating
- Vendor Documents
- Field Configuration Observation
- Implementation

DCN 51751: Add Strainer as Necessary to Protect ERCW Supply to Auxiliary Feedwater (AFW) Pumps (Mitigating Systems)

- Materials/Replacement Components
- Equipment Protections
- Flow paths
- Structural
- Process Medium
- Failure Modes
- Implementation

DCN STG 52233-01: Add Tornado Bypass Switch to EDG Room Exhaust Fan Controls (Mitigating Systems)

- Energy Needs
- Timing
- Control Signals
- Equipment Protection
- Operations
- Ventilation Boundary
- Licensing Basis
- Failure Modes

DCN 51370: Replace Unit 1 Vital Inverters (Mitigating Systems)

- Energy Needs
- Materials/Replacement Components
- Licensing Basis
- Implementation
- Post Modification Testing

DCN 51937: Modify SGBD Isolation/AFW Valve Logic (Mitigating Systems)

- Timing
- Licensing Basis
- Post Modification Testing

DCN 52179: Shutdown Board Room A&B AHU Motor Requires Replacement
(Mitigating Systems)

- Energy Needs
- Timing
- Licensing Basis
- Implementation
- Post Modification Testing

Documents reviewed included procedures, engineering calculations, modification design and implementation packages, work orders, site drawings, corrective action documents, applicable sections of the UFSAR, supporting analyses, TS, and design basis information.

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

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

The inspectors reviewed seven post-maintenance test (PMT) procedures and/or test activities, listed below, 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.

- 07-821619-000, A-train rod position indication programmable logic controller replacement
- 07-817282-000, A-train 6.9 Kv shutdown board room (SDBR) chiller circulating water pump rotor replacement

- 06-820030-000, A-train main control room (MCR) chiller hot gas and large expansion valve replay replacement
- 06-817372-000, A-train MCR chiller TCV-67-1051 disassembly and cleaning
- 06-817376-000, Disassemble and clean ERCW TCV strainer for the A-train electric board room (EBR) chiller
- 07-822902-001, TDAFW pump failed to trip when actuated from control room
- 07-820152-000, Replace SDBR chill water pump B-B discharge check valve

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors witnessed four surveillance tests and/or reviewed test data of selected risk-significant structures, systems, or components (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.

- WO 07-819986-000: 1-SI-63-901-A, Safety Injection Pump 1A-A Quarterly Performance Test*
- WO 07-818537-000: 1-SI-3-902, TDAFW Pump 1A-S Quarterly Performance Test*
- WO 07-818677-000: 1-SI-62-901-A, Centrifugal Charging Pump 1A-A Quarterly Performance Test*
- WO 07-814684-000: 0-SI-31-56-B, Main Control Room Pressure Test B-train

*This procedure included inservice testing requirements

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

40A1 Performance Indicator Verification

The following Performance Indicator Verification inspection activities were inadvertently omitted from the WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT 05000390/2007003 AND 05000391/2007003

a. Inspection Scope

The inspectors sampled licensee submittals for the PI indicated below for the period from August 2006 through March 2007. To verify the accuracy of the PI data reported during that period, PI definitions and guidance contained in NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 4, were used to verify the basis in reporting for each data element.

Occupational Radiation Safety Cornerstone

- Occupational Exposure Control Effectiveness

The inspectors reviewed PER records generated from August 2006 through May 2006 to ensure that radiological occurrences were properly classified per NEI 99-02 guidance. The inspectors also reviewed electronic dosimeter alarm logs, radioactive material intake records, and monthly PI reports for calendar year 2006. In addition, licensee procedural guidance for classifying and reporting PI events was evaluated.

Public Radiation Safety Cornerstone

- RETS/ODCM Radiological Effluents Occurrence

The inspectors reviewed records used by the licensee to identify occurrences of quarterly doses from liquid and gaseous effluents in excess of the values specified in NEI 99-02 guidance. Those records included monthly effluent dose calculations for calendar year 2006. The inspectors also interviewed licensee personnel that were responsible for collecting and reporting the PI data. In addition, licensee procedural guidance for classifying and reporting PI events was evaluated.

The inspectors completed two of the required samples for IP 71151. One sample for the occupational radiation safety performance indicator and one sample for the public radiation safety performance indicator.

b. Findings

No findings of significance were identified.

4OA2 Identification & Resolution of Problems

.1 Review of Items Entered into the Corrective Action Program

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, Identification and Resolution of Problems, 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 human performance trends, licensee trending efforts, and repetitive equipment and corrective maintenance issues. The inspectors also considered the results of the daily inspector CAP item screening discussed in Section 40A2.1. The inspectors' review nominally considered the six-month period of June through December 2007, although some examples expanded beyond those dates when the scope of the trend warranted. The inspectors compared and contrasted their results with the results contained in the licensee's latest integrated quarterly assessment report and trend PERs in the CAP.

b. Assessment and Observations

No findings of significance were identified. 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.

.3 Annual Sample: Corrective Actions Associated With Both Trains of Auxiliary Building Gas Treatment System (ABGTS) Inoperable Due to Boundary Breach

a. Inspection Scope

The inspectors reviewed the plan and implementation of corrective actions for PER 116477, Both Trains of Auxiliary Building Gas Treatment System (ABGTS) Inoperable Due to Boundary Breach.

b. Background

On December 12, 2006, radiation protection personnel were moving material out of the auxiliary building through doors A111 and A112. Doors A111 and A112 serve as part of the auxiliary building secondary containment envelope (ABSCE) boundary and are electrically interlocked to prevent simultaneous opening. With door A112 to the outside open, door A111 was opened by pressing its door interlock override button. With both doors A111 and A112 open, a pathway was opened to the outside atmosphere that would have prevented the ABGTS from maintaining a negative pressure in the auxiliary building. Licensee procedure TI-65, Breaching the Containment Annulus, Auxiliary Building Secondary Containment Envelope (ABSCE), or Control Building Pressure Boundaries, provides instructions for breaching of a second door of an ABSCE interlock boundary for less than 60 seconds. In this case, both doors were open for approximately 45 minutes prior to discovery by operations personnel.

Both doors were shut and the licensee initiated PER 116477 to determine the cause of the ABSCE boundary breach. The licensee concluded that the apparent cause was a lack of positive controls to prevent operation of the A111 door interlock override which allowed both doors to be open simultaneously.

The corrective action plan for PER 116477 included verification of door A111 postings, installing a cover over the door's interlock switch with instructions for use, supervisory briefings, and the evaluation of general employee training to prevent future ABSCE boundary violations.

c. Assessments and Observations

No findings of significance were identified with the CAP. However, the inspectors identified the following observations concerning the implementation of corrective actions, which were discussed with the licensee:

- In December 2007, the inspectors performed a walkdown of the waste packaging area and surrounding doors in the vicinity of door A111. The walkdown revealed that door A111 did not have a standard door identification sign, nor did it have any sign(s) explaining the use of the interlock defeat switch similar to the signs on doors A113 and A114 which are also interlocked with door A112. The installed instructions for door A111 was "emergency use only" which was the same instruction available in 2006. The licensee initiated PER 135500 for the identified deficiencies.
- On December 3, 2007, licensee procedure SOI-271.01, Railroad Bay Hatch Covers and Auxiliary Building Rolling Door A112, was put in place to provide instructions for operation door A112 and its associated interlocked doors. The procedure provided instructions on defeating door interlocks when door A112 was raised and gave allowance to do so if less than 60 seconds. The procedure did not specify the requirements of TI-65 or direct the user to the TI-65 requirements. Upon questioning by the inspectors, the licensee revised SOI-271.01 with instructions to follow the requirements of TI-65.

4OA3 Event Followup

.1 (Closed) Licensee Event Report (LER) 05000390/2005002-02: G45 Fuel Assembly Clad Damage

This LER is Revision 2 to LER 05000390/2005002-00 which was documented in Inspection Report 05000390, 05000391/2006002, Section 4OA3.2. Revision 1 of the subject LER was documented in Inspection Report 05000390, 05000391/2006005, Section 4OA3.2. The licensee has concluded that the apparent cause of the failure of assembly G45 was debris fretting or missing fuel surface pellet clad interaction. In addition to the licensee's foreign material control process, a limitation on power escalation was established to decrease the possibility of cladding degradation. The licensee has not experienced any leaking fuel during the current fuel cycle operation.

Enclosure

Revision 2 of the LER was reviewed by the inspectors, and no findings of significance were identified and no violation of NRC requirements occurred. This LER is closed.

.2 (Closed) LER 05000390/2006010-00: Both Trains of Auxiliary Building Gas Treatment System (ABGTS) Inoperable Due to Boundary Breach

On December 12, 2006, the licensee identified that both trains of the ABGTS were inoperable due to a breach in the ABSCE. The enforcement aspects of this LER are documented in Section 4OA7 of this report. This LER is closed.

4OA5 Other

.1 Institute of Nuclear Power Operations (INPO) Plant Assessment Report Review

a. Inspection Scope

The inspectors reviewed the final report for the WANO Peer Review Interim Report conducted in August 2007. The inspectors reviewed the report to ensure that issues identified were consistent with the NRC perspectives of licensee performance and to verify if any significant safety issues were identified that required further NRC follow-up.

b. Findings

No findings of significance were identified.

.2 (Closed) Unresolved Item (URI) 05000390/2006005-01: Potential Failure to Properly Reactivate RO/SRO Licenses in Accordance with Procedure OPDP-1, "Conduct of Operations."

Introduction: The inspectors identified a Green NCV of TS 5.7.1.1(a), Procedures, regarding the failure of two operators to reactivate a reactor operator (RO) license and a senior reactor operator (SRO) license in accordance with OPDP-1, "Conduct of Operations."

Description: During the biennial requalification inspection, the inspectors identified that RO/SRO licenses were reactivated without following the guidance in procedure OPDP-1, "Conduct of Operations." OPDP-1 implements the regulatory requirements of 10 CFR 55.53(f)(2), Conditions of Licenses, which states, in part, that "the licensee has completed a minimum of 40 hours of shift functions under the direction of an operator or senior operator as appropriate and in the position to which the individual will be assigned. The 40 hours must have included a complete tour of the plant and all required shift turnover procedures."

The inspectors identified that two operators had not satisfied the requirements for completing a plant tour as part of reactivating their operator license. Records supplied by the licensee showed that a reactivating RO performed his tour with an SRO whose license was not currently active. They also provided records that a reactivating SRO

Enclosure

performed his tour with an RO. The licensee initiated a corrective action document to address these issues (PER 109261).

Analysis: The inspectors determined that the licensee's failure to adequately ensure that licensed operators reactivated their license in accordance with procedure OPDP-1 is a performance deficiency. The finding, which involves the Mitigating Systems Cornerstone, is greater than minor because it is associated with human performance attributes that affect the capability of licensed operators to respond to initiating events to prevent undesirable consequences. The finding was evaluated using Manual Chapter (MC) 0609, Appendix I, "Licensed Operator Requalification Significance Determination Process," and determined to be of very low safety significance (Green) because operators did not stand the watch without being qualified or without other qualified operators in the control room.

Enforcement: 10 CFR 55.53(f)(2), Conditions of Licenses, states, in part, that, "the licensee has completed a minimum of 40 hours of shift functions under the direction of an operator or senior operator as appropriate and in the position to which the individual will be assigned. The 40 hours must have included a complete tour of the plant and all required shift turnover procedures."

TS 5.7.1.1(a) requires written procedures be established, implemented and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, Administrative Procedures.

OPDP-1, "Conduct of Operations", Revision 5, in part, delineates requirements for procedure adherence, minimum shift staffing and the method of ensuring 10 CFR 55.53 (f)(2) requirements are met. Attachment P of OPDP-1 states, "The licensee has completed a minimum of 40 hours of shift functions under the directions of an RO or SRO and in the position to which the operator is to be assigned. The 40 hours must include a complete tour (with a licensed operator) of the plant and a review of all required shift turnover procedures. This tour shall be in those areas covered by shift rounds."

Contrary to the above, on August 18, 2006, the NRC identified that the licensee failed to properly reactivate two licensed operators on May 20, 2005, and January 21, 2006, in accordance with procedure OPDP-1. Because the failure to correctly perform the plant tour as part of reactivation is of very low safety significance and has been entered in the licensee corrective action program (PER 109261), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000390/2007005-01, Failure to Follow Procedure per TS 5.7.1.1(a), Resulting in Two Part 55 Licensee Failings to Properly Reactivate RO/SRO Licenses.

.3 (Closed) URI 05000390/2007007-04, Fire Protection Program did not Demonstrate Eight-Hour Emergency Light Unit Battery Capacity

a. Inspection Scope

The inspectors completed a review and characterization of URI 05000390/2007007-04, including results of testing on emergency lighting units (ELUs) and evaluation of the risk significance.

b. Findings

Introduction: The team identified a Green NCV related to the licensee's failure to demonstrate, on a continuing basis, the eight-hour capacity of the emergency lights. The eight-hour capacity is required by 10 CFR 50, Appendix R, Section III.J, Emergency Lighting.

Description: The licensee had 197 ELUs installed with three different battery types: 30 ELUs with LEC 361 batteries, 25 ELUs with LEC 36 batteries, and 142 ELUs with PM 6420 batteries. As described by the fire protection program and WBN 0-FOR-228 "Quarterly Inspection and Testing of Emergency Light Battery Packs," the licensee's program to ensure, on a continuing basis, that the ELUs had an eight-hour capacity was as follows:

- Perform an initial eight-hour discharge test
- Perform a quarterly two to three-minute discharge test with voltage check
- Replace batteries at a conservative interval, based on vendor recommendations, with respect to the expected service life

Part II of the Fire Protection Report describes how the various features of the program meet the requirements. Section B.14.9.b gives the basis for the testing and inspection requirements of ELUs. It states: "A battery is replaced periodically as a function of its service life, the environmental conditions the battery will experience, and a safety factor." The service life and the environmental factors are based on information from the manufacturer. Part V of the Fire Protection Report, Section 4.2, states that the battery replacement program is used in lieu of performing the periodic, deep discharge eight-hour test. A review of the manufacturer's published data for the PM 6420 indicated that the rated design life was eight years and expected service life for standby use was four to five years. In actual practice, the licensee's stated replacement interval for the PM 6420 was five years.

After the team questioned whether the five year replacement interval was conservative as intended by the program, the licensee acknowledged that the replacement interval should have been conservative with respect to the expected service life and not the design life. Immediately following the inspection, Sentry Corporation, manufacturer of the PM 6420 battery, informed the licensee that a conservative replacement interval for the PM 6420 battery would be three years. Therefore, the replacement time criterion of five years for the PM 6420 batteries in the licensee's program was not conservative.

The team also found that the licensee was starting the five-year replacement interval clock when they performed the on-site initial eight-hour discharge test. This practice did not take into account storage time prior to performance of the eight-hour discharge test. Storage time for an ELU battery could be up to two years at the licensee's warehouse and seven months at the manufacturer's location. Considering that a non-conservative replacement interval was being used (i.e. five years versus three years) and that shelf time (which could be more than two years) was not being accounted for, the licensee was not implementing the conservative replacement portion of their stated program which was intended to demonstrate, on a continuing basis, that the ELUs had an eight-hour capacity.

After this discussion, the licensee reviewed all 142 PM 6420 batteries in service in the plant and identified 60 batteries for immediate replacement, based on a service time of more than three years or shelf time greater than 12 months. NRC Inspection Report 05000390/2007007 indicates 74 ELU batteries were identified for replacement. While the replacement activity was in progress, the replacement criteria was clarified, reducing this number by 14. However, 9 of the 14 had already been replaced. Therefore, 69 batteries were actually replaced. Subsequently, 13 of the 69 batteries were subjected to an eight-hour discharge test. The sample of 13 was selected at random, and the sample size was chosen according to the guidelines of Military Standard MIL-TD-105. The result of this test was that all but one battery passed the test. The one failure illuminated its light brightly for eight hours, but the voltage was below the specified minimum design voltage of 5.25 volts at the eight-hour point.

Analysis: This issue is a performance deficiency because the licensee did not follow its approved fire protection program for replacement of batteries in the emergency lighting units to demonstrate conformance with the eight-hour capacity requirement on a continuing basis. The finding is more than minor because it is associated with the reactor safety attribute of the Mitigating Systems Cornerstone of protection against external factors (i.e., fire) and it affects the objective of ensuring reliability and capability of systems that respond to initiating events. Because the finding adversely affected to some degree the ability to carry out local operator actions required to achieve and maintain a safe shutdown condition following a severe fire, the criteria contained in Manual Chapter 0612, Appendix B, indicated that the finding should be evaluated using Manual Chapter 0609, Appendix F, Fire Protection Significance Determination Process.

Review of the in-service time of the entire population of the 60 batteries which were replaced pursuant to the above stated criteria shows that these batteries were beyond the conservative replacement period but not the published service life. The in-service time of the 13 tested batteries was representative of the entire population of 60. A characteristic of lead-acid batteries is that they degrade in an almost linear fashion over time between 100 percent and 80 percent of rated capacity. The fact that the tested sample of 13 batteries could deliver 100 percent capacity, except for one which fell short by a small amount, substantiated the assertion that the batteries were on the linear portion of the degradation curve and had not yet reached the knee of the aging curve. This information provided a high degree of confidence that the questionable batteries, in their state at the time of the inspection, would have had the capacity to illuminate their

emergency lights for at least 90 minutes. This means there was no objective evidence that any battery could not provide illumination for the local operator actions specified in the post-fire safe shutdown procedure.

The licensee made a calculation of the eight-hour discharge capacity of the batteries as compared to the power requirements of the emergency lights, and this calculation was consistent with the same calculation performed by the inspectors. The conclusion from this calculation was that, from a design perspective, the batteries had the capacity to supply their emergency lights for eight hours at the end of the published service life with an additional 16 percent margin to account for variations in ambient temperature and normal variation from manufacturer's published data. It was also confirmed by the inspectors that the ELU battery chargers were capable of properly charging the batteries. This information together with the results of the testing described above tended to show that the great majority of PM 6420 batteries could in fact power the ELUs for eight hours. This meant that even if a few ELUs could not last for the entire eight-hour requirement, the main control room and auxiliary shutdown panel room, each of which had several ELUs installed, would remain illuminated for eight hours during a loss of normal lighting event.

In the context of Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," the finding category is "post-fire safe shutdown" (refer to Table 1.1.1). Based on the above discussion, the finding is assigned a degradation rating of "low" because safe shutdown would likely have been achieved with nearly the same level of effectiveness and reliability as it would have been had the degradation not been present. All fire protection findings that have low degradation screen as having very low safety significance.

Enforcement: Watts Bar Unit 1 License Condition 2F requires that the licensee implement and maintain in effect all provisions of the approved fire protection program. These documents invoke the requirements of 10 CFR 50, Appendix R, Section III.J, which requires ELUs with at least an eight-hour battery power supply be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.

Contrary to the above, the licensee failed to demonstrate on an ongoing basis the requirement for eight-hour battery power was being met. This resulted in a number of installed emergency light units being beyond their conservative replacement period. This condition has existed since 2002 when the PM 6420 batteries were first installed. Because this finding is of very low safety significance and has been entered into the corrective action program (PER 126210), this finding is being treated as an NCV, consistent with Section VI.A.1 of the NRC's Enforcement Policy. This finding is identified as NCV 05000390/2007005-02, Fire Protection Program Did Not Demonstrate Eight-Hour Emergency Light Unit Battery Capacity.

4OA6 Meetings, including Exit

The inspectors presented the inspection results to Mr. M. Skaggs and other members of licensee management at the conclusion of the inspection on January 3, 2008. 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 5.7.1 requires that procedures be established, implemented, and maintained covering the activities specified in Appendix A of Regulatory Guide 1.33, Revision 2. Paragraph 3g of Appendix A requires procedures for operating atmosphere cleanup systems. Licensee procedure TI-65, Breaching the Containment Annulus, ABSCE, or Control Building Pressure Boundaries, specified the requirements for breaching a second door of an auxiliary building secondary containment enclosure (ABSCE) interlock configuration for less than 60 seconds to maintain auxiliary building gas treatment system (ABCTS) operability. Contrary to this procedure, on December 12, 2006, operators inadvertently breached the ABSCE boundary for approximately 45 minutes until noticed and corrected by the licensee. This was documented in PER 116477. This violation is of very low significance because the inappropriate action only represented a degradation of the auxiliary building radiological barrier.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

M. Brandon, Licensing and Industry Affairs Manager
A. Hinson, Site Engineering Manager
M. Lorek, Plant Manager
K. Lovell, Maintenance and Modifications Manager
M. McFadden, Site Nuclear Assurance Manager
P. Sawyer, Radiation Protection Manager
A. Scales, Operations Manager
M. Skaggs, Site Vice President
S. Smith, Operations Superintendent
D. Voeller, Performance Improvement Manager

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

05000390/2005002-02	LER	G45 Fuel Assembly Clad Damage (Section 4OA3.1)
05000390/2006010-00	LER	Both Trains of Auxiliary Building Gas Treatment System (ABGTS) Inoperable due to Boundary Breach (Section 4OA3.2)
05000390/2006005-01	URI	Potential Failure to Properly Reactivate RO/SRO Licenses in Accordance with Procedure OPDP-1, "Conduct of Operations" (4OA5.2)
05000390/2007007-04	URI	Fire Protection Program did not Demonstrate Eight-Hour Emergency Light Unit Battery Capacity (4OA5.3)

Opened and Closed

05000390/2007005-01	NCV	Failure to Properly Reactivate RO/SRO Licenses in Accordance with Procedure OPDP-1, "Conduct of Operations" (4OA5.2)
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05000390/2007005-02

NCV

Fire Protection Program Did Not
Demonstrate Eight-Hour Emergency Light
Unit Battery Capacity (4OA5.3)

Discussed

None

LIST OF DOCUMENTS REVIEWED

Section 1R02: Evaluation of Changes, Tests, or Experiments

Safety Evaluations

DCN 52220-0 Modify train A & B electrical circuits for high radiation in refueling area, dated 7/26/07

AOI 8, EDG damper tornado switches, dated 3/2/07

SOI-15-01 Rev 53, Steam Generator (SG) Blowdown System, Increase in SG blow down Flow to cooling tower blow down, dated 1/12/07

TACF 0-006-0003-067, Rev. 0, ERCW header venting, dated 2/23/06

PER 95337, Compensatory measure - venting of train B ERCW header, dated 1/25/06

WO 05-820250-000, adjust flow controllers for Aux. Bldg general exhaust fans and fuel handling area fans, dated 9/7/06

WO 04 810450-000, Perform EMI testing prior to entry into mode 5 at beginning of U1C6 outage, dated 12/16/04

DCN 52233, Add tornado bypass switch to EDG room exhaust fan controls, dated 8/31/07

SOI 15.01, Rev 49, SG blow down System, revise to allow AFW flow during SG blow down, dated 6/9/06

EDC 51407, revise LOCA dose analysis to analyze the annulus at atmospheric pressure, dated 11/25/06

Screen evaluation

DCN 52057 Replace flow element 1-FE-63-170 with more restrictive orifice plate, dated SOI-82.01, Rev. 64, Diesel Generator (DG) 1A-A, Section 8.8 start air receiver blowdown, dated 10/5/07

0-PI-OPS-28A, Rev. 9, Train A ERCW and RCW Flow Verification During Chemical Additions, dated 12/05/06

DCN 51828-a, Replace obsolete process flow measurement instrument in CVCS system, dated 7/5/07

AOI-14, Rev. 32, Loss of RHR Shutdown Cooling, dated 8/29/07

SOI-82.01, Rev. 64, Diesel Generator (DG) 1A-A, section 8.8, start air receiver blowdown, dated 10/5/07

DCN 51358, Replace existing Kerotest pressurizer spray bypass valves, dated 1/17/07

DCN 51751, Add strainer to protect orifices upstream of AFW pumps, dated 9/26/06

DCN 51475 Replace Temperature Control Valves (TCVs) for the Shutdown Boardroom, Main Control room and Electrical Board Room Chillers, dated 12/27/04
 DCN 52179 Shut down board room A&B AHU motor requires replacement, dated 12/6/06
 DCN 51370 Replace Unit 1 Vital Inverters , dated 2/5/07
 Work Order (WO) 06820042-000, Temporary repair of Ice condenser glycol pipe leak, dated 10/2/06

Procedures

SPP-9.4, 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments, Rev. 7

Other Documents

Self-assessment WBN-ENG-07-003, Implementation of 10 CFR 50.59 Rule and SPP-9.4R7, dated 6/4-10/30/2007

Section 1R12: Maintenance Effectiveness

- Paul Trinity Micro Corporation tech manual WBN-VTD-P477-0020
- PER's 73262, 118698, 132191
- TI-119, Attachment 7, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting for Control Air System (032)
- Aux Control Air System Performance Improvement Plan (all 4 revisions)

Section 1R17: Permanent Plant Modifications

Procedures

SOI 235.07, 120 VAC Vital Instrument Power Board 2-111, Rev. 13
 SOI 67-01, essential Raw Cooling Water System, Rev. 66

Design Change Packages (DCNs)

DCN 51358 Replace Kerotest PZR Spray Bypass Valve, Rev. A
 DCN 51459 Replace valves 1-RTV-68-454A, -445A, and 1-DRV-68-581, Rev. A
 DCN 51751 Add strainer as necessary to protect ERCW supply to AFW pumps , Rev. A
 DCNSTG 52233-01 Add tornado bypass switch to EDG room exhaust room fan controls, Rev. A
 DCN 51475 Replace Temperature Control Valves (TCVs) for the Shutdown Boardroom, Main Control room and Electrical Board Room Chillers, Rev. A
 DCN 51370 Replace Unit 1 vital inverters , Rev. A
 DCN 51937 Modify SGBD isolation/AFW valve logic, Rev. A
 DCN 52179 Shut down board room A&B AHU motor requires replacement, Rev. A

Procedures

SPP-9.3, Plant Modifications and Engineering Change control, Rev. 15

PERs

07-133013 SOI 15.01, Steam Generator Blowdown Flow, revised flow rate value was not restored to original value at date specified by procedure change document
 07-133164 Action sign-off in WO 03-017784-006 was not correctly verified.
 07-122050 Maintenance and Modifications Integrated Trend review issue
 06-112549 Post modification test of 0-1 Vital Inverter out of tolerance acceptance criteria value

Work Orders

03-017784-006, Perform in-service leak test for components installed via DCN 51475A
 04-815778-000, RCS leakage Test
 05-813545, Perform ISLT on 1-DRV-68-581
 03-021773-000, Pressurizer Spray Temp Loop 2 Periodic Calibration
 03-021774-000, Pressurizer Spray Temp Loop 3 Periodic Calibration
 04-820680-000, TDAFW & MDAFW pump strainer install PMT
 03-019726-002, Fuse Installation, 1/3/2005
 06-822134-000, SGBD Room Chiller Air Handling Unit A-A Motor Replacement, 11/21/2006
 06-822160-000, PMT SGBD Room Chiller Air Handling Unit A-A Motor Replacement, 11/24/2006
 05-818252-000, Steam Generator Blowdown Control, 4/28/2006
 05-818252-004, PMT for Steam Generator Blowdown Control, 10/3/2006

Drawings

1-45W760-30-23, Wiring Diagrams Ventilating System Schematic Diagrams, Rev. 21
 1-47W611-30-7, Electrical Logic Diagram Ventilating System, Rev. 17

Other Documents

Metrex Model FTVA-300-WAT Valve Technical manual, dated 6/30/04
 Metrex Model 50M-350 Technical Manual, dated 9/16/04
 1-LPT-68-317-S, Scaling and Setpoint Document Loop Cover Sheet, Rev. 00
 1-LPT-68-316-S, Scaling and Setpoint Document Loop Cover Sheet, Rev. 00
 PMTI-51358-1, Testing of Pressurizer Spray Bypass Valve 1-BYV-068-0552, Rev. 0
 PMTI-51358-2, Testing of Pressurizer Spray Bypass Valve 1-BYV-068-0555, Rev. 0
 Snap Shot Self Assessment, ENG-070001, Post Modification Test Instruction, dated 2/16-3/9/07