



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

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

July 25, 2006

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 NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000390/2006003 AND 05000391/2006003

Dear Mr. Singer:

On June 30, 2006, 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 July 12, 2006, 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.

The report documents two NRC-identified findings and two self-revealing findings of very low safety significance (Green). The issues were determined to involve violations of NRC requirements. Additionally, licensee-identified violations which were determined to be of very low safety significance are listed in this report. However, because of their very low safety significance and because they have been entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A of the NRC Enforcement Policy. If you contest any of the NCVs 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 United States 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/*

Malcolm T. Widmann, 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 05000390/2006003, 05000391/2006003  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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Report to K. W. Singer from Malcolm Widmann dated July 25, 2006.

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT  
05000390/2006003 AND 05000391/2006003

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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: 05000390/2006003, 05000391/2006003

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, 2006 - June 30, 2006

Inspectors: J. Bartley, Senior Resident Inspector  
M. Pribish, Resident Inspector  
R. Hamilton, Senior Health Physicist  
G. Kuzo, Senior Health Physicist  
A. Nielsen, Health Physicist

Approved by: Malcolm T. Widmann, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

Enclosure

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## SUMMARY OF FINDINGS

IR 05000390/2006-003, 05000391/2006-003; 04/01/2006 - 06/30/2006; Watts Bar, Units 1 & 2; Identification and Resolution of Problems

The report covered a three-month period of routine inspection by resident inspectors and announced inspections by regional health physics inspectors. Two NRC-identified and two self-revealing Green findings, all of which were non-cited violations, 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 3, dated July 2000.

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

#### **Cornerstone: Emergency Preparedness**

- Green. An NRC-identified non-cited violation of Technical Specification 3.3.3, "Post Accident Monitoring (PAM) Instrumentation," was identified for failure to take the required actions when the containment high range radiation monitors were not restored to operable status within the allowed outage time. The licensee has entered this violation into their corrective action program for resolution.

The finding is more than minor because it is associated with the facilities and equipment attribute of the Emergency Preparedness Cornerstone and affects the cornerstone objective planning standard of 10 CFR 50.47(b)(8). The finding is of very low safety significance because the performance deficiency was a failure to comply with a non-risk significant planning standard and no planning standard function failure occurred. The cause of the finding is related to the cross-cutting element of problem identification and resolution, in that, the licensee failed to adequately evaluate the condition for impact on equipment operability. (Section 4OA2.3)

- Green. An NRC-identified non-cited violation of 10 CFR 50.47(b)(8) was identified for the failure to maintain respiratory protection equipment required for emergency response activities. Specifically, from October 2004 through April 2006, the licensee failed to conduct semiannual breathing air quality surveillances for the Service Building high pressure compressor used to fill self-contained breathing air tanks maintained to support emergency preparedness activities.

This finding is greater than minor because it is associated with the response organization performance attribute of the Emergency Preparedness Cornerstone and adversely affects the cornerstone objective of ensuring the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Failure to maintain

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respiratory protective equipment for emergency response personnel could result in the impairment of individuals performing their specified emergency response functions. This finding was evaluated using the Emergency Preparedness Significance Determination Process and was determined to be of very low safety significance because there were no maintenance activities for the compressor system during the subject period that could potentially affect air quality, and subsequent breathing air test results conducted in April 2006 met Grade D air standards. The licensee has entered this finding in its corrective action program as Problem Evaluation Report Number 100604 and is evaluating corrective action to be taken. (Section 2OS3)

### **Cornerstone: Occupational Radiation Safety**

- Green. A self-revealing non-cited violation of 10 CFR 20.1601(d) was reviewed by the inspectors for failure to establish controls in a way that does not prevent individuals from exiting a high radiation area. This event involved workers being locked inside the containment.

The finding is greater than minor because it is associated with the program and process attribute of the Occupational Radiation Safety Cornerstone and adversely affects the cornerstone objective of ensuring the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. Failure to maintain a means of egress from a posted high radiation area could result in radiation exposures that are only limited by the actual dose rates and the period of time that the individuals remain in the area. This finding was evaluated using the Occupational Radiation Safety Significance Determination Process and was determined to be of very low safety significance because the individuals were able to wait in a relatively low dose waiting area and the period in which they were locked in was relatively short (25 minutes). The licensee has entered this finding in its corrective action program as Problem Evaluation Report Number 96865 and has established corrective actions which should reduce the likelihood of reoccurrence. (Section 2OS1)

- Green. A self-revealing non-cited violation of 10 CFR 20.1101(b) was reviewed by the inspectors for failure to use, to the extent practical, procedural and engineering controls based on sound radiation protection principles to achieve occupational doses that are as low as reasonably achievable. The Radiation Work Permit (RWP) used for setting the reactor head was not revised to reflect a change in work scope and radiological conditions. The workers were allowed to exceed their electronic dosimeters dose and dose rate alarm settings which resulted actual dose received greatly exceeding RWP allowances.

This finding is more than minor because it is associated with the program and process attribute of the Occupational Radiation Safety Cornerstone and adversely affects the cornerstone objective of ensuring the adequate protection of the worker health and safety from exposure to radiation from radioactive

material during routine civilian nuclear reactor operation. The failure by radiation protection personnel to properly evaluate the change in work scope and conditions and to follow established procedural requirements resulted in three individuals exceeding RWP dose limits. This finding was evaluated using the Occupational Radiation Safety Significance Determination Process and was determined to be of very low safety significance because the individuals did not exceed regulatory dose limits and the licensee's three year rolling average for occupational exposure is less than 135 rem. The licensee has entered this finding in its corrective action program as Problem Evaluation Report Numbers 90814, 91648, and 92759 and has implemented corrective actions. The cause of the finding is related to the cross-cutting element of human performance, in that, individuals were allowed to continue working with dosimeters in alarm and outside RWP requirements for exposure control. (Section 2OS1)

B. Licensee-Identified Violations

Three violations of very low safety significance, which were identified by the licensee, have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and 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 until May 30, 2006, when the unit was manually tripped due to high turbine vibration. The unit was restarted and returned to 100 percent power on June 29, 2006, and remained at full power through the end of the inspection period. Unit 2 remained in a suspended construction status.

## **1. REACTOR SAFETY**

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

#### 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, Updated Final Safety Analysis Report (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.

- 1A, 2A, and 2B diesel generators (DGs) during 1B DG component outage
- Train B containment spray (CS) during Train A CS check valve inspection
- Train A main control room (MCR) air handling unit (AHU) during corrective maintenance on the Train B MCR AHU

##### b. Findings

No findings of significance were identified.

#### 1R05 Fire Protection

##### Fire Protection - Tours

##### a. Inspection Scope

The inspectors conducted tours of nine areas important to reactor safety, listed below, to evaluate, 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.

- Residual heat removal (RHR) pump rooms A and B
- Containment spray (CS) pump rooms A and B
- Turbine-driven auxiliary feedwater (TDAFW) pump room
- Centrifugal charging pump (CCP) rooms A and B
- Safety injection pump (SIP) rooms A and B

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed the licensee's program for maintenance and testing of three risk-important heat exchangers in the essential raw cooling water (ERCW) system. The inspectors reviewed three heat exchangers because of the past history of silt accumulation and clams in the ERCW system. Specifically, the review included the program for testing and analysis of the 2A-A DG, 1B-B DG, and 2B-B DG heat exchangers. The inspectors observed the physical condition of the heat exchangers during cleaning activities and verified that the frequency of inspection was sufficient to detect degradation prior to loss of heat removal capabilities below design requirements, that the inspection results were appropriately categorized against preestablished engineering acceptance criteria including the impact of tubes plugged on the heat exchanger performance, and that the licensee had developed adequate acceptance criteria for bio-fouling controls.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

On May 4, 2006, the inspectors observed operators in the plant's simulator during simulator scenario 3-OT-SRT0137, Reactor Trip, Safety Injection, and Rapid Cooldown Caused by Multiple Equipment Failures, to verify 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.

b. Findings

No findings of significance were identified.

## 1R12 Maintenance Effectiveness

### a. Inspection Scope

The inspectors reviewed a performance-based problem relating to a trip of the B shutdown boardroom chiller on high pressure. The focus of the review 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 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 reclassification; and (8) the appropriateness of performance criteria for SSCs classified as (a)(2) or goals and corrective actions for SSCs classified as (a)(1). Specific documents reviewed are listed in the attachment.

### 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 on the Train B shutdown boardroom (SDBR) chiller during Train A work week
- Scheduled work on DG 2A-A and CS pump 1A-A
- Emergent work due to problem with 1A-A CCP breaker
- Schedule work on the 1A-A auxiliary air compressor during the 1A-A emergency DG component outage
- Scheduled work on CS and RHR spray

### b. Findings

No findings of significance were identified.

#### 1R14 Personnel Performance During Non-routine Plant Evolutions

##### a. Inspection Scope

On May 30, 2006, Unit 1 was manually tripped due to high turbine vibrations caused by a failed blade on the C low pressure turbine. The inspectors reviewed operator logs, plant computer data, completed procedures, and the reactor trip report, and interviewed operators to determine what occurred and how the operators responded. In addition, the inspectors verified that the operator response was in accordance with plant procedures. Further details associated with this event are documented in Section 4OA3.1. Documents reviewed are listed in the attachment.

##### b. Findings

No findings of significance were identified.

#### 1R15 Operability Evaluations

##### a. 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. Documents reviewed are listed in the attachment.

- Problem Evaluation Report (PER) 100095, Containment high range radiation monitors (1-RE-90-271 to 274) thermally-induced current
- PER 99866, 2A-A diesel generator axial vibration
- PER 100635, B-train SDBR chiller tripped on high pressure
- PER 102939, Air entrapment in ERCW line to B-Train AFW pumps
- PER 104378, 1B-B RHR pump seal leakage while in shutdown cooling mode

##### b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testinga. Inspection Scope

The inspectors reviewed seven 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.

- Work Order (WO) 06-813294-000, Repair 1B-B DG air intake damper
- WO 05-824059-000, Perform 2-SI-211-4-B, 92-day trip actuating device operational test on undervoltage relays for 2B-B 6.9kv shutdown board
- WO 06-813556-000, Troubleshoot and repair B SDBR chiller
- WO 05-819803-000, Replace 1B DG batteries
- WO 03-021098-000, Replacement of electrolytic capacitors on the 2B DG electronic woodward controls
- WO 05-812280-000, Replace A-A ERCW pump motor clutch
- WO 06-816485-000, Replace A train MCR chiller air handling unit regulator

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activitiesa. Inspection Scope

The licensee began a forced outage on May 30, 2006, after manually tripping Unit 1 due to high turbine vibrations. The inspectors observed portions of the shutdown, cooldown, maintenance activities, and startup activities to verify that the licensee maintained defense-in-depth (DID) commensurate with the applicable TS. The inspectors monitored licensee controls over the outage activities listed below.

- Licensee configuration management, including daily outage reports, to evaluate DID and compliance with the applicable TS when taking equipment out of service.
- Installation and configuration of reactor coolant instruments to provide accurate indication and an accounting for instrument error.

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- Controls over the status and configuration of redundant safety systems (diesel generators and standby RHR pump) to ensure risk was minimized.
- Decay heat removal processes to verify proper operation and that steam generators, when relied upon, were a viable means of backup cooling.
- Heatup and startup activities to verify that TS, license conditions, and other requirements, commitments, and administrative procedure prerequisites for mode changes were met prior to changing modes or plant conditions. Reactor coolant system (RCS) integrity was verified by reviewing RCS leakage calculations, and containment integrity was verified by reviewing the status of containment penetrations and containment isolation valves.
- Containment closure activities, including a detailed containment walkdown, to verify no evidence of leakage and that debris had not been left which could affect the performance of the containment sump or ice condenser.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors witnessed seven 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. Additional documents reviewed are listed in the attachment.

- WO 05-824059-000: 2-SI-211-7-B, Channel calibration test on load shed and diesel start undervoltage relays for 6.9kv shutdown board 2B-B
- WO 05-824341-000: 0-SI-82-19-A, 184-day fast start and load test DG 2A-A
- WO 05-825192-000: TI-50.038, Spent fuel pit circulating pump A-A quarterly performance test\*
- WO 05-824272-000: 1-SI-268-1-A, 92-day permanent hydrogen mitigation system Train-A igniter availability test
- WO 05-825313-000: 1-SI-68-41, 18-month reactor coolant pump 2 undervoltage calibration
- WO 06-814974-000: 0-SI-82-18-B, 184-day fast start and load test DG 2B-B
- WO 06-813427-000: 1-SI-0-24, Measurement of the at power moderator temperature coefficient

\*This procedure included inservice testing requirements



b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modificationsa. Inspection Scope

The inspectors reviewed the following temporary plant modification against the requirements of SPP-9.5, Temporary Alterations and SPP-9.4, 10 CFR 50.59 Evaluation of Changes, Test, and Experiments, and verified that the modifications 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.

- TACF 0-06-0004-067, Addition of a vent line to the B-ERCW discharge header

b. Findings

No findings of significance were identified.

**2. RADIATION SAFETY****Cornerstone: Occupational Radiation Safety**2OS1 Access Controls to Radiologically Significant Areasa. Inspection Scope

The inspectors reviewed three previous access control occurrences. Reviewed items included corrective action documents, audits, procedures, Radiation Work Permits (RWP), As Low AS is Reasonably Achievable (ALARA) Planning Reports, and plant Technical Specifications. The inspectors interviewed personnel who were involved with the occurrences.

b. Findings.1 High Radiation Area Access Control

Introduction. A Green self-revealing NCV of 10 CFR 20.1601(d) was identified for the failure to implement controls that do not prevent individuals from exiting a high radiation area. Two workers were locked inside containment for approximately 25 minutes while the unit was operating at full power. The workers were able to wait in a low dose area, which minimized the dose they received.

Description. The inspectors reviewed an event involving workers who were inadvertently locked inside the containment. On February 8, 2006, two work groups entered the Unit 1 lower containment, with each entry documented on a separate roster. A number of factors contributed to poor coordination by personnel responsible for tracking workers inside the containment and a lack of effective controls, the containment was locked following the first group's exit. This situation was identified through two mechanisms. It was self-revealing, in that, when the workers inside containment attempted to leave, they found the containment hatch locked and unattended. Also, while attempting to close out the paperwork for the containment entry, control room operators determined that the other work group had not exited the containment. The second work group was locked inside containment for approximately 25 minutes. The inspectors reviewed PER 96865, which document this event in the corrective action program, and a Nuclear Assurance Audit of the TVAN Radiation Protection Program. The inspectors interviewed the Radiation Protection Manager and other individuals involved in the event.

Analysis. The inspectors determined that the failure to provide a means of egress from the containment while posted as a high radiation area was a performance deficiency. The dose received while working in a high radiation area is proportional to the dose rate the individual is exposed to and the time that the individuals are exposed. Had the error not been discovered or if the dose rates had been higher then a significant unplanned exposure could have resulted.

This finding is more than minor because it is associated with the program and process attribute of the Occupational Radiation Safety Cornerstone and adversely affects the cornerstone objective of ensuring the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. Failure to maintain a means of egress from a posted high radiation area could result in radiation exposures that are only limited by the actual dose rates and the period of time individuals are locked inside the area. This finding was evaluated using the Occupational Radiation SDP. The finding was determined to be of very low safety significance (Green) because it did not involve (1) ALARA planning and control, (2) an overexposure, (3) a substantial potential for overexposure, in that the workers were able to wait in an area with low dose rates and the period until discovery was short, or (4) an impaired ability to assess dose.

Enforcement. 10 CFR20.1601(d) requires that the access controls for high radiation areas be established in a way that does not prevent individuals from leaving the high radiation area.

Contrary to 10 CFR 20.1601(d) on February 8, 2006, two individuals were inadvertently locked inside a posted high radiation area. Two work groups entered the lower containment on separate work orders and at different times. When the first group exited the area, the containment hatch was secured thereby locking the second work group inside containment. Because the failure to provide a means of egress from a high radiation area was determined to be of very low safety significance and was entered into the licensee's corrective action program (CAP) as PER Number 96865, this violation is

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being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 50-390/2006003-02, Failure to establish controls in a way that does not prevent individuals from exiting a high radiation area.

## .2 Inadequate Control of Worker Dose

Introduction. A Green self-revealing NCV was identified for failure to comply with 10 CFR 20.1101(b) which requires licensees to use, to the extent practical, procedural and engineering controls based on sound radiation protection principles to achieve occupational doses that are as low as reasonably achievable.

Description. On May 17, 2005, while setting the reactor head, three individuals continued to work with their electronic dosimeters (ED) in alarm and the actual dose they received greatly exceeded RWP allowances. When a pair of flip cameras used for aligning the reactor head with the alignment pins failed, the licensee elected to implement a previously established contingency of sending personnel into the cavity to facilitate the alignment and subsequent head set. The licensee determined that the RWP specified dose and dose rate setpoints would be inadequate with the change in work scope. The dose alarm setpoint was changed from 150 mrem to 200 mrem and the dose rate setpoint was changed from 1000 mR/hr to 2500 mR/hr; however, the RWP was not changed to reflect the new setpoints. The RWP required that personnel not exceed the alarm setpoints by greater than 25 mrem. This would allow individuals to exit an area if their ED alarmed. The ALARA planning report (APR) had a recommendation that if doses exceeded 250 mrem or general area dose rates exceeded 1500 mR/hr that the workers back out of the area and the job be reevaluated. The procedure for preparing APR indicated that the recommendations in the APR were not binding.

When three workers entered the cavity their ED began to alarm. Since the RWP had not been changed, the new alarm setpoints had not been entered into the ED. With the dose rates in the cavity exceeding the initial RWP dose rate setpoints, the ED alarmed once the work area was entered. Radiation Protection (RP) supervision elected to allow work to continue with ED in alarm based on the telemetric dosimetry being tracked by an RP supervisor who was in radio contact with an RP technician in the cavity with the other two workers. Because of the increased exposure time caused by the early entry it became apparent that even the revised setpoints were insufficient. The acting Radiation Protection Manager authorized the work group to continue as long as the workers had dose remaining. The workers received 255, 330 and 492 mrem. All three workers exceeded the 200 mrem alarm setpoint on the ED by greater than the 25 mrem allowance specified in the RWP.

There were two engineering controls designed to minimize worker exposure while setting the reactor head. The first was the flip cameras that would allow the head to be lowered onto the guide pins without personnel being in the refueling cavity. The second was a pre-measured plastic chain attached to the head that served as a positive indication for workers to enter the cavity when the head was lowered to the point where the chain touched the cavity floor. Since the flip cameras didn't work properly, the

workers entered the cavity before the chain touched the floor. The administrative controls of having an approved ALARA Review Plan and RWP for the job both failed when workers were allowed to continue to work with their dosimetry in alarm and exposure related exit strategies were not followed .

Analysis. The failure to properly use procedural and engineering controls to achieve occupational doses that are as low as reasonably achievable is a performance deficiency. It was within the licensee's capability to either stop the job and repair the flip cameras or to reassess the job with the changed work scope and change the RWP to reflect that assessment.

The finding is more than minor because it is associated with the program and process attribute of the Occupational Radiation Safety Cornerstone and adversely affects the cornerstone objective of ensuring the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. The failure to properly implement procedural and engineering controls resulted in three workers received unplanned dose. The use of dosimetry alarms to minimize worker dose is a fundamental radiation protection procedural control that was allowed to fail. This finding was evaluated using the Occupational Radiation Safety SDP and was determined to be of very low safety significance (Green) because it involved ALARA planning or work control and the licensee's three year rolling average for occupational exposure is less than 135 rem. The cause of the finding is related to the cross-cutting element of human performance, in that, individuals were allowed to continue working with dosimeters in alarm and outside RWP requirements for exposure control.

Enforcement. 10 CFR 20.1101(b) requires licensees to use, to the extent practical, procedural and engineering controls based on sound radiation protection principles to achieve occupational doses that are as low as reasonably achievable. RWP 05023 provided dose and dose rate ED alarm setpoints for workers involved with the reactor head set and contained a requirement not to exceed the alarm setpoints by more than 25 mrem. Contrary to the above, on May 17, 2005, personnel failed to meet RWP requirements when their ED alarmed and the dose they received exceeded the RWP setpoint by more than 25 mrem.

Because the failure to implement procedural and engineering controls to achieve occupational doses that are as low as reasonably achievable was determined to be of very low safety significance and was entered into the licensee's CAP as PER Numbers 90814, 91648, and 92759, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 0500390/2006003-03, Failure to implement procedural and engineering controls to achieve occupational doses that are as low as reasonably achievable.

## 2OS3 Radiation Monitoring Instrumentation and Protective Equipment

### a. Inspection Scope

Area Radiation Monitoring Instrumentation and Post-Accident Sampling Systems The operability, availability and reliability of selected direct area radiation monitor (ARM) and continuous air monitor (CAM) equipment used for routine monitoring activities were reviewed and evaluated. The inspectors observed material condition, installed configuration, where accessible, and the results of performance checks and calibrations for selected ARMs and CAMs. The inspectors observed and discussed the licensee's Post-Accident Sampling System (PASS) capabilities with responsible licensee personnel.

Licensee program activities in this area were reviewed against requirements specified in TS 5.7.1, Procedures; applicable licensee procedures; and Section 12 of the UFSAR. Licensee guidance documents, records and data reviewed are listed in Section 2OS3 of the report Attachment.

Personnel Survey Instrumentation Current program guidance and its implementation to maintain operability, accuracy, and availability of selected portable survey instruments were reviewed and evaluated. The inspectors observed licensee personnel selecting, inspecting, functional testing and subsequently using portable survey instruments for routine surveillances and job coverage. Availability of portable instruments for licensee use was evaluated through observation of instruments staged for issue and discussion with licensee personnel. Portable instrument calibration data was evaluated for those instruments staged for use or recently used by health physics technicians (HPT) during coverage of selected Radiologically Control Area (RCA) tasks. The instrument calibration data reviewed is listed in Section 2OS3 of the report Attachment.

Operability and detection capabilities of personnel monitoring equipment used to survey individuals exiting the RCA for external and internal contamination were evaluated. The inspectors reviewed calibration records and discussed the functional testing and testing intervals for personnel contamination monitor (PCM) and portal monitor equipment located at the RCA and protected area exits. PCM equipment detection capabilities were demonstrated using a low level mixed source, approximate activity of 5000 disintegrations per minute per 100 square centimeters, that was passed through the equipment while taped to the inspectors. The operability and analysis capabilities of the whole body counting (WBC) equipment was evaluated. Recent WBC equipment quality control (QC) data was reviewed and discussed with responsible personnel. In addition, current qualitative and quantitative dry active waste stream radionuclide results were reviewed to assess current calibration practices for personnel contamination and WBC equipment.

Licensee activities associated with personnel radiation monitoring instrumentation were reviewed against 10 CFR 20.1204 and 20.1501, and applicable licensee procedures listed in Section 2OS3 in the report Attachment.

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Respiratory Protection - Self Contained Breathing Apparatus (SCBA) The licensee's respiratory protection program guidance and its implementation for SCBA equipment and one-piece supplied air respiratory suits were evaluated. The SCBA units staged for emergency use in the Control Room and selected locations were inspected for material condition, air pressure status, and number of units available. The inspectors reviewed and evaluated selected records associated with supplied-air quality and SCBA equipment maintenance. Control room operators and radiation control personnel were interviewed and training materials were reviewed to assess availability of spectacle inserts and training effectiveness for air cylinder change out. The inspectors verified that training, medical, and fit test qualifications were current for selected operations, HP, and maintenance personnel. The inspectors also assessed the licensee's logistics for supplying replacement air bottles to the Control Room on a sustained basis. In addition, licensee procedures were reviewed and personnel were interviewed regarding program guidance and training.

Licensee activities associated with maintenance and use of SCBA equipment were reviewed against 10 CFR Parts 20.1703 and 50.47(b); TS 5.7.1, Procedures; Regulatory Guide (RG) 8.15, Acceptable Programs for Respiratory Protection, Rev. 1, October 1999; American Nuclear Standards Institute (ANSI)-Z88.2-1992, American National Standard Practices for Respiratory Protection; and applicable licensee procedures. Procedures and reviewed data are listed in Section 2OS3 of the report Attachment.

Problem Identification and Resolution Selected licensee CAP documents, including audits, self-assessments, and PERs associated with ARM and CAM equipment, portable radiation detection instrumentation, and respiratory protective program activities were reviewed and assessed. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with licensee procedure SPP-3.1, Corrective Action Program, Rev. 10. Specific CAP documents reviewed and evaluated are listed in Section 2OS3 of the report Attachment.

The inspectors completed 9 of 9 required samples for Inspection Procedure (IP) 71121.03.

b. Findings

Introduction. A Green NRC-identified NCV of 10 CFR 50.47(b)(8) was identified for failure to conduct semiannual surveillances of the Service Building high pressure compressor used to fill SCBA tanks utilized for emergency preparedness activities.

Specifically, the inspectors noted that between October 2004 and April 2006, the licensee failed to conduct semiannual Grade D air quality surveillance tests for this compressor. 10 CFR 50.47 (b)(8) requires that adequate equipment to support emergency response activities be provided and maintained.

Description. From review of licensee procedures and discussion with cognizant licensee personnel, the inspectors noted that SCBA tanks staged for emergency preparedness activities were filled from the high pressure compressor located on the Watts Bar Service Building (TB) 713 foot elevation. Procedure RCI-107, Respiratory Protection Equipment Inspection, Maintenance, Issuance and Accountability, specifies semiannual surveillances to verify Grade D air quality of compressor systems used to provide breathing air. From review and discussion of surveillance records required by RCI-107, the inspectors noted that between October 2004 and April 2006, the licensee failed to complete the semiannual Grade D air quality surveillances for the high pressure compressor located on the 713' TB elevation. Further, the inspector noted that during the subject period when the surveillances were missed, numerous SCBA tanks were filled using the subject system.

Licensee representatives noted that no maintenance activities were performed on the subject compressor system during this time period. In addition, air quality analysis for an April 2006 sample taken in response to the NRC inspection met the Grade D requirements.

Analysis. The inspectors determined that the failure to conduct the required surveillances to assure Grade D quality for the high pressure system used to supply air for filling the SCBA tanks was a performance deficiency. The failure to conduct the surveillances could impair licensee actions to support emergency plan response activities. This finding is associated with the facilities and equipment attribute of the Emergency Preparedness Cornerstone and adversely affects the cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of radiological emergency and is, therefore, more than minor. This finding was evaluated using the Emergency Preparedness SDP and determined to be of very low safety significance (Green). The fact that the supplied air met the Grade D quality requirements once tested in April 2006 was the basis for the finding not being a planning standard problem and, therefore, a Green significance determination.

Enforcement. 10 CFR 50.47(b)(8) requires licensees to maintain facilities and equipment that are required by the emergency plan. RCI 107, Respiratory Protection Equipment Inspection, Maintenance, Issuance and Accountability, specifies that systems used to provide breathing air are tested semiannually to assure Grade D air quality.

Contrary to the above, the licensee failed to conduct semiannual Grade D air surveillances between October 2004 and April 2006 for the Service Building compressor which is used to fill SCBA bottles used to implement the Emergency Plan activities. Because the failure to conduct semiannual Grade D air quality tests was determined to be of very low safety significance and has been entered into the licensee's CAP as PER 100604, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000390/2006003-04, Failure to maintain established Grade D Air Quality surveillance frequency for high pressure compressors used to supply emergency preparedness SCBA air tanks.

**Cornerstone: Public Radiation Safety**

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems

a. Inspection Scope

Effluent Monitoring and Radwaste Equipment During inspector walk-downs, accessible sections of the liquid and gaseous radioactive waste (radwaste) and effluent systems were assessed for material condition and conformance with system design diagrams. The inspection included various liquid radwaste tanks, mobile radwaste demineralizer equipment, waste disposal system effluent monitor 0-RE-90-122, essential raw cooling water effluent monitors 0-RE-90-133, 134, 140 and 141, turbine building sump effluent monitor 0-RE-90-212, auxiliary building ventilation effluent monitor 0-RE-90-101, and associated effluent sample lines. The inspectors interviewed chemistry supervision regarding radwaste equipment configuration requirements for representative sampling and effluent monitor operation.

The inspectors reviewed performance records and calibration results for selected radiation monitors, flowmeters, and air filtration systems. For liquid effluent radiation monitors 0-RE 90-212 and 0-RE 90-122, the inspectors reviewed the last two loop calibration records. The most recent surveillances for the containment purge and auxiliary building gas treatment systems High Efficiency Particulate Air (HEPA) filtration and charcoal beds were also reviewed. The inspectors evaluated out-of-service effluent monitor logs and selected compensatory action data for the period of January 2005 - February 2006.

Installed configuration, material condition, operability, and reliability of selected effluent sampling and monitoring equipment were reviewed against details documented in the following: 10 CFR Part 20; RG 1.21, Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials In Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants; ANSI-N13.1-1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities; and UFSAR, Chapters 11 and 12. Procedures and records reviewed during the inspection are listed in Section 2PS1 of the report Attachment.



Effluent Release Processing and Quality Control Activities The inspectors observed the preparation and counting of particulate, iodine, and tritium samples from weekly gaseous and liquid releases. Chemistry technician proficiency in collecting, processing, and counting the samples, as well as preparing the applicable release permits was evaluated.

Quality Control (QC) activities regarding gamma spectroscopy and beta-emitter detection were discussed with count room technicians and Chemistry supervision. The inspectors reviewed daily QC data logs for High Purity Germanium (HPGe) detectors No. 1 and 4 and reviewed licensee procedural guidance for count room QC. In addition, the inspectors reviewed the last two calibration records for HPGe detectors No. 1 and 4. Results of the 2004 and 2005 radiochemistry cross-check program were also reviewed.

Selected parts of three procedures for effluent sampling, processing, and release were evaluated for consistency with licensee actions. One liquid and two gaseous release permits were reviewed against Offsite Dose Calculation Manual (ODCM) specifications for pre-release sampling and effluent monitor setpoints. The inspectors also reviewed the 2004 and 2005 annual effluent reports to evaluate reported doses to the public and to review ODCM changes.

The inspectors discussed the status of licensee corrective actions and evaluated the licensee's groundwater monitoring results for previously identified abnormal liquid releases from degraded radioactive waste piping and spent fuel pool (SFP) transfer tube leakage. The evaluations included review of current SFP telltale drain system maintenance activities, specific groundwater well and sump radionuclide monitoring analyses conducted and results obtained, and potential offsite dose consequences subsequent to replacement of the degraded radioactive waste piping and sealing of the SFP transfer tube leaks. Licensee current capabilities and routine surveillances to minimize and to rapidly identify any abnormal leaks from systems, structures, and components associated with liquid radioactive waste tanks and processing lines, and spent fuel pools and associated equipment were discussed.

Observed task evolutions, count room activities, and offsite dose results were evaluated against details and guidance documented in the following: 10 CFR Part 20 and Appendix I to 10 CFR Part 50; ODCM; RG 1.21; RG 1.33, Quality Assurance Program Requirements (Operation); and TS Section 5. Procedures and records reviewed during the inspection are listed in Section 2PS1 of the report Attachment.

Problem Identification and Resolution Nine PERs and one quality assurance audit associated with effluent release activities were reviewed and assessed. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve selected issues in accordance with procedure SPP-3.1, Corrective Action Program, Rev. 10. Reviewed documents are listed in Section 2PS1 of the report Attachment.

The inspectors completed 10 of 10 required samples for IP 71122.01.

b. Findings

No findings of significance were identified.

2PS3 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Programa. Inspection Scope

REMP Implementation The inspectors observed routine sample collection and surveillance activities as required by the licensee's REMP. The inspectors noted the material condition and operability of airborne particulate filter and iodine cartridge sample stations at monitoring locations PM-2, PM-3, RM-3, LM-1, LM-2, and LM-3. Environmental thermoluminescent dosimeters (TLDs) NW-3, NNE-3, NNW-4, NNE-1A, SSW-2, and NE-1 were checked for material condition and appropriate identification. Collection of a milk sample was observed at the sample location designated as Farm L. In addition, automatic water samplers were inspected for material condition at river water locations TRM517.9, TRM523.1, and TRM529.3, and onsite groundwater locations A and B. The inspectors determined the current location of selected air samplers, TLDs, water samplers, and dairy farm using NRC global positioning system instrumentation. Land use census results, changes to the ODCM, and sample collection/processing activities were discussed with environmental technicians.

The inspectors reviewed the last two calibration records for selected environmental air samplers. The inspectors also reviewed the 2004 and 2005 Radiological Environmental Operating Reports, results of the 2004 and 2005 interlaboratory cross-check program, a procedure for environmental sample collection and processing, and two ODCM Special Reports for tritium in onsite groundwater. Selected environmental measurements were reviewed for consistency with licensee effluent data, evaluated for radionuclide concentration trends, and compared with detection level sensitivity requirements.

Procedural guidance, program implementation, and environmental monitoring results were reviewed against: 10 CFR Part 20; Appendix I to 10 CFR Part 50; TS Section 5.0; ODCM; RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operation) - Effluent Streams and the Environment; and the Branch Technical Position, An Acceptable Radiological Environmental Monitoring Program - 1979. Documents reviewed are listed in Section 2PS3 of the report Attachment.

Meteorological Monitoring Program During a weekly surveillance of the meteorological tower, the inspectors observed the physical condition of the tower and discussed equipment operability and maintenance history with a technician. The inspectors compared locally generated meteorological data with information available to control room operators. For the 10 meter meteorological measurements of wind speed, wind direction, and temperature, the inspectors reviewed calibration records for applicable tower instrumentation and evaluated measurement data recovery for 2004 and 2005.

Licensee procedures and activities related to meteorological monitoring were evaluated against: ODCM; FSAR Section 2.3; ANSI/ANS-2.5-1984, Standard for Determining Meteorological Information at Nuclear Power Sites; and Safety Guide 23, Onsite Meteorological Programs. Documents reviewed are listed in Section 2PS3 of the report Attachment.

Unrestricted Release of Materials from the Radiologically Controlled Area (RCA) The inspectors observed surveys of material and personnel being released from the RCA using Gamma Tool Monitor (GTM), Personnel Contamination Monitor (PCM), and Portal Monitor instruments. The inspectors also observed source checks of these instruments and discussed equipment sensitivity and release program guidance with licensee staff. To evaluate the appropriateness and accuracy of release survey instrumentation, radionuclides identified within recent waste stream analyses were compared with radionuclides used in current calibration sources and performance check sources. The inspectors also reviewed the last two calibration records for selected GTM, PCM and Portal Monitor instruments.

Licensee programs for monitoring materials and personnel released from the RCA were evaluated against 10 CFR Part 20 and IE Circular 81-07, Control of Radioactively Contaminated Material. Documents reviewed are listed in Section 2PS3 of the report Attachment.

Problem Identification and Resolution The inspectors reviewed selected PERs and an audit in the areas of environmental monitoring, meteorological monitoring, and release of materials. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with procedure SPP-3.1, Corrective Action Program, Rev. 10. Documents reviewed are listed in section 2PS3 in the Attachment to this report.

The inspectors completed 10 of 10 required line-item samples detailed in IP 71122.03.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator (PI) Verifications

a. Inspection Scope

Licensee records were reviewed to determine whether the submitted PI statistics were calculated in accordance with the guidance contained in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline.

### Mitigating Systems and Barrier Integrity Cornerstones

The inspectors verified the accuracy of the data for the PIs, listed below, which was reported to the NRC. The inspectors reviewed data from April 1, 2004, through March 31, 2006. The inspectors reviewed licensee event reports and maintenance rule records to verify the accuracy of the safety system functional failures PI data. Additionally, portions of the operator and chemistry logs were reviewed to verify that the licensee had accurately determined the RCS maximum dose equivalent iodine-131 activity and leakage during the period reviewed. The inspectors also observed chemistry personnel obtain and analyze an RCS sample using licensee procedures CM-6.24, Sampling CVCS Mixed Bed Demineralizers, CM-7.10, Degassing Operations and CM-7.17, Preparation of Samples for Degassed Liquid Activity Determination.

- Safety system functional failures (Mitigating System Cornerstone)
- RCS identified leakage (Barrier Integrity Cornerstone)
- RCS specific activity (Barrier Integrity Cornerstone)

### Occupational Radiation Safety Cornerstone

For the PI listed below, the inspectors reviewed PER records generated from January 2005 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 2005. In addition, licensee procedural guidance for classifying and reporting PI events was evaluated. Reviewed documents are listed in Section 4OA1 of the report Attachment.

- Occupational Exposure Control Effectiveness

### Public Radiation Safety Cornerstone

For the PI listed below, 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 2005. 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. Reviewed documents are listed in Section 4OA1 of the report Attachment.

- RETS/ODCM Radiological Effluents Occurrence

### b. Findings

No findings of significance were identified.

## 4OA2 Identification & Resolution of Problems

### .1 Review of Items Entered into the Corrective Action Program (CAP)

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 CAP. This review was accomplished by reviewing daily problem evaluation report (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 4OA2.1. The inspectors' review nominally considered the six-month period of January through June 2006, 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 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. The licensee site support organization 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 management. 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. The inspectors identified the following areas of interest during this trend review:

- The number of temporary alterations has increased from 12 to 21 during this period. Thirteen of the 21 temporary alterations are on secondary or non-safety systems. The licensee is aware of the large number of temporary alterations and is working to reduce the number by implementing design changes or completing corrective maintenance so the temporary alteration can be removed.

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- Steam generator tube leakage increased slightly during this period to detectable levels and continued to increase slowly. Tube leakage was less than one gallon per day and is projected to be two to three gallons per day by the end of the cycle in September 2006. TS allow up to 150 gallons/day leakage on each steam generator. The licensee is closely monitoring this trend.
- The inspectors identified three examples of failure to implement corrective actions during the first quarter. Procedures were revised as directed by the CAP but field personnel failed to implement the procedures as revised. All three examples were related to completed corrective actions for NCVs. The inspectors determined each example was minor. The licensee initiated PERs for each issue.

.3 Annual Sample: Review of PERs Open More Than One Year

a. Inspection Scope

The inspectors reviewed all PERs with open corrective actions greater than one year old to determine if adequate interim corrective actions were identified and implemented to minimize the problem and/or mitigate its effects, until the permanent action could be implemented. Specific documents reviewed are listed in the attachment.

b. Assessment and Observations

One finding of significance was identified as noted below. Overall, problems were identified and properly evaluated for operability/reportability issues. Any interim actions, if required, were adequately addressed and documented in the corrective action program.

Introduction. A Green NRC-identified Non-cited Violation (NCV) of Technical Specification (TS) 3.3.3, "Post Accident Monitoring (PAM) Instrumentation," was identified for failure to take the required actions when the containment high range radiation monitors (HRRMs) were not restored to operable status within the allowed outage time.

Description. On February 20, 2001, the licensee initiated PER 13755 to review NRC Information Notice (IN) 97-45, S1, Environmental Qualification Deficiency for Cables and Containment Penetration Pigtailed. The licensee's initial review determined that the containment HRRMs were the only devices susceptible to the temperature induced current (TIC) phenomenon as described in the referenced IN. On July 12, 2005, the licensee concluded that the review of test data from both EPRI and the University of Connecticut revealed that the TIC phenomenon would cause false high indications on the HRRMs during the rapid temperature rise that would initially occur inside containment during a loss of coolant accident or a high energy line break. Conversely during the same accidents, once the containment air return fans start, the rapid temperature decrease would result in the HRRMs providing a false low indication to the point of causing a loss of signal alarm. The containment HRRMs are required post

accident monitoring equipment that is evaluated during an accident to assist in determining the required emergency action level in accordance with the site's radiological emergency plan. In order to eliminate the TIC phenomenon, the licensee is planning to issue a design change to replace the HRRM cabling during a future refueling outage.

During a review of longstanding PER corrective actions, the inspectors determined that the licensee had not implemented interim corrective actions to ensure the emergency response organization (ERO) was aware of the potential for the HRRMs to provide false indications during accidents. When questioned by the inspectors whether the issue warranted interim corrective actions, the licensee initiated PER 100095. As an immediate action, the emergency preparedness organization issued an interim instruction to members of the ERO responsible for making emergency classifications. The instruction described the TIC phenomenon and provided guidance on using diverse sources to validate HRRM readings. The functional evaluation from PER 100095 considered the HRRMs operable, but degraded/non-conforming.

Upon further review of the TIC phenomenon, the inspectors determined that during accident temperature transients, the HRRMs were not capable of performing their specified safety function due to system capability being degraded to a point where it could not perform with reasonable expectation or reliability. The TIC phenomenon would cause control room meters, annunciators and alarms to give anomalous and potentially confusing indications to the operators and the ERO. These anomalous indications would be present for approximately the first 45 minutes of an accident. These observations were discussed with plant management. Subsequently, the licensee declared all four HRRMs inoperable on July 21, 2006, and initiated PER 107282.

Analysis. The inspectors determined that the licensee's failure to take the required technical specification actions was a performance deficiency since the HRRM TIC effects could impair licensee efforts to support emergency response activities. The finding is more than minor because it is associated with the facilities and equipment attribute of the Emergency Preparedness Cornerstone and adversely affects the cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of radiological emergency. This finding was evaluated using Sheet 1, Failure to Comply, of Manual Chapter 0609, Appendix B, Emergency Preparedness Significance Determination Process (SDP). The finding is of very low safety significance because the performance deficiency was a failure to comply with a non-risk significant planning standard and no planning standard function failure occurred since other parameters could be used to validate the indications from the containment HRRMs. The cause of the finding is related to the cross-cutting element of problem identification and resolution, in that, the licensee failed to adequately evaluate the condition for impact on equipment operability.

Enforcement. TS 3.3.3 requires that with two required PAM channels being inoperable for greater than 7 days, the licensee shall submit a PAM report to the NRC within the following 14 days detailing the preplanned alternate method of monitoring, the cause of

the inoperability, and the plans for restoring the HRRM channels to operable status. Contrary to this, from July 12, 2005, through July 21, 2006, the licensee failed to restore the HRRMs to operable status or submit the required PAM report. In addition, the licensee failed to take interim actions to establish a preplanned method of monitoring. Because this violation was determined to be of very low safety significance and has been entered into the licensee's corrective action program as PER 107282, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000390/2006003-01, Failure to Comply with Technical Specification Required Actions for Two Inoperable Containment High Range Radiation Monitors.

.4 Annual Sample: Failure to Establish Contingency Plan for Orange Risk Condition Involving Electrical Power (NCV 05000390/2005002-06)

a. Inspection Scope

The inspectors reviewed the implementation of corrective actions for NCV 05000390/2005002-06, Failure to Establish Contingency Plan for Orange Risk Condition Involving Electrical Power, which was documented in Level B PER 77673.

b. Assessments and Observations

No findings of significance were identified. The inspectors reviewed the licensee's apparent cause determination and corrective actions based on that determination. The "why staircase" developed by the licensee for determining the apparent cause determined that there were two causes: the orange condition was overlooked by the individual putting together the safety plan; and there was not a formalized process for reviewing and approving the safety plan.

The inspectors reviewed the planned corrective actions and determined that the actions appeared adequate to correct the identified deficiencies. Three corrective actions were implemented to address the two identified causes. The corrective actions consisted of revisions to licensee procedures SPP-7.2 and O&SSDM 4.0, Operational Defense-In-Depth Assessment. The inspectors reviewed the completed corrective actions and determined that the completed actions adequately addressed the identified causes with one exception. The body of O&SSDM 4.0 was revised; however, Attachment 2, WBN Defense-In-Depth Assessment, was not updated to indicate that a contingency plan was required for Orange risk conditions. The Attachment would require a contingency plan for Red risk conditions and would not alert the user that a contingency plan was required, by procedure, for Orange risk conditions. The licensee initiated PER 106654 to track and resolve this discrepancy.



#### 4OA3 Event Followup

##### .1 Reactor trip due to high turbine vibration

###### a. Inspection Scope

The inspectors reviewed the licensee's event critique and PER 104097, which documented this event in the CAP, to verify that the cause of the reactor trip event of May 30, 2006, was identified and that corrective actions were reasonable. The inspectors reviewed plant parameters and verified that timely notifications were made in accordance with 10 CFR 50.72, that licensee staff properly implemented the appropriate plant procedures, and that plant equipment performed as required.

###### b. Findings

No findings of significance were identified.

##### .2 (Closed) Licensee Event Report (LER) 05000390/2006-002-000: Potential Loss of Cooling to the Chemical and Volume Control Seal Water Heat Exchanger During an Appendix R Fire

On January 27, 2006, during an operating experience review, licensee personnel identified a scenario in which an 10 CFR 50 Appendix R fire event could result in a loss of component cooling water (CCS) to the chemical and volume control system seal water heat exchanger (reactor coolant pump [RCP] seal return). The loss of CCS to the seal water heat exchanger results in high suction temperature on the running charging pump (CCP) causing a lack of adequate suction head. The temperature could be high enough to potentially damage both the CCP and the RCP seals. The enforcement aspects of this finding are discussed in Section 4OA7. This LER is closed.

##### .3 (Closed) LER 05000390/2006-003-000: Fire Protection Header Isolation

On February 1, 2006, fire protection header isolation valve 0-ISV-26-1351 was found in the closed position with a danger tag on the valve after the clearance had been released. As a result, portions of the automatic water suppression system for the control and auxiliary buildings were isolated without the required fire watches established. The licensee determined the casus to be: 1) non-licensed assistant unit operators were overconfident that they could perform the task error free and allowed complacency to affect use of error reduction tools; and 2) individuals developing clearance restoration plan and work order header charging instructions did not coordinate the activities sufficiently. The licensee initiated PER 96327 with corrective actions that included coaching individuals involved and establishing operation's standing order 2006-005 which covered the expectations and guidelines for hanging and removing tagouts. The finding was determined to have very low safety significance (Green) using Appendix F of the SDP because of the duration that the header was isolated and because of the low number of potential fire ignition sources in the affected areas. Additionally, the areas were monitored by smoke detection instrumentation, and

there were nearby hose stations which could be used for fire suppression activities. This licensee-identified finding involved a violation of Facility Operating License NPF-90 for Watts Bar Nuclear Plant Unit 1. The enforcement aspects of this finding are discussed in Section 4OA7. This LER is closed.

#### 4OA5 Other

##### .1 (Closed) NRC Temporary Instruction (TI) 2515/165: Operational Readiness of Offsite Power and Impact on Plant Risk

The inspectors reviewed licensee procedures and controls and interviewed operations and maintenance personnel to verify these documents contained specific attributes delineated in the TI to ensure the operational readiness of offsite power systems in accordance with plant TS; the design requirements provided in 10 CFR 50, Appendix A, General Design Criterion 17, Electric Power Systems; and the impact of maintenance on plant risk in accordance with 10 CFR 50.65(a)(4), Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants. Documents reviewed are listed in the attachment. Appropriate documentation of the results of this inspection was provided to NRC headquarters staff for further analysis as required by the TI. This completes the Region II inspection of TI requirements for the Watts Bar Nuclear Station.

##### .2 (Closed) VIO 05000390/2005013-01, Failure to Implement and Maintain Shutdown Procedures which Resulted in Pressurizer PORV Actuations

Based on the satisfactory results of the supplemental inspection documented in IR 05000390/2006010 and the licensee's established corrective actions, this violation was determined to be sufficiently addressed to close the associated open item. Given the licensee's acceptable performance in addressing the lifting of the pressurizer power operated relief valves, the White finding associated with this issue will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in IMC 0305, "Operating Reactor Assessment Program."

##### .3 Inspection Procedure (IP) 50001: Steam Generator Replacement Inspection

###### a. Inspection Scope

The inspectors reviewed the licensee's control of excavation and fill operations in preparation for the steam generator replacement outage to verify that changes to plant elevations would not affect the plant's drainage system and direction of rain water runoff. The inspectors reviewed the design change notice for grading controls and verified elevations measurements.

###### b. Findings

No findings of significance were identified.

#### 4OA6 Meetings, Including Exit

The inspectors presented the inspection results to Mr. M. Skaggs and other members of licensee management on July 12, 2006. 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 violations of very low safety significance were identified by the licensee and are violations of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600 for being dispositioned as NCVs:

- Facility Operating License NPF-90 for Watts Bar Nuclear Plant Unit 1, Condition 2.F, requires that TVA shall implement and maintain in effect all provision of the approved fire protection program as described in the Fire Protection Report (FPR). The FPR Operating Requirement (OR) 14.3.1.a.2 requires establishing a roving fire watch and backup suppression when portions of the water-based fire suppression system are inoperable. Contrary to this, from January 27, 2006, to February 1, 2006, a fire header isolation valve was inadvertently left shut while clearing a tagging hold order, and a roving fire watch and backup suppression were not established. The shut valve isolated portions of the water-based fire suppression system in the control and auxiliary buildings. This was identified in the licensee's CAP as PER 96327. This finding was of very low safety significance because of the duration that the header was isolated and because of the low number of potential fire ignition sources in the affected areas. Additionally, the areas were monitored by smoke detection instrumentation, and there were nearby hose stations which could be used for fire suppression activities.
- 10 CFR 50, Appendix R, III.G.a., requires that one train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station remain free of fire damage. Contrary to the above from 1996 until February 1, 2006, one train of systems necessary to achieve and maintain hot shutdown conditions would not be free from fire damage. Specifically, the power and control cables for the 1A-A and 1B-B component cooling system (CCS) pumps, one of which must remain operating to achieve and maintain hot shutdown, are located within the same fire areas and are not separated by more than 20 feet, a one-hour barrier, or a three-hour barrier. This issue is in the licensee's CAP as PER 96145. The inspectors and a Region 2 senior risk analyst performed a Phase 2 SDP using MC 0609, Appendix F, Fire Protection Significance Determination Process. This finding was determined to be of very low safety significance due to the very limited fire ignition sources which could affect the cables of concern and because one train of the emergency core cooling system equipment would be free from fire damage and available to mitigate a reactor coolant pump seal (RCP) loss of coolant accident (LOCA).

- TS 5.11.2(a) requires, in part, that high radiation areas with dose rates greater than 1.0 rem/hr at 30 centimeters but less than 500 rads/hr at 1 meter shall have each entryway conspicuously posted as a high radiation area and shall be provided with a locked or, continuously guarded door or gate that prevents unauthorized entry.

The licensee identified that in July and November 2005 they had inappropriately used flashing lights for the control of locked high radiation areas when a means readily existed to secure the area with a lockable barrier or door. In one instance a pump was posted as high radiation area with flashing lights when the pump was inside a room that had a door that could easily be locked. In the second instance flashing lights were used to control access to the truck bay which could have been controlled using an existing door and a ladder guard. These events are documented in the licensee's CAP as PER 91647. This finding was determined to be of very low safety significance because it did not involve a very high radiation area or unplanned personnel exposure.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee personnel

B. Briody, Maintenance and Modifications Manager  
M. DeRoche, Site Nuclear Assurance Manager  
D. Feldman, Training Manager  
J. Hinman, Manager of Projects  
A. Hinson, Site Engineering Manager  
G. Laughlin, Plant Manager  
P. Pace, Licensing and Industry Affairs Manager  
P. Sawyer, Radiation Protection Manager  
M. Skaggs, Site Vice President  
S. Smith, Operations Superintendent  
D. White, Operations Manager  
J. Bushnell, Licensing  
P. Sawyer, Radiation Protection Manager  
S. Wood, Chemistry Supervisor  
J. Ortez, System Engineer-Liquid Radioactive Waste  
K. Grimm, ALARA Specialist

#### NRC Personnel

J. Bartley, Senior Resident Inspector  
M. Pribish, Resident Inspector

### **ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened and Closed

05000390/2006003-01	NCV	Failure to Comply with Technical Specification Required Actions for Two Inoperable Containment High Range Radiation Monitors (Section 4OA2.3)
05000390/2006003-02	NCV	Failure to establish controls in such a way as does not prevent individuals from exiting a high radiation area. (Section 2OS1)
05000390/2006003-03	NCV	Failure to use procedural controls to control occupational exposure. (Section 2OS1)
05000390/2006003-04	NCV	Failure to perform air quality test for compressors used to supply emergency preparedness SCBA breathing air tanks (Section 2OS3).

Closed

05000390/2006-002-000	LER	Potential Loss of Cooling to the Chemical and Volume Control Seal Water Heat Exchanger During an Appendix R Fire (Section 4OA3.2)
05000390/2006-003-000	LER	Fire Protection Header Isolation (Section 4OA3.3)
2515/165	TI	Operational Readiness of Offsite Power and Impact on Plant Risk (Section 4OA5.1)
05000390/2005013-01	VIO	Failure to Implement and Maintain Shutdown Procedures which Resulted in Pressurizer PORV Actuations (Section 4OA5.2)

Discussed

None.

## **LIST OF DOCUMENTS REVIEWED**

### **Section 1R12: Maintenance Effectiveness**

- WO 06-813556-000, B shutdown boardroom chiller tripped on over pressure
- WBN-VTD-M359-0030, Valve Technical Manual for Metrex Model FTVA-400-WAT
- PER 100635, B-train SDBR chiller tripped on high pressure

### **Section 1R13: Maintenance Risk Assignment & Emergent Work Evaluation**

- Work Week Risk Evaluation - WW 06-305-01
- Work Week Risk Evaluation - WW 06-306-01
- Work Week Risk Evaluation - WW 05-702-01

### **Section 1R14: Personnel Performance During Nonroutine Evolutions**

- E-0, Reactor Trip or Safety Injection
- ES-0.1, Reactor Trip Response
- TI-127, Reactor/Turbine Trip Report

### **Section 1R15: Operability Evaluations**

- NUREG-0588, Interim Staff Position on Environmental Qualification of Safety-related Equipment
- Calculation WBNAPS3-078, Offsite and Control Room Dose Due to a ECCS Leak Outside Containment Following a LOCA
- PER 77145 functional evaluation for RHR Pump 1A seal leakage
- PER 76171 functional evaluation for RHR Pump 1A seal leakage

### **Section 1R19: Post-Maintenance Testing**

- PMUG 0537W, Replacement of ERCW Pump Motor Clutch

### **Section 1R22: Surveillance Test**

- COLR for Watts Bar Unit 1, Cycle 7

### **2OS1 Access Controls to Radiologically Significant Areas**

#### Procedures

MI-68.001, Disassembly and Reassembly of the Reactor Pressure Vessel and Attachments, Rev. 30

Records & Documents

APR 05-023, Rev. 1, ALARA Preplanning Report  
RWP 05009151, Rev. 0, Quarterly Briefing Locked High Radiation Areas  
RWP 05009151, Logbook Entry Report March 18, 2005 to March 24, 2005

Corrective Action Documents

PER 90814, On 3/17/05, during movement of reactor head to reactor head flange, three individuals received electronic dosimeter alarms.  
PER 91647, Interpretation of technical specifications has resulted in less rigorous control of locked high radiation areas when other more positive controls clearly meeting regulatory requirements were readily available.  
PER 91648, Radiological work planning and control for high dose outage evolutions is not always effective at implementing ALARA principles.  
PER 92759, Weaknesses with radiation protection decision making and breakdowns in administrative barriers contribute to unplanned dose to some radiation workers.  
PER 96865, On 2/8/06, two employees were locked in U-1 lower containment during containment day activities.  
Nuclear Assurance Radiological Protection and Control Audit Report SSA0502, Browns Ferry(BFN), Sequoyah (SQN), Watts Bar (WBN) Nuclear Plants and Corporate (COC), 1/19/06

**2OS3 Radiation Monitoring Instrumentation and Protective Equipment**

Procedures, Guidance Documents and Manuals

Radiological Control Instruction (RCI)-107, Respiratory Protective Equipment Inspection, Maintenance, Issuance, and Accountability, Rev. 9  
RCI-109, Radiological Control Portable Instrumentation, Rev. 14  
RCI-110, Calibration of Radiological Control Laboratory Scaler/Counters, Rev. 8  
RCI-112, WBC Operation and Calibration, Rev. 11  
TVA Standard Programs and Processes (SPP) - 3.1, Corrective Action Program, Rev. 10

Records and Data Reviewed

Watts Bar Nuclear (WBN) Plant - Service Air Compressor, High Pressure SCBA Compressor, and WBTC Maintenance Lab Compressor Breathing Air Quality Test Results, dated 10/27/2004  
WBN - Service Air Compressor 'D' Breathing Air Quality Test Results, dated 02/15/2005  
WBN - WBN 713 Foot Service Building SCBA High Pressure Compressor Breathing Air Quality Test Results, 04/10/2006  
Work Order (WO) 05-812751-000, WBN-0-FPS-510-SCBA, Cleaning/Sanitizing, Maintenance, Inspection Storage and Inventory of Positive Pressure MSA SCBAs, conducted 03/39-04/01/2006  
WO 05-813010-000, WBN-0-FPS-510-SCBA, Cleaning/Sanitizing, Maintenance, Inspection Storage and Inventory of Positive Pressure MSA SCBAs, conducted 04/25-26/2006  
Tennessee Valley Authority - S.E.R.T.A of Chattanooga, TN; MSA BMR Certified C.A.R.E Technicians Certification, dated 03/04/2005



TVA Automated Training Information System Qualification List Data as of 04/06-07/2006: Skill KSA 003720, SCBA: for Nuclear Unit Operators, Manager Nuclear Plant Shift Operator, Supervisor, Nuclear Unit Supervisor; Maintenance; Radiation Protection;

WBN Respiratory Qualification Reports for the following Departments: Radiological Controls, Operations, and Maintenance, 05/10/2006

WO 03006111000, Periodic Calibration of the Waste Packaging Area Monitor Loop 0-LPR-90-0003, 12/18/03

WO 04816751000, Periodic Calibration of the Waste Packaging Area Monitor Loop 0-LPR-90-0003, 09/13/05

WO 021587400, 18 Month Channel Calibration (Source Cal) of the General Atomic Fuel Pool Radiation Monitor LOOP 0 - LPR - 90- 102, dated 06/12/03

WO 04820193000, 18 Month Channel Calibration (Source Cal) of the General Atomic Fuel Pool Radiation Monitor LOOP 0 - LPR - 90- 102, dated 11/03/04

WO 030649200, 18 Month Channel Calibration (Source Cal) of the General Atomic Fuel Pool Radiation Monitor LOOP 0 - LPR - 90- 103, dated 11/15/03

WO 04819980000, 18 Month Channel Calibration (Source Cal) of the General Atomic Fuel Pool Radiation Monitor LOOP 0 - LPR - 90- 103, dated 02/02/05

WO 04815889000, 92 Day Channel Operational Test of the General Atomic Fuel Pool Radiation Monitor Loop 0 - LPR - 90- 103, dated 02/02/05

WO 021553800, 18 Month Channel Calibration (Source Cal) of the General Atomic Main Control Room Intake Radiation Monitor LOOP 0-LPR-90-125, 01/31/03

WO 0481312500, 18 Month Channel Calibration (Source Cal) of the General Atomic Main Control Room Intake Radiation Monitor LOOP 0-LPR-90-125, 09/08/04

WO 0319619000, 18 Month Channel Calibration Test of Containment Building Lower Compartment Particulate Radiation Monitor LOOP 1-LPR-90-106A, 04/30/04

WO 0322417000, 92 Day Channel Operational Test of the Containment Building Lower Compartment Particulate Radiation Monitor LOOP 1-LPR-90-106A, 04/23/04

WO 05814419000, 18 Month Channel Calibration Test of Containment Building Lower Compartment Particulate Radiation Monitor LOOP 1-LPR-90-106A, 11/28/05

WO 04813147000, 18 Month Channel Calibration Test of Containment Building Lower Compartment Total Gas Radiation Monitor LOOP 1-LPR-90-106B, 08/14/04

WO 05819451000, 18 Month Channel Calibration Test of Containment Building Lower Compartment Total Gas Radiation Monitor LOOP 1-LPR-90-106B, 01/30/06

WO 021046500, 18 Month Channel Calibration (Source Cal) of Train A Containment Upper Compartment High Range Post Accident Area Radiation Monitor LOOP 1-LPR-90-271, 02/06/03

WO 04813298000, 18 Month Channel Calibration (Source Cal) of Train A Containment Upper Compartment High Range Post Accident Area Radiation Monitor LOOP 1-LPR-90-271, 09/16/04

Calibration Data Sheets for the following portable instrumentation: TVA No. 534101 Bicon/RSO-50, 02/17/06; Bicon/Surveyor 50 TVA No. 841760, 03/10/06; Eberline Teletector TVA No. 522930, 04/07/06; Ludlum 12-4 TVA No. 841776, 02/22/06; Scintrix 309 CMCC010268, 04/10/2006; MiniEDGAR CAM Calibration TVA No. WBID 1550;

Fast Scan Whole Body Counter (WBC) Systems Nos. 1 and 2, Selected Quality Control Data for July through December 2005

Corrective Action Program (CAP) Documents

Problem Evaluation Report (PER) No. 64418, SFP Allowable Value, 07/01/2004  
PER No. 68484, MCR Recorder Clock Times, 09/09/2004  
PER No. 71012, Repeat Maintenance on 0-RM-90-0015, 10/28/2004  
PER No. 74950, 2-LPR-90-1 Not Calibrated, 01/14/2005  
PER No. 76083, Inadequate Documentation for LUD-300 Survey Instrument Placed In-Service, Inadequate Documentation, 02/03/2005  
PER No. 82208, Procedure Not Available to Place CAMs In-Service Following DCN Implementation, 05/08/2005  
PER No. 82325, CAM Deletion-Annunciator Function, 05/10/2005  
PER No. 87988, EPIP-12 Missing SCBA Equipment, 08/21/2005

**2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems**

Procedures

Chemistry Manual, Chapter 9.02, Rev. 9, Chemistry Countroom Quality Assurance Program  
Chemistry Manual, Chapter 9.70, Rev. 19, Gaseous Effluent Radiation Monitor Filter Replacement  
Chemistry Manual, Chapter 9.71, Rev. 37, Gaseous Effluent Grab Sampling  
Chemistry Manual, Chapter 9.73, Rev. 5, Liquid Radwaste Tanks and Liquid Effluent Radiation Monitor Sampling Methods  
Chemistry Manual, Chapter 9.7.101, Rev. 6, Auxiliary Building Exhaust Effluent Monitor Grab Sampling and Filter Replacement  
Chemistry Manual, Chapter 9.7.112, Rev. 0, Gaseous Upper Containment Sampling  
Chemistry Manual, Chapter 9.7.106, Rev. 0, Gaseous Lower Containment Sampling  
Chemistry Manual, Chapter 9.7.119, Rev. 5, Condenser Vacuum Exhaust Gaseous Effluent Grab Sampling  
Chemistry Manual, Chapter 9.7.132, Rev. 0, Service Building Exhaust Effluent Monitor Grab Sampling and Filter Replacement  
CM-9.42 LSC-6500A, Dated 10/13/2004, WBN Chemistry Countroom Chi-Square Analysis, Appendix A, CM Chapter 9.42  
CM-9.20 LSC-6500A, Dated 10/13/2004, WBN CM Chapter 9.60, Appendix A LSC-6500A  
CM932, Appendix B, Dated 08/01/2005, WBN Annual Confirmations Package, 3rd Quarter, Year 2005  
0-ODI-90-1, Rev. 24, Liquid Radwaste Tank Release  
0-ODI-90-1, Surveillance Task Dated April 20, 2006  
0-ODI-90-1, Surveillance Task Dated March 22, 2002  
0-ODI-90-2, Rev. 20, Steam Generator Blowdown Release  
0-ODI-90-2, Surveillance Task Dated 05/30/2005  
0-ODI-90-2, Surveillance Task Dated 03/07/2006  
0-ODI-90-323, Rev. 19, 92 Day Flow Instrument Calibration of the Auxiliary Building Vent Radiation Monitor  
0-ODI-90-3, Rev. 8, Conditional Turbine Building Station Sump Release  
0-ODI-90-5, Rev. 27, Waste Gas Tank Release  
0-ODI-90-5, Surveillance Task Dated 03/04/2006  
0-ODI-90-8, Rev. 10, Monthly Service Building Exhaust Release  
1,ODI-90-15, Rev. 22, Containment Purge Release

0-ODI-90-22, Rev. 19, Weekly Auxiliary Building Exhaust Release  
0-ODI-90-23, Rev. 11, Conditional Condensate Demineralizer Tank Release  
1-ODI-90-25, Rev. 23, Condenser Vacuum Exhaust Release  
1-ODI-90-25, Surveillance Task Dated 04/01/2005  
2-ODI-90-26, Rev. 1, Weekly Sampling of Unit 2 Shield Building Exhaust  
1-ODI-90-26, Rev. 16, Weekly Sampling of Unit 1 Shield Building Exhaust  
0-ODI-90-43, Rev. 7, 18 Month Channel Calibration (Source Cal) of the Waste Disposal System Liquid Effluent Radiation Monitor Loop 0-LPR-90-222  
0-ODI-90-47, Rev. 7, 18 Month Channel Calibration (Source Cal) of the Liquid Radiation Monitor Loop 0-LPR-90-212  
SPP 3.1, Corrective Action Program, Rev. 10  
Watts Bar Nuclear Plant Updated Final Safety Analysis Report, Chapters 11 and 12  
Watts Bar Nuclear Plant Offsite Dose Calculation Manual Rev. 16

Records and Data

WO 04-815750-000, Containment Purge Air Cleanup System Train-B Test  
WO 05-821249-000, Auxiliary Building Gas Treatment System Filter Train-B Test  
WO 05-822077-000, Weekly Auxiliary Building Exhaust Release  
WO 05-810502-000, Weekly Auxiliary Building Exhaust Release  
WO 04-820340-000, Monthly Analysis on Gaseous and Liquid Effluents  
WO 05-818814-000, Monthly Analysis on Gaseous and Liquid Effluents  
WO 05-816252-000, Quarterly Analysis on Gaseous and Liquid Effluents  
WO 04-820341-000, Quarterly Analysis on Gaseous and Liquid Effluents  
WO 04-819365-000, 18 Month Channel Calibration (Source Cal) of the Liquid Radiation Monitor Loop 0-LPR-90-212  
WO 05-824074-000, 18 Month Channel Calibration (Source Cal) of the Liquid Radiation Monitor Loop 0-LPR-90-212  
WO 04-826261-000, 18 Month Channel Calibration (Source Cal) of the Waste Disposal System Liquid Effluent Radiation Monitor Loop 0-LPR-90-222  
WO 031548400, 18 Month Channel Calibration (Source Cal) of the Waste Disposal System Liquid Effluent Radiation Monitor Loop 0-LPR-90-222  
Control Room Computer Screen Snap Shot (TVA 4RM1 Gaseous Rad Monitoring, May 11, 2006, 10:04:52)  
Control Room Computer Screen Snap Shot (TVA 4RM2 Liquid Rad Monitoring, May 11, 2006, 10:04:44)  
Control Room Computer Screen Snap Shot (SDS [Aux Building Exhaust Flow Alarm Set Points], May 11, 2006, 10:11:02)  
Nuclear Assurance - TVAN-Wide - Audit Report No. SSA0502- Radiological Protection and Control Unit  
CM 9.02, WBN Chemistry Manual, Chapter 9.02, Results of Radiochemistry Cross Check Program, 1st, 2nd, 3rd and 4th Quarters 2004  
CM 9.02, WBN Chemistry Manual, Chapter 9.02, Results of Radiochemistry Cross Check Program, 1st, 2nd and 3rd Quarters 2005  
CM Chapter 9.60, Setup and Calibration of the Liquid Scintillation Counters, Dated 10/13/2004 (Instruments No. LSC-6500B and LSC-6500A)

CAP Documents

PER 77153, During plant shutdown for U1C6 RFO on 02/21/05, high rad alarms were received on monitors RM-90-120/121 as a result of higher Steam Generator Blowdown activity from an increase in the primary to secondary leak rate.

PER 78630, On 3/12/05 and 3/14/05 during initial attempt to release Monitor Tank 0-RE-90-122 secured release on High RAD. Monitor count rate was above alarm setpoint. In both cases tank was resampled and verified that the setpoint was correct.

PER 97973, 18 month SGBD Flow Sensor Calibration Frequency is Too Long.

PER 91156, On 10/18/05 at 02:00 2-RE-90-400 was declared inoperable. No REM cart was installed until 07:30 on 10/18/05. 2-ODI-90-26 requires REM cart to be installed within 4 hours of inoperability. No effluent releases were made during the inoperable period.

PER 93983, The work week schedule did not have a support activity for radcon to assist with entries into lower containment for the pocket sump effluent sample points determination.

PER 98384, Based on a recent Operating Experience (OE) report at Braidwood Nuclear Power Plant, the Tritium leakage to groundwater condition at Braidwood needs to be evaluated for Watts Bar. This PER should evaluate: (1) the reporting of groundwater release paths in the Annual Effluent Report and (2) describing the groundwater release paths in the ODCM.

PER 80972, WBN exceeded FY05 Low Level RAD Waste target of 150 cubic meters. WBN generated 174.5 cubic meters ending the second quarter of FY05.

PER 96527, Groundwater monitoring wells K and I could not be located to perform requested sampling. It appears that they were covered over or removed during restoration of the radwaste line excavation.

PER 99035, While performing 0-ODI-77-5042,(05-819927-000), it was found that radwaste effluent flow loop 0-LPF-77-5042 was found out of tolerance.

**2PS3 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program**

Procedures and Guidance Documents

SC-01, Collection of Environmental Monitoring Samples, Rev. 18

EPFS-3, Servicing of Meteorological Equipment at Environmental Data Stations, Rev. 12

RCI-138, Alpha Surveillance and Periodic Radionuclide Assessment Program, Rev. 1

SPP-3.1, Corrective Action Program, Rev. 10

Records

2004 and 2005 Annual Radiological Environmental Operating Reports

2005 Annual Effluent Report

ODCM Special Report T04 050422 804, 4/22/05

ODCM Special Report T04 050721 830, 7/21/05

Radiological Environmental Monitoring Air Sampler Gas Meter Calibration Data Sheets, Serial No. 1030575, 6/17/04 and 5/17/05

Western Area Radiological Laboratory Interlab Crosscheck Results, 2004 and 2005

Meteorological Data Recovery, 10-m wind speed and direction, 10- and 46-m temperatures, 2004 and 2005

Ultrasonic Wind Sensor Calibration Records, Serial No. 878, 9/14/04 and 8/29/05

Resistance Temperature Detector Calibration Record, Serial No. 28694, 3/10/05

PCM-2 Calibration Data Sheets, TVA No. 842398, 4/28/05 and 10/26/05  
PM-7 Calibration Data Sheets, TVA No. 842442, 7/14/05 and 1/5/06  
GTM Calibration Data Sheets, 4/22/05 and 10/19/05  
10 CFR Part 61 Analysis, Dry Active Waste Stream, 3/8/05

Corrective Action Program Documents

Nuclear Assurance Audit Report SSA0502, Radiological Protection and Control Audit, 1/19/06  
PER 102877, ODCM Table 9.2 does not fully describe all three fish sample locations, 5/10/06  
PER 76384, Tritium levels of 550,000 pCi/L found in onsite groundwater monitoring well, 2/8/05  
PER 75309, Meteorological tower fiber optic cable cut during excavation, 1/21/05  
PER 87927, Yellow-handled tool found outside RCA, 8/19/05  
PER 90694, REMP groundwater monitoring sample unavailable due to loss of electrical power, 10/7/05

**40A1 Performance Indicator Verification**

Procedures and Records

SPP-3.1, Corrective Action Program, Rev. 10  
SPP- 3.4, Performance Indicator and MOR Submittal Using INPO Consolidated Data Entry, Rev. 3

**Section 40A2: Identification & Resolution of Problems**

40A2.3 PERS:

- 4155, Thrust and torque calculations not updated after DCN M-20950-A
- 5619, MDAFW level control valves capability to close under high differential pressures
- 12648, Operating experience (OE) review of SQN PER 12648, 480V turbine building common board while being fed from alternate source
- 33454, OE review of GE SIL 448 concerning lubrication and maintenance of AK and AKR circuit breakers
- 34189, Westinghouse OE for DS-206 circuit breaker new style trip latches
- 61423, Westinghouse technical bulletin TB-04-5 concerning RCP inspections/maintenance
- 63296, INPO topical report TR4-35, Analysis of Large Pump Motor Failures Impacting Power Production
- Westinghouse technical bulletin TB-04-20 concerning over-temperature delta-temperature reactor trip function
- 72003, 1A MDAFW pump oil leakage
- 79310, WBN procedure MI-88.003 for containment and ABSCE penetrations
- 80948, OE review of SQN PER 76958, heavy equipment in the switchyard