



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

April 30, 2008

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

**SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT
05000390/2008002 AND 05000391/2008002**

Dear Mr. Campbell:

On March 31, 2008, 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 April 4, 2008, with Mr. M. Skaggs and other members of your staff.

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

This report documents one NRC-identified finding and one self-revealing finding of very low safety significance (Green) which were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they are entered into your corrective action program, the NRC is treating these two findings as non-cited violations (NCVs) consistent with Section VI.A of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Watts Bar facility.

TVA

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

Sincerely,

/RA/

Rebecca Nease, Chief
Reactor Projects Branch 6
Division of Reactor Projects

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

Enclosure: NRC Inspection Report 05000390/2008002, 05000391/2008002
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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Letter to William R. Campbell, Jr. from Rebecca L. Nease dated April 30, 2008

SUBJECT: WATTS BAR NUCLEAR PLANT - NRC INTEGRATED INSPECTION REPORT
05000390/2008 AND 05000391/2008

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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: 05000390/2008002, 05000391/2008002

Licensee: Tennessee Valley Authority (TVA)

Facility: Watts Bar Nuclear Plant, Units 1 and 2

Location: Spring City, TN 37381

Dates: January 1, 2008 - March 31, 2008

Inspectors: R. Monk, Senior Resident Inspector
M. Pribish, Resident Inspector
H. Gepford, Senior Health Physicist (Sections 2OS1, 2OS2, 2PS2, 4OA1)
W. Loo, Health Physicist (Sections 2OS1, 2OS2, 2PS2, 4OA1)
R. Chou, Reactor Inspector (Section 1RO8)
A. Rogers, Reactor Inspector (Section 1RO8)
J. Rivera, Reactor Inspector (Section 4OA5)
M. Coursey, Reactor Inspector (Section 4OA5)

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

Enclosure

SUMMARY OF FINDINGS

IR 05000390/2008-002, 05000391/2008-002; 01/01/2008 - 03/31/2008; Watts Bar, Units 1 & 2; Problem Identification and Radioactive Material Processing and Transportation.

The report covered a three-month period of routine inspection by resident inspectors and announced inspections by two regional radiation specialists and four regional reactor inspectors. One NRC-identified Green finding and one self-revealing Green finding, both of which are non-cited violations (NCVs), were identified. The significance of an issue is indicated by its color (Green, White, Yellow, Red) using the Significance Determination Process in Inspection Manual Chapter 0609, Significance Determination Process (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a NCV of Technical Specification (T.S.) 5.7.1 for failure to properly implement procedural requirements and engineering controls for materials brought into containment while the plant was at power. The procedural violation resulted in temporary equipment/material left in containment with incorrect/incomplete documentation. The licensee entered these issues into the corrective action program (CAP) and either removed or properly evaluated the materials left in containment.

This finding is more than minor because it was associated with the Mitigating Systems Cornerstone attribute of equipment performance, specifically reliability, and adversely affected the cornerstone objective. The finding is of very low safety significance because no equipment was rendered inoperable. The finding directly involved the cross-cutting area of human performance under the procedural compliance aspect of the work practices component, in that, the procedural requirements of the licensee's procedure for containment access were not met and equipment/material left in containment was not properly analyzed and documented. (H.4 (b)) (Section 4OA2)

Cornerstone: Public Radiation Safety

- Green. A self-revealing NCV of 10 CFR 71.5 was identified for failure to properly package radiological material such that, under conditions normally incident to transportation, the radiation levels at the external surface of the package would not exceed applicable Department of Transportation (DOT) limits. When the shipment of equipment arrived at a processing facility on March 3, 2008, the contact radiation dose rate measurement in a small area on the bottom of the

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external surface of one of the packages was 340 mrem/hr, which was in excess of the 200 mrem/hr limit. Subsequent measurements by the licensee determined the dose rate to be 400 mrem/hr. This finding was entered into the licensee's corrective action program as Problem Evaluation Report (PER) 139447.

This finding is more than minor because it is associated with the plant facilities/equipment and instrument attribute of the Public Radiation Safety Cornerstone and adversely affected the cornerstone objective, in that the improper transportation packaging resulted in a shipping container with external dose rates exceeding regulatory requirements. Using the Public Radiation Significance Determination Process, the finding was determined to be of very low safety significance because the area on the package with the elevated radiation level was inaccessible to the public and the radiation level did not exceed two times the DOT limit. This finding was reviewed for cross-cutting aspects and none were identified. (Section 2PS2)

B. Licensee-Identified Violations

None.

REPORT DETAILS

Summary of Plant Status

Unit 1 operated at or near 100 percent power until February 5, 2008, when power was reduced to 60% due to the inadvertent lifting of a moisture separator reheater relief valve. The unit was returned to full power on February 7, 2008, and remained there until February 10, 2008; when the unit was shut down to commence the cycle 8 refueling outage. The unit started up after the refueling outage and was in the process of escalating to full power operation at the end of the inspection period.

Restart of construction on Unit 2 began in December of 2007. Information on Watts Bar Unit 2 reactivation can be found at <http://www.nrc.gov/reactors/plant-specific-items/watts-bar.html>

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R04 Equipment Alignment

.1 Partial Walkdowns

a. Inspection Scope

The inspectors conducted three equipment alignment partial walkdowns, listed below, to evaluate the operability of selected redundant trains or backup systems 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 TS to determine correct system lineups for the current plant conditions. The inspectors performed walkdowns of the systems to verify that critical components were properly aligned and to identify any discrepancies which could affect operability of the redundant train or backup system.

- Walkdown of the B-train auxiliary feedwater (AFW) and turbine-driven auxiliary feedwater (TDAFW) systems while A-train AFW was out of service for scheduled maintenance
- Walkdown of the spent fuel cooling system and support systems
- Walkdown of the 1A and 2A emergency diesel generators (EDGs) while the 1B EDG was out of service for corrective maintenance

b. Findings

No findings of significance were identified.

.2 Semiannual Complete System Walkdown

a. Inspection Scope

The inspectors conducted one detailed walkdown/review of the alignment and condition of the safety injection system to verify proper equipment alignment and to identify any discrepancies that could impact the function of the system and increase risk. The inspectors utilized licensee procedures, as well as licensing and design documents, when verifying that the system alignment was correct. During the walkdown, the inspectors also verified, as appropriate, that: (1) valves were correctly positioned and did not exhibit leakage that would impact the function(s) of any valve; (2) electrical power was available as required; (3) major portions of the system and components were correctly labeled, cooled, ventilated, etc.; (4) hangers and supports were correctly installed and functional; (5) essential support systems were operational; (6) ancillary equipment or debris did not interfere with system performance; (7) tagging clearances were appropriate; and (8) valves were locked as required by the licensee's locked valve program. Pending design and equipment issues were reviewed to determine if the identified deficiencies significantly impacted the system's functions. Items included in this review were the operator workaround list, the temporary modification list, system health reports, and outstanding maintenance work requests/work orders (WOs). In addition, the inspectors reviewed the licensee's CAP to ensure that the licensee was identifying equipment alignment problems and that they were properly addressed for resolution

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

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

- Control room emergency ventilation system
- Vital DC boardroom I, II, III, IV
- A 6.9 KV shutdown boardroom (SDBR)
- B 6.9 KV SDBR
- Motor-driven auxiliary feedwater (MDAFW) pumps/component cooling system pumps

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

a. Inspection Scope

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

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection (ISI) Activities

.1 Piping Systems ISI

a. Inspection Scope

The inspectors reviewed the implementation of the licensee's ISI program for monitoring degradation of the reactor coolant system (RCS) boundary and risk significant piping system boundaries. The inspectors reviewed a sample from activities performed during the Unit 1 Cycle 8 (U1C8) Refueling Outage (RFO) including: a) nondestructive examinations (NDE) required by the 2001 Edition through 2003 Addenda, of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI; b) examinations of reactor pressure vessel (RPV) head and head penetrations in accordance with NRC Order EA-03-009 under Temporary Instruction (TI) 2515/150, contained in Section 4OA.5; c) Boric Acid Program activities done in response to GL 88-05; d) steam generator examination activities in accordance with TS and industry guidelines; and e) augmented examination commitments. The inspectors also reviewed the procedures, equipment, personnel qualifications, and work packages and observed ultrasonic examinations and the operation of the mechanical stress improvement process on the pressurizer surge line nozzle to safe end weld, related to the implementation of Material Reliability Program (MRP) – 139. The inspectors reviewed Self Assessment CRP-ENG-SS-07-003, Snapshot Assessment – Watts Bar ISI Program Reporting.

Specifically, the inspectors reviewed NDE procedures, reports, equipment calibration and certification records, personnel qualification records, for the following NDE activities.

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- Ultrasonic (UT) examination of Pressurizer 15" diameter surge line, nozzle to safe end dissimilar weld WP-10-SE
- UT examination of pressurizer 8" diameter safety line, nozzle to safe end dissimilar weld WP-13-SE
- UT examination of pressurizer 6" diameter spray line, nozzle to safe end dissimilar weld WP-11-SE
- Liquid Penetrant (PT) examinations of pressurizer level sensing line welds 1-068A-T074-23A, 24B, 38A, 47A, & 48C
- Visual (VT) examination of pipe support 1-63-005
- VT examinations of reactor vessel bottom head and bottom-mounted instrument connections

Recordable indications accepted by the licensee for continued service since the previous refueling outage.

- VT examination indications on the spring can setting of pipe support 63-1SIS-R207

The inspectors reviewed the following repair/replacement activities for compliance with ASME Code. Specifically, the inspectors reviewed weld process control sheets, welder operating instructions, welding procedure specifications, welding procedure qualification records, welder qualification records, certified material test reports for weld material, and NDE reports.

- Weld Repair/Replacement WO 07-817814-000, Adding Vent Valves for Safety Injection Relief Valves 1-RFV-063-0534, 0535, and 0536

b. Findings

No findings of significance were identified.

.2 Pressurized Water Reactor Vessel Upper Head

a. Inspection Scope

The inspection for the vessel upper head and head penetrations in accordance with NRC Order EA-03-009 was documented under Section 4OA.5, Other Activities: Temporary Instruction TI-2515/150, Reactor Pressure Vessel Head and Vessel Head Penetration Nozzles.

b. Findings

No findings of significance were identified.

.3 Boric Acid Corrosion Control (BACC) Program

a. Inspection Scope

The inspectors reviewed the licensee's BACC program to ensure compliance with commitments made in response to NRC Generic Letter 88-05, Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary, and Bulletin 2002-01, Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity.

The inspectors conducted an on-site record review and an independent walkdown of the containment building, which is not normally accessible during at-power operations, to evaluate licensee compliance with their program procedures and applicable industry guidance. In particular, the inspectors verified that the licensee's visual examinations focused on locations where boric acid leaks could cause degradation of safety-related components and that degraded or non-conforming conditions were properly identified in the licensee's CAP.

b. Findings

No findings of significance were identified.

.4 Steam Generators

a. Inspection Scope

From February 20-22 and 26-27, 2008, the inspectors reviewed the Unit 1 steam generator (SG) tube eddy current testing (ECT) examination activities to ensure compliance with TS, applicable industry operating experience and technical guidance documents, and ASME Code Section XI requirements.

The inspectors reviewed licensee SG inspection activities to ensure that ECT inspections were conducted in accordance with the licensee's SG program and applicable industry standards. The inspectors reviewed the SG examination scope, ECT acquisition procedures, examination technique specification sheets, ECT analysis guidelines, the most recent SG degradation assessment and operational assessment, and also the condition monitoring results as they became available. The inspectors reviewed documentation to ensure that the ECT probes and equipment configurations used were qualified to detect the expected types of SG tube degradation. The inspectors ensured that all tubes evaluated in condition monitoring were appropriately screened for in-situ testing. No tubes met the criteria for in-situ testing.

The inspectors monitored the licensee's secondary side activities, which included a foreign object search and recovery for loose parts, and sludge lancing. The inspectors reviewed data results for tubes for bobbin probe and +point inspection of:

- SG 1: Row 24, Column 125
- SG 2: Row 36, Column 5
- SG 3: Row 6, Column 1; Row 88, Column 33; and Row 58, Column 115

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- SG 4: Row 86, Column 95

b. Findings

No findings of significance were identified.

.5 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed a review of ISI related problems, including welding, and the BACC program that were identified by the licensee and entered into the CAP as problem evaluation report (PER) documents. The inspectors reviewed the PERs to confirm that the licensee had appropriately described the scope of the problem and had initiated corrective actions. The review also included the licensee's consideration and assessment of operating experience events applicable to the plant. The inspectors performed this review to ensure compliance with 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, requirements. The corrective action documents reviewed by the inspectors are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification

a. Inspection Scope

On January 15, 2008, the inspectors observed the simulator evaluations for a staff crew per 3-OT-SRT-ECA3-1A, Revision 0, Faulted-Ruptured Steam Generator. The plant conditions led to a site area emergency level classification.

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

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

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

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b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the two performance-based problems listed below. The focus of the reviews was to assess the effectiveness of maintenance efforts that apply to scoped structures, systems, or components (SSCs) and to verify that the licensee was following the requirements of 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).

- Failure causing containment spray sump valve B to be inoperable for one complete cycle
- Safety-related equipment impact during ERCW system flushes performed online and during outages

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 four 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.

- Maintenance risk associated with failure of TDAFW pump speed control circuit
- Maintenance risk assessment associated with review of ORAM vs. defense-in-depth sheet vs. plant conditions
- Maintenance risk assessment associated with shifting the C-S spent fuel pool cooling pump from B-train power to A-train power for one hour during which time only one train was operating and available (B-train)
- Emergent risk assessment due to 1B EDG unplanned unavailability

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 the compensatory measures, if involved, were in place, would work as intended, and were appropriately controlled; (4) where continued operability was considered unjustified, the impact on TS Limiting Conditions for Operation (LCOs) and the risk significance in accordance with the SDP. The inspectors verified that the operability evaluations were performed in accordance with SPP-3.1, Corrective Action Program.

- PER 135754, 1A containment spray system heat exchanger – flow blockage on inlet piping
- PER 134772, B-train SDBR oil heater failure
- PER 135473, Diesel generator CO₂ door seals missing
- PER 136391, ERCW piping less than minimum wall thickness
- PER 131378, Ice condenser/ice loading requirements

b. Findings

No findings of significance were identified.

1R18 Plant Modifications

a. 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: (1) the installation of the temporary modification was in accordance with the work package; (2) adequate configuration control was in place; (3) procedures and drawings were updated; and (4) post-installation tests verified operability of the affected systems.

- WO 08-811045-000, Thermal barrier booster pump containment isolation valve spuriously closing

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testinga. Inspection Scope

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

- WO 07-821769, A ERCW pump impeller adjustment
- WO 07-816330-000, 1-SI-211-3-A, 18-month system functional test on 6900v shutdown board (SDBD) 1A-A degraded voltage and UV relays, following relay calibration tests
- WO 08-812227, 1B CCP failed to start during 1-SI-82-4, 18-month loop w/SI test EDG 1B-B
- WO 07-820360-000, B-MCR chiller TCV inspection and rebuild
- WO 08-812330-000, #3 RCP normal feeder breaker failed to open during 1-SI-0-53-A, 18-month verification of remote shutdown transfer switches for Train-A
- WO 07-822902-002, Revision 0, Trip/throttle would not fully shut on actuation allowing turbine to continue to roll
- WO 07-822902-002, Revision 1, Electric overspeed solenoid actuated but would not unlatch trip/throttle valve, replaced trip crank

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activitiesa. Inspection Scope

The inspectors reviewed the outage risk control plan for the upcoming U1C8 RFO to assess whether the licensee had appropriately considered risk, industry experience, and previous site-specific problems, and to also confirm that the licensee had mitigation/response strategies for losses of key safety functions.

The licensee began its U1C8 RFO on February 10, 2008. From that date through the end of the RFO, the inspectors observed portions of the shutdown, cooldown, defueling, maintenance activities, reduced inventory and midloop operations, refueling, heatup, and startup to verify that the licensee maintained defense-in-depth (DID) commensurate with the outage risk plan and applicable TS. During the outage, the inspectors also reviewed the licensee's control of heavy loads to ensure the licensee was properly handling heavy loads in areas where a load drop could impact fuel in the reactor core or equipment that

would be required to achieve safe shutdown. To do this the inspectors examined the licensee's basis for considering the containment polar crane to be single-failure proof in order to verify that it met industry standards, reviewed the polar crane testing and inspection done prior to lifting the reactor head, and observed the initial head lift to verify that it complied with the safe load path specified in licensee procedures.

The inspectors monitored licensee controls over the outage activities listed below. In addition, the inspectors reviewed the licensee's CAP to ensure that the licensee was identifying equipment alignment problems and that they were properly addressed for resolution.

- Licensee configuration management, including daily outage reports, to evaluate DID commensurate with the outage safety plan 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
- Controls over the status and configuration of electrical systems and switchyard to ensure that TS and outage safety plan requirements were met
- Licensee implementation of clearance activities to ensure equipment was appropriately configured to safely support the work or testing
- Decay heat removal processes to verify proper operation and that steam generators, when relied upon, were a viable means of backup cooling
- Controls to ensure that outage work was not impacting the ability to operate the spent fuel pool cooling system during and after-core offload
- Reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss
- Reactivity controls to verify compliance with TS and that activities which could affect reactivity were reviewed for proper control within the outage risk plan.
- Licensee control of heavy loads while moving the reactor vessel head from the vessel to the head stand
- Refueling activities for compliance with TS to verify proper tracking of fuel assemblies from the spent fuel pool to the core and to verify foreign material exclusion was maintained
- Reduced inventory and mid-loop conditions for commitments to Generic Letter 88-17 to verify that these commitments were in place, that plant configuration was in accordance with those commitments, that required instrumentation was properly functioning, and that distractions from unexpected conditions or emergent work did not affect operator ability to maintain the required reactor vessel level
- 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; RCS integrity verified by reviewing RCS leakage calculations; and containment integrity verified by reviewing the status of containment penetrations and containment isolation valves
- Containment closure activities, including a detailed containment walkdown prior to startup, 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

Introduction: The inspectors identified an unresolved item (URI) for failure to properly control the design of devices affecting the function of the RHR Flow Control Valves. This

URI will remain unresolved pending additional inspection to determined if a violation of regulatory requirements occurred.

Description: On March 14, 2008, inspectors observed the licensee preparing the RHR System for mid-loop operation. Procedure GO-10, Reactor Coolant System Drain and Fill Operations, Appendix Q requires flow limiting devices to be installed on both the RHR Heat Exchanger Bypass Valve, 1-FCV-32 and RHR Heat Exchanger Outlet Valve, 1-FCV-16 for A train. The purpose of these devices is to limit RHR flow in the event of a loss of non-safety related instrument air, thus causing pump cavitation and potential air binding of the RHR pumps at mid-loop. Communications between field personnel installing the devices and the Control Room Operators indicated that they were experiencing difficulty configuring the devices. Later reports indicated that two devices had been installed on the bypass valve and one was removed. Based on the wording in Appendix Q which says in step one to "FABRICATE blocking devices suitable for application to the operators of the applicable valves on the operating train (similar to Figure 1)" and the apparent difficulty with the installation, the inspectors asked if the valves were to be opened such as to engage the blocking devices to ensure actual flow was not higher than expected. Control room personnel indicated that there was no plan to do this. Inspectors questioned the basis of not verifying the functionality of the devices, and the control room personnel agreed to raise flow on each valve until the flow limiter blocked further increase. The bypass valve was tested first by raising flow to the limiter, then reducing flow below the initial flow and that back to the desired flow. The bypass valve functioned as expected. A similar test on the outlet valve proceeded smoothly until the Operator attempted to raise the flow back to the original flow. The Operator was unable to raise flow back to the original flowrate. The devices were removed, but later reinstalled and mid-loop operations continued.

Inspectors went into the 1A RHR Heat Exchanger Room to observe these devices as they were being reinstalled. The devices were similar to the drawing in Appendix Q in terms of function, but not much so in terms of fit and form. Appendix Q shows a 2 inch outside diameter cylinder with a 7/8 inch, axial hole and three holes on each side drilled into the device for six bolts, with length to be determined in the field (i.e. sufficiently long to limit to the desired flow). The actual devices observed, appeared to be a length of pipe split axially, and held on the actuator stem with a single center mounted hose clamp. The operator had some difficulty installing them due to rubber gloves and due to the fact that the wall of the pipe was thin and difficult to hold aligned while the hose clamp was tightened.

Analysis: The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems Cornerstone and adversely affected the cornerstone objective to ensure that modifications of systems did not increase the likelihood of a loss of decay heat removal.

Enforcement: An unresolved item was identified pending additional inspection to determine if a violation of regulatory requirements occurred. This unresolved item is identified as URI 50-390/2008002-03, Failure to Ensure Adequate Design and Testing of RHR Flow Limiters.

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.

- WO 07-819408: 0-SI-67-901A, ERCW Pumps A-A and C-A Performance Test*
- WO 07-821156: 0-SI-82-17-A, 184-day Fast Start and Load Test for 1A-A EDG
- WO 07-816460: 1-SI-067-701C, Containment Isolation Local Leak Rate Test Lower Containment Essential Raw Cooling Water**
- WO 07-816354: 1-SI-61-2, 18-month Ice Weighing***
- WO 07-821070: 1-SI-63-901B, Safety Injection Pump Quarterly Performance Test*
- WO 07-821011: 1-SI-3-902, TDAFW Pump Quarterly Performance Test*
- WO 07-816428: 0-SI-82-3, 18-month Loss of Offsite Power with a Safety Injection

*This procedure included inservice testing requirements

**This procedure included containment isolation valve requirements

***This procedure included ice condenser surveillance requirements

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation

a. Inspection Scope

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

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety (OS)

2OS1 Access Control To Radiologically Significant Areas

a. Inspection Scope

Access Control: The inspectors evaluated licensee activities for monitoring and controlling worker access to radiologically significant areas, reviewing activities associated with routine operations and U1C8 outage activities. The inspection included direct observation of administrative and physical controls, appraisal of the knowledge and proficiency of radiation workers and health physics technicians (HPTs) in implementing radiological controls, and review of the adequacy of procedural guidance and implementation.

The inspectors reviewed licensee procedures regarding access control to radiologically significant areas. Selected procedural details for posting, surveying, and access control to airborne radioactivity, radiation area, high radiation area, locked high radiation area (LHRA), and very high radiation area (VHRA) locations were reviewed and discussed with cognizant licensee representatives. The inspectors reviewed a number of radiation work permits (RWPs) associated with U1C8 activities. The selected RWPs were assessed for adequacy of access controls and specified electronic dosimeter alarm setpoints with respect to expected work area dose rates and work conditions. Access control procedures for posted LHRA and VHRA locations were reviewed and discussed with selected radiation protection (RP) management, supervision, and technicians.

During facility tours the inspectors evaluated select radiological postings, barricades, and surveys associated with radioactive material storage areas and radiologically significant areas within the reactor auxiliary building, fuel handling building, and upper and lower containment. The inspectors performed independent radiation dose rate measurements at various locations and compared those results to licensee radiation survey map data. The inspectors independently assessed implementation of LHRA controls and evaluated the adequacy of the licensee's LHRA and VHRA key controls through procedural reviews and supervisory interviews.

During the inspection, the proficiency and knowledge of the radiation workers (radworkers) and Radiation Protection (RP) staff in communicating and applying radiological controls for selected tasks were evaluated. The inspectors attended pre-job and RWP briefings for a HEPA vacuum filter changeout and transfer of ultrasonic cleaning equipment from the transfer canal to its transport container. The inspectors also observed steam generator ECT remotely, including assessing the remote monitoring by HPTs. Radworker and HPT training/skill levels, procedural adherence, and implementation of RWP-specified access controls, including those associated with changing radiological conditions, were observed and evaluated by the inspectors during job site reviews and tours within the licensee's radiological control area.

RP activities were evaluated against the UFSAR Section 12, Radiation Protection; Technical Specification (TS) Sections 5.7, Procedures and Programs, and 5.11, High Radiation Area; 10 CFR 19.12; 10 CFR Part 20, Subparts B, C, F, G, H, and J; and approved licensee procedures. The procedures and records reviewed are listed in the Attachment.

Problem Identification and Resolution: PERs associated with access control to radiologically significant areas, radiation worker performance, and HPT proficiency were reviewed and assessed. The PERs listed in the attachment were reviewed and evaluated in detail during inspection of this program area. The inspectors assessed the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with approved CAP procedures.

The inspectors completed 21 of the required 21 samples for Inspection Procedure (IP) 71121.01. All samples have now been completed for this IP.

b. Findings

No findings of significance were identified.

2OS2 ALARA Planning and Controls

a. Inspection Scope

As Low As Reasonably Achievable (ALARA): Implementation of the licensee's ALARA program during U1C8 was observed and evaluated by the inspectors. The inspectors reviewed ALARA planning, dose estimates, and prescribed ALARA controls for outage work tasks expected to incur the maximum collective exposures. Reviewed activities included control rod guide tube support pins (split pins), reactor pressure vessel head volumetric inspection, steam generator ECT, reactor coolant pump seal replacement, HEPA filter changeout on ECT probe pusher vacuums, and decontamination and removal of ultrasonic fuel cleaning pumps. Also, incorporation of planning, established work controls, expected dose rates and dose expenditure into the ALARA pre-job briefings and RWPs for those activities were reviewed. The inspectors directly observed performance of these activities while evaluating the licensee's use of engineering controls, low-dose waiting areas, and on-the-job supervision.

Select elements of the licensee's source term reduction and control program were examined to evaluate the effectiveness of the program in supporting implementation of the ALARA program goals. Shutdown chemistry program implementation and the resultant effect on containment and auxiliary building dose rate trending data were reviewed and discussed with cognizant licensee representatives; this included a 20% reduction in dose rates from what was observed in previous outages.

Trends in individual and collective personnel exposures were reviewed. Records of year-to-date individual radiation exposures sorted by work groups were examined for significant variations of exposures among workers.

The inspectors examined the dose records of all declared pregnant workers from 2006 and 2007 to evaluate total or current gestation dose. The applicable RP procedure was reviewed to assess licensee controls for declared pregnant workers. Trends in the plant's three-year rolling average collective exposure history, outage, non-outage, and total annual doses for select years were reviewed and discussed with licensee representatives.

The licensee's ALARA program implementation and practices were evaluated for consistency with UFSAR Chapter 12, Sections 1-5, Radiation Protection; 10 CFR Part 20

requirements; Regulatory Guide 8.29, Instruction Concerning Risks from Occupational Radiation Exposure, February 1996; and licensee procedures. Documents reviewed during the inspection of this program area are listed in Section 2OS2 of the report attachment.

Problem Identification and Resolution: The inspectors reviewed CAP documents listed in Section 2OS2 of the report attachment that were related to the ALARA program. The inspectors assessed the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with SPP-3.1, Corrective Action Program, Revision 12.

The inspectors completed 25 of the samples detailed in IP 71121.02. (Minimum sample size is 15; however, additional line items were completed because the licensee was in the 4th quartile for 3 year rolling average for occupational collective dose ranking). All samples have now been completed for this IP.

b. Findings

No findings of significance were identified.

2PS2 Radioactive Material Processing and Transportation

a. Inspection Scope

Waste Processing and Characterization: The inspectors reviewed the plant's solid radioactive waste (radwaste) system as described in the UFSAR and process control program. The most recent radiological effluent release report was reviewed for information on the types and amounts of waste disposed. The scope of the licensee's audit program was reviewed to verify that it met the requirements of 10 CFR 20.1101(c). The inspectors walked down the accessible portions of the liquid and solid radwaste processing systems to verify that the current system configuration and operation agreed with the UFSAR and process control program. The liquid radwaste system status was discussed with cognizant personnel to determine its potential to create an unmonitored release pathway.

The inspectors reviewed the plant's process for transferring radioactive resin and sludge discharges into shipping/disposal containers to determine if appropriate waste stream mixing and/or sampling procedures and methodology for waste concentration averaging provided representative samples of the waste product for waste classification purposes. The inspectors reviewed current 10 CFR 61 analysis results and the procedures for obtaining the samples to support the analysis.

The scaling factors used for radioactive waste streams were reviewed, including licensee calculations used to determine the amount of hard to detect nuclides. The program was reviewed to verify compliance with 10 CFR 61.55-56 and 10 CFR 20, Appendix G. In addition, the inspectors reviewed the program for provisions that would ensure that the waste stream composition accounted for changes in operational parameters and would remain valid between required periodic updates.

Transportation: The inspectors observed the shipment of radioactive material, low specific activity, to a processing facility. Specifically, the inspectors observed the creation of shipping papers based on radiation surveys and evaluation of the shipment. The inspectors observed shipping personnel conducting radiation surveys and reviewing package labeling, vehicle placarding, routine vehicle safety checks, and presenting the driver's briefing

(including the provision and discussion of emergency instructions). The inspectors also noted the shipper's preparation of emergency response documentation for the 24-hour emergency telephone number monitored by plant control room personnel. The inspectors also directly observed the performance of receipt surveys/inspections for an incoming shipment of radioactive material and reviewed licensee actions taken in response to an incoming shipment with contact dose rates exceeding DOT limits. The inspectors reviewed shipping documentation for several shipments that had occurred in the previous year. The inspectors also reviewed the training curricula and records of radiation workers involved in the packaging and shipment of radioactive material.

Transportation program implementation was reviewed against regulations detailed in 10 CFR Part 20, 10 CFR Part 71, 49 CFR Parts 172-178; as well as the guidance provided in NUREG-1608. TS 6.13, Process Control Program was used as a basis for evaluation of the solid radioactive waste program. Training activities were assessed against 49 CFR Part 172 Subpart H. Documents reviewed during the inspection are listed in Section 2PS2 of the report attachment.

Problem Identification and Resolution: Select PERs and one fleet-wide audit of the Radiation Protection Program were reviewed in detail. The inspectors assessed the licensee's ability to characterize, prioritize, and resolve the identified issues in accordance with licensee procedure SPP-3.1, Corrective Action Program, Revision 12. Documents reviewed for problem identification and resolution are listed in Section 2PS2 of the report attachment.

The inspectors completed six of the required six samples for IP 71122.02. All samples have now been completed for this IP.

b. Findings

Introduction. A Green self-revealing NCV of 10 CFR 71.5 was identified involving a shipment of radioactive material that exceeded the regulatory dose limits upon arrival at a vendor facility. The violation involved a failure to properly package material such that, under conditions normally incident to transportation, the radiation levels at the external surface of the package would not exceed applicable Department of Transportation (DOT) limits.

Description. On March 2, 2008, the licensee made a shipment containing seven boxes (packages) of contaminated equipment from its Watts Bar facility to a vendor's facility located in Lynchburg, Virginia. The shipment, WBN 08-029, consisted of contaminated fuel cleaning equipment and was shipped as two boxes of radioactive material, Type A, two boxes of radioactive material, surface contaminated object (SCO-II), and three boxes of radioactive material, excepted package, limited quantity. Boxes 0454 and 0455 were shipped as Yellow III, Type A packages. The total activity of the shipment was 247 millicuries of solid/metal oxides. The licensee's radiation survey performed prior to shipping indicated that the maximum radiation level on any external surface of the packages was 75 millirem per hour (mrem/hr), identified on Box 0455. When the shipment arrived at the vendor's facility on March 3, 2008, a receipt radiation survey performed by the vendor indicated that maximum contact radiation dose rates on the external surface of one package (Box 0454) exceeded 200 mrem/hr using a Geiger-Mueller (GM) radiation survey instrument. The vendor identified a small area on the bottom of Box 0454 with a contact

dose rate of 340 mrem/hr. The instrument used by the vendor was within its calibration due date. The vendor informed the licensee of this condition on March 3, 2008. On March 3-4, 2008, a TVA HPT performed confirmatory radiation surveys on the shipment at the vendor facility using a GM survey instrument and obtained a contact dose rate of 400 mrem/hr on the same box identified by the vendor to have exceeded the 200 mrem/hr dose rate limit. The dose rate six inches from the bottom of the box was 30 mrem/hr and the contact dose rate underneath the trailer (nearest accessible surface) was 2 mrem/hr. The instrument used by the licensee was within its calibration due date. The source of the elevated dose rate was determined to be a hot particle. While the cause of the difference between the vendor's measurement (340 mrem/hr) and the licensee's measurement (400 mrem/hr) could not be explained with certainty, the inspectors noted that the GM tube size differed for the instruments used which could have affected the dose rate measurements from the hot particle. Based on the small size, high specific activity, and directionality of the hot particle, a small change in the particle's distance to the center of the detector and the volume of the detector irradiated could have a significant impact on the dose rate measured. Additionally, there is an allowed tolerance in the calibration of the instruments. The licensee entered the issue into their CAP as "B" level PER 139447 with root cause analysis required.

Analysis. The licensee's failure to ensure radiation levels did not exceed applicable DOT dose rate limits under conditions normally incident to transportation is a performance deficiency because compliance with the requirement was reasonable and within the licensee's ability to achieve. This finding is more than minor because it is associated with the plant facilities/equipment and instrument attribute of the Public Radiation Safety Cornerstone and it adversely affected the cornerstone objective in that the improper transportation packaging resulted in a shipping container on public roadways with external dose levels exceeding regulatory requirements. The significance of this finding was evaluated using the Public Radiation Safety Significance Determination Process and was determined to be of very low safety significance (Green) because the area on the package with the elevated radiation level was inaccessible to the public and the radiation level did not exceed two times the DOT limit. This finding was reviewed for cross-cutting aspects and none were identified.

Enforcement. 10 CFR 71.5 requires each licensee who transports licensed materials on public highways to comply with the requirements of the DOT regulations in 49 CFR Parts 170 through 189. The 49 CFR 173.441(a), "Radiation Level Limitations," requires that each package of radioactive material offered for transportation be designed and prepared for shipment so that, under conditions normally incident to transportation, the radiation level does not exceed 200 mrem/hr at any point on the external surface of the package.

Contrary to the above, on March 2, 2008, Watts Bar Nuclear Station shipped radioactive materials to a vendor's facility located in Lynchburg, Virginia, but failed to properly prepare the shipment for transport in that on March 3, 2008, when the shipment arrived at the vendor facility, the vendor measured radiation levels of 340 mrem/hr on the bottom of the external surface of one package, which exceeded the DOT regulatory limit. However, because this finding is of very low safety significance, and has been entered into the licensee's CAP as PER 139447, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 050-390/2008002-01, Failure to Properly Prepare a Radioactive Material Package for Shipment.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verifications

The inspectors sampled licensee submittals for the six PIs listed below. To verify the accuracy of the PI data reported during the periods listed, PI definitions and guidance contained in NEI 99-02, Regulatory Assessment Indicator Guideline, Revision 4, were used to verify the basis in reporting for each data element.

Initiating Events Cornerstone PI

- Unplanned Scrams per 7000 Critical Hours
- Unplanned Scrams with Complications
- Unplanned Power Changes per 7000 Critical Hours

The inspectors reviewed selected licensee event reports and portions of the operator logs from the period of January 1, 2007, to December 31, 2007, to verify that the licensee had accurately identified the number of scrams and unplanned power changes greater than 20 percent that occurred during the previous four quarters. The inspectors also reviewed the accuracy of the number of critical hours reported and the licensee's basis for crediting normal heat removal capability for each of the reported scrams.

Barrier Integrity Cornerstone PI

- Reactor Coolant System Activity

The inspectors reviewed portions of the operator and chemistry logs from the period of January 1, 2007, to December 31, 2007, to verify that the licensee had accurately determined and reported the reactor coolant system maximum dose equivalent iodine-131 activity during the period reviewed. In addition, the residents observed a primary chemistry sample.

Occupational Radiation Safety Cornerstone PI

- Occupational Exposure Control Effectiveness

The inspectors reviewed PER records generated from January through December 2007 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 2007. In addition, licensee procedural guidance for classifying and reporting PI events was evaluated. Reviewed documents are listed in Section 4OA1 of the report attachment.

Public Radiation Safety Cornerstone PI

- RETS/ODCM Radiological Effluents Occurrence

The inspectors reviewed and evaluated selected radiological liquid and gaseous effluent release data, abnormal release results, cumulative and projected doses to the public, and selected PERs for the period of January through December 2007. Documents reviewed are listed in Section 4OA1 of the report Attachment. The inspectors completed four of the

required samples for IP 71151, one for the occupational radiation safety PI, and one for the public radiation safety PI.

b. Findings

No findings of significance were identified.

4OA2 Identification & Resolution of Problems

.1 Review of Items Entered into the Corrective Action Program

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

.2 Semi-Annual Review to Identify Trends

a. Inspection Scope

As required by Inspection Procedure 71152, Identification and Resolution of Problems, the inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on human performance trends, licensee trending efforts, and repetitive equipment and corrective maintenance issues. The inspectors also considered the results of the daily inspector CAP item screening discussed in Section 4OA2.1. The inspectors' review nominally considered the six-month period of October 2007 through March 2008, although some examples expanded beyond those dates when the scope of the trend warranted.

b. Assessment and Observations

The inspectors compared the licensee process results with the results of the inspectors' daily screening and identified two potential trends in the CAP data.

- Delays in PER initiation due to failure of some members of the plant staff to recognize a PER condition until prompted by the inspectors.
- During routine review of items entered into the CAP during the third and fourth quarters of CY2007, the inspectors identified an increase in the number of items being left in containment while the plant was at power. In addition to several PERs documenting engineering evaluations for temporary equipment in containment, there were several PERs that stated that the requirements of TI-12.07 were either not being met or the associated documentation was incorrect/incomplete. On December 12, 2007, the inspectors requested a list of all temporary equipment/material in containment along with the associated engineering evaluations.

While researching items left in containment, as documented in the CAP appendices of TI-12.07, the licensee determined that the accountability of items in containment

was deficient. The licensee made the decision to walk down accessible portions of containment and remove all temporary equipment/material that was not properly analyzed and documented per TI-12.07. PERs 131587, 134072, 134961 and 135907 were entered into the CAP document the accountability deficiencies.

c. Findings

Introduction. The inspectors identified a Green NCV of TS 5.7.1 for failure to properly implement procedural requirements and engineering controls for materials brought into the containment while the plant was at power.

Description. Licensee procedure TI-12.07, Containment Access, specified requirements for containment access during Modes 1, 2, 3 and 4. Additionally, the TI maintained accountability of all items taken into, removed, or left in containment. Any items left in containment were required to be recorded on Appendix E of TI-12.07. Appendix E also required an engineering evaluation to determine if it was acceptable to leave items in containment.

During routine review of items entered into the CAP during the third and fourth quarters of CY2007, the inspectors identified an increase in the number of items being left in containment while the plant was at power. In addition to several PERs documenting engineering evaluations for temporary equipment in containment, there were several PERs that stated that the requirements of TI-12.07 were either not being met or the associated documentation was incorrect/incomplete. On December 12, 2007, the inspectors requested a list of all temporary equipment/material in containment along with the associated engineering evaluations.

While researching items left in containment, as documented in the CAP and appendices of TI-12.07, the licensee determined that the accountability of items in containment was deficient. The licensee made the decision to walk down accessible portions of containment and remove all temporary equipment/material that was not properly analyzed and documented per TI-12.07.

Analysis. The inspectors determined that the failure to properly implement procedural and engineering controls for materials brought into the containment while the unit was at power was more than minor because it was associated with the Mitigating Systems Cornerstone attribute of equipment performance (reliability) and adversely affected the cornerstone objective. The inspectors evaluated the risk significance of this finding using NRC Manual Chapter 0609, "Significance Determination Process," Appendix E, Phase 1. The finding screened to very low safety significance (Green) because no equipment was rendered inoperable. The finding directly involved the cross-cutting area of human performance under the procedural compliance aspect of the work practices component; in that the procedural requirements of TI-12.07 were not met and equipment/material left in containment was not properly analyzed and/or documented (H.4(b)).

Enforcement. TS 5.7.1.1.a requires that written procedures be implemented and maintained covering the activities in the applicable procedures recommended by Regulatory Guide (RG) 1.33, Revision 2, Appendix A. Part 1.i of REG 1.33 states that access to containment should be covered by written procedures. Contrary to this requirement, the licensee did not properly implement procedural requirements and engineering control of materials brought into the containment while the plant was at full

power operation. Because this violation was of very low safety significance and was entered into the corrective action program (PERs 131587, 134072, 134961 and 135907), this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000390/2008002-02, Failure to Follow Procedure Resulted in Inadequate Control of Materials Brought into Containment.

4OA3 Event Followup

.1 Inadvertent Lift of Moisture Separator Reheater Relief Valve

a. Inspection Scope

The inspectors responded to the control room after a moisture separator reheater (MSR) relief valve inadvertently lifted due to being bumped during scaffold building activities. The inspectors observed operator performance in the control room and observed the licensee stabilize the unit at approximately 60% power where the relief valve reseated.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

.1 (Closed) NRC Temporary Instruction 2515/150, Reactor Pressure Vessel Head and Head Penetration Nozzles (NRC Order EA-03-009) (Unit 1)

a. Inspection Scope

From February 19-22, 2008, the inspectors reviewed the licensee's activities relative to the non-destructive examination (NDE) of the reactor pressure vessel head (RPVH) nozzles and the visual examination to identify potential boric acid leaks from pressure-retaining components above the RPVH. These activities were reviewed during the Unit 1 refueling outage in order to verify licensee compliance with the regulatory requirements of NRC Order EA-03-009 Modifying Licenses dated February 20, 2004 (hereinafter called the NRC Order). This NRC inspection activity also had the purpose of gathering information to help the NRC staff identify possible further regulatory positions and generic communications.

The inspectors' review of the NDE of RPVH nozzles included: (1) review of NDE procedures, (2) assessment of NDE personnel training and qualification, (3) review of NDE equipment certification and performance demonstration, and (4) observation and assessment of UT and liquid penetrant (PT) examinations. The inspectors also held discussions with vendor representatives and licensee personnel involved in the RPVH examination. Specifically, the inspectors reviewed a sample of NDEs as follows:

- Observed portion of in-process UT scanning of RPVH Nozzles 30 and 50
- Reviewed UT data sheets and electronic data for RPVH Nozzles 10, 11, 24, 26, 62, 65, 74, and 76 including the assessment for leakage into the annulus between the penetration nozzle and the low-alloy steel (interference fit zone)
- Observed the PT examination performed on RPVH vent line weld and reviewed the corresponding report

- Reviewed training and qualification records for the NDE personnel who performed the above volumetric and surface examinations
- Reviewed certification, performance demonstration, and calibration records for the NDE equipment used to perform the above volumetric examinations
- Reviewed vendor's examination procedures used to perform the above volumetric and surface examinations.

The inspectors' review of the visual examination to identify potential boric acid leaks from pressure-retaining components above the RPVH consisted of the review of licensee procedures used to meet this NRC Order requirement and the results from the visual examinations performed at the end of Unit 1 Cycles 5, 6, 7, and 8.

The inspectors also reviewed the licensee's effective degradation years calculation, which was performed to determine the RPVH's susceptibility category and its examination requirements.

b. Observations and Findings

- 1) Verification that the examinations were performed by qualified and knowledgeable personnel

The inspectors reviewed personnel training and qualifications to verify that volumetric and surface NDEs were performed by trained and qualified personnel. All examiners were qualified in accordance with the ASME Code and had additional training on RPVH examination, as required by the vendor's "Written Practice for the Qualification and Certification of NDE Personnel" document. All data analysis personnel were required to be certified to Level II or III in the ultrasonic method and have at least 16 hours of additional training on RPVH penetration examinations.

- 2) Verification that the examinations were performed in accordance with approved and demonstrated procedures.

Watts Bar's RPVH (Unit 1) has 73 control rod drive mechanism (CRDM) penetrations and 1 vent line penetration. Fifty seven (57) out of the 73 CRDM penetrations contain thermal sleeves; 8 penetrations contain part lengths; and the remaining 8 penetrations have open bores. The RPVH also has 5 thermocouple nozzles with open bores. All penetration nozzles, including the vent line, were examined by remote automated UT from the inside diameter surface in accordance with vendor-approved procedures.

In addition to the CRDM, vent line, and thermocouple penetrations, Watts Bar's RPVH has four auxiliary head adapter penetrations. These penetrations consist of an Alloy 600 nozzle attached to the top of the RPVH with a dissimilar metal full penetration weld. These welds were not included as part of examinations performed to meet the NRC Order requirements. However, they were examined as part of the ASME Section XI examination requirements for category B-F welds. The vendor examined these penetrations from the inside diameter using a rotating UT probe in accordance with an adapted performance demonstration initiative procedure.

RPVH penetrations with thermal sleeves, part length penetrations, and open bore penetrations were examined with the Time of Flight Diffraction (TOFD) technique using a blade probe containing one set of 55 degree/5 MHz/L-Wave transducers circumferentially

oriented for axial flaws. The transducer set was contained in a single inspection housing. Assessment of leakage into the interference fit zone was employed by analyzing the pattern and amplitude of the backwall reflection from the TOFD transducers set up.

RPVH thermocouple penetrations (open bore) were examined with a 0 degree/5 MHz/L-Wave transducer, one TOFD set of 30 degree/5 MHz/L-Wave transducers axially oriented for circumferential flaws, one 60 degree/2.25 MHz/S-Wave transducer (axial down beam direction), and one TOFD set of 45 degree/5 MHz/L-Wave transducers circumferentially oriented for axial flaws. All transducer sets were contained in a single rotating inspection housing. Assessment of leakage into the interference fit zone was employed by analyzing the pattern and amplitude of the backwall reflection from the TOFD and 0 degree transducers set up.

The vent line penetration nozzle was examined with a 0 degree/5 MHz/L-Wave transducer, one set of 45 degree/5 MHz/S-Wave transducers (clockwise and counterclockwise beam direction), and one set of 70 degree/5 MHz/S-Wave transducers (up and down beam direction). All transducer sets were contained in a single rotating inspection housing. Assessment of leakage through the J-groove weld was employed by performing a PT examination on the surface of the J-groove weld in accordance with the vendor's PT procedure.

The inspectors found that the vendor's examination procedures for CRDM nozzles were adequate to detect and size flaws in the RPVH nozzles in accordance with Electric Power Research Institute (EPRI) NDE Center's protocol contained in "Materials Reliability Program: Demonstration of Vendor Procedures for the Inspection of Control Drive Mechanism Head Penetrations (MRP-89)." The vendor's equipment demonstration took place from August 14-24, 2006. The vendor had performed a similar demonstration in 2002, as documented in MRP-89. However, because the vendor modified its equipment including changing the essential variables of the demonstration in 2002, the demonstration was repeated. The 2006 demonstration was performed with three RPVH nozzle mockups with multiple tube flaws representing the expected field degradations. These mockups were different from the ones used during the demonstration performed in 2002 (i.e. demonstration documented in MRP-89). The demonstration adopted security portions from the EPRI performance demonstration initiative protocol by restricting the access to the mockups and making them available to the vendor only when the EPRI NDE personnel were present. EPRI's letter to TVA, dated October 8, 2007, documents the comparison of the recent vendor's equipment demonstration with the previous demonstration performed in 2002. The letter states that the scatter observed is within the variability of the examination, and the reliability of the examinations conducted with the new instrumentation will be comparable to the previous demonstration.

The procedure used for the RPVH vent line was not demonstrated under a specific program such as the EPRI MRP. This procedure was developed with NDE techniques similar to the CRDM procedures with regard to basic fundamental UT requirements. The procedure used for the PT examination of the vent line weld surface was developed in accordance with the ASME Code.

- 3) Verification that the licensee was able to identify, disposition, and resolve deficiencies.

All indications of cracks or interference fit zone leakage were required to be reported for further examination and disposition as specified in the vendor's NDE procedures. Based on observation of the examination process, review of NDE data, and discussions with the vendor's personnel, the inspectors considered that deficiencies would be appropriately identified, dispositioned, and resolved. UT indications associated with the fabrication of the J-groove weld and nozzle tube material were identified at several RPVH penetrations. These indications did not exhibit service related crack characteristics and were documented for future reference.

- 4) Verification that the licensee was capable of identifying the primary water stress corrosion cracking and/or RPVH corrosion phenomenon described in the NRC Order.

The NDE techniques employed for the examination of RPVH CRDM nozzles had been previously demonstrated under the EPRI MRP/Inspection Demonstration Program as capable of detecting primary water stress corrosion cracking type manufactured cracks. Based on the review of performance demonstration documents, observation of in-process examinations, and review of NDE data, the inspectors considered that the licensee was capable of identifying primary water stress corrosion cracking and/or corrosion as required by the NRC Order.

- 5) Evaluation of the RPVH condition (e.g. debris, insulation, dirt, boron from other sources, physical layout, viewing obstructions).

A bare metal visual examination was not required to be performed during the Unit 1 Winter 2008 refueling outage. A bare metal visual examination was performed in the Fall 2006 refueling outage as required by the NRC Order. The NRC review of this visual examination activity was documented in NRC Integrated Inspection Report 05000390/2006005, Section 1R08.

- 6) Evaluation of the licensee's ability to identify and characterize small boron deposits, as described in NRC Bulletin 2001-01.

See item 5) above.

- 7) Evaluation of the extent of material deficiencies (i.e., cracks, corrosion, etc.) that required repair.

No examples of CRDM penetration tube flaws requiring repair were identified during the NDEs. As indicated above, UT indications were identified at several RPVH penetrations and they were dispositioned as fabrication indications (not service related).

- 8) Evaluation of any significant impediments to effectively perform each examination method (e.g., centering rings, insulation, thermal sleeves, nozzle distortion, etc.)

The volumetric examination coverage extended from a minimum of two inches above the highest point of the J-groove weld to the maximum coverage possible below the lowest point of the J-groove weld, which resulted to be more than one inch for all nozzles, except for thermocouple penetration No. 74.

The examination coverage for penetration No. 74 was approximately 0.91-inch below the lowest point at the toe of the J-groove weld. The examination coverage limitation was due to the nozzle length, the weld profile on the downhill side of the nozzle, and the tapered tip of the thermocouple nozzle. At the time of the NRC inspection, the licensee was working on a request for relaxation from the NRC Order requirements.

The inspectors reviewed Dominion Engineering Calculation C-3217-00-01, which contains the axial and hoop stress analysis for Watts Bar's RPVH nozzles. The analysis determined the distance below the J-groove weld where the stresses reach 20 ksi (tension) in penetrations with set up angles representative of Watts Bar's RPVH design. The inspectors reviewed the coverage obtained for a sample of RPVH penetrations at different set up angles to verify that the distance below the lowest point of J-groove weld to reach 20 ksi was bounded by the examination coverage. With the exception of thermocouple penetration No. 74, no issues concerning UT coverage in the remaining penetrations were found during the NRC inspection.

- 9) Evaluation of the basis for the temperatures used in the susceptibility ranking calculation.

The inspectors reviewed the susceptibility ranking calculation and the basis for the RPVH temperatures used in the calculation. The calculation determined the RPVH EDY and susceptibility ranking based on best estimated values of effective full power days (EFPD) since the first operating cycle. This calculation has been updated at the end of every operating cycle since the NRC Order was effective. The temperature used for the calculation was the reactor coolant system cold leg temperature. The basis for using this temperature relied on the initial RPVH temperature assumed for the Loss of Coolant Accident analysis discussed in Section 15.3.1 of NRC's NUREG 0847, "Safety Evaluation Report for Watts Bar Nuclear, June 1982."

- 10) Verification that the methods used for disposition of NDE-identified flaws were consistent with NRC flaw evaluation guidance.

No indications considered to be penetration nozzle flaws were found during the RPVH examinations. As indicated above, UT indications were identified at several RPVH penetrations and they were dispositioned as fabrication indications (not service related).

- 11) Evaluation of the existing procedures to identify potential boric acid leaks from pressure-retaining components above the RPVH and the licensee's follow-up actions for indications of boric acid leaks.

The NRC Order requirement to inspect the RPVH every outage to identify potential boric acid leaks from pressure-retaining components above the RPVH was incorporated into the licensee's procedure BP-257, Integrated Material Issues Management Plan. The implementation of this requirement was performed through a WO, which primary objective was to perform a visual inspection of the RPVH upper surface, specially the CRDM canopy seal welds, for indications of leakage. If a potential leak indication is identified, the WO instructs the examiners to perform an additional follow-up inspection and chemical sampling for confirmation.

The inspectors reviewed the results of these inspections for the refueling outages corresponding to the end of operating cycles 5, 6, 7, and 8; and held discussions with licensee personnel to assess follow-up actions taken for any evidence of boric acid leaks above the RPV

4OA6 Meetings, including Exit

The inspectors presented the inspection results to Mr. M. Skaggs and other members of licensee management at the conclusion of the inspection on April 4, 2008. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

L. Belvin, Radiation Protection Manager
M. Brandon, Licensing and Industry Affairs Manager
A. Hinson, Site Engineering Manager
F. Leonard, Engineering
J. Lockwood, ISI Coordinator
M. Lorek, Plant Manager
K. Lovell, Maintenance and Modifications Manager
M. McFadden, Site Nuclear Assurance Manager
A. Scales, Operations Manager
M. Skaggs, Site Vice President
S. Smith, Operations Superintendent
D. Voeller, Performance Improvement Manager
M. Welch, ISI Level III

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-390/2008002-03	URI	Failure to Ensure Adequate Design and Testing of RHR Flow Limiters (Section 1R20)
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Opened and Closed

50-390/2008002-01	NCV	Failure to Properly Prepare a Radioactive Material Package for Shipment (Section 2PS2)
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50-390/2008002-02	NCV	Failure to Follow Procedure Resulted in Inadequate Control of Materials Brought into Containment (Section 4OA2.2)
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Closed

50-390/2515/150	TI	Reactor Pressure Vessel Head and Head Penetration Nozzles (NRC Order EA-03-009) (Unit 1) (Section 4OA5)
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Discussed

None

LIST OF DOCUMENTS REVIEWED

Section 1R06: Flood Protection Measures

Updated Final Safety Analysis Report (UFSAR) Sections 2.4.14, 3.4
 Abnormal Operating Instruction (AOI)-7.01, Maximum Probable Flood, Revision 16
 WO 06-822696-000,001, 0-SI-77-1, 18 mo Channel Calibration Auxiliary Building Passive Sump
 Loop 0-LPL-77-134
 WO 06-822634-000,001, 0-SI-77-2, 18 mo Channel Calibration Auxiliary Building Passive Sump
 Loop 0-LPL-77-135

Section 1R08: In-Service Inspection Activities

Procedures

N-UT-82, Generic Procedure for the Ultrasonic Examination of Dissimilar Pipe Welds, Rev. 2
 1-TRI-0-10.2, ASME Section XI ISI/NDE Program, Rev. 0 (For Second 10 Year Interval)
 Westinghouse MRS-SSP-2184, Watts Bar Unit 1 Pressurizer Mechanical Stress Improvement
 Process (MSIP), Rev. 1
 Westinghouse MSIP Parameters for Pressurizer Surge Nozzle to Safe End Weld
 SPP-9.7, Corrosion Control Program, Rev. 0014
 N-PT-9, Liquid Penetrant examination of ASME and ANSI Code Components and Welds, Rev.
 0030
 N-VT-1, Visual Examination procedure for ASME Section XI Preservice and Inservice, Rev. 41
 1-SI-68-907, Steam Generator Tubing Inservice Inspection and Augmented Inspections, Rev. 0022
 T71-080107-802, Steam Generator Eddy Current Examination Guideline Inconel 690, Rev. 2

Corrective Action and Evaluation Documents

PER 97672, 2" Diameter Pipe Wall Thickness Problem
 PER 125585, Flowserve Borg-Warner Check Valve Raised Weld Potentially Preventing the Valve
 Disc from Closing
 PER 114250, Lamination Was Found at ¾" Thick A-36 Steel Plate at Oconee Nuclear Station

Other Records

Work Order (WO) 09-811971-000, Dry Boric Acid Residue Was Found at the Packing of 1-FCV-
 074-0008 RHR Suction Line
 Boric Acid Leak Location List from Walkdown of UIC8 Emergent Leaks TI-68-017
 WO 07-816266-000 for Procedure 0-TRI-67-902-A, ASME Section XI Buried Piping System
 Pressure Test – ERCW System Train A, Dated February 18, 2008
 WO 07-817814-00, Adding Vent Valves at Locations of Relieve Valves 1-RFV-0534, 0535, and
 0536
 Drawing 1-47A435-767 & 771, Mechanical Safety Injection Vent Pipe Supports
 Drawing 1-47A435-2056, Problem N3-63-09A Analysis Isometric of SIS Piping
 WO 07-814055-000, Reroute of Pressurizer Level Instrumentation Sensing Lines
 Watts Bar Nuclear Plant Unit 1, Cycle 8, Degradation Assessment, Rev. 0
 Watts Bar Nuclear Plant Unit 1, Cycle 8, Replacement Steam Generator Tubing Examination Scan
 Plan, Rev. 1
 WBN-CEM-07-011, UIC8 Condenser Tube Leak Chemistry Department Response Self
 Assessment, 3/15/07 - 4/30/07

SQN-ENG-07-004, Steam generator Program at SQN and WBN Self Assessment, July 23-27, 2007

Section 1R20: Refueling/Outage Activities

MI-0-.045 Control of Heavy Loads in Critical Lifting Zones – NUREG-0612
 MI-271.004 Reactor Building Polar Crane Annual Inspection
 WBN-VM-E298-3008 Ederer Incorporated Operations and Maintenance Manual for 175 Ton Polar Crane New Main/Aux Hoist DC Digital Controls, Vol. I & II
 Nuclear Power Group Technical Position Paper Reactor Pressure Head Lifts WBN Unit 1
 Clearance 1-TO-RF08-2008, Section 1-3-0300-RF, TDAFW Pump
 Clearance 1-TO-RF08-2008, Section 1-62-0286-RF, 1B CCP

Section 2OS1: Access Control to Radiologically Significant Areas

Procedures, Instructions, Guidance Documents, and Operating Manuals

RCI-100, Control of Radiological Work, Rev. 32
 RCI-101, Radiation, Contamination, and Airborne Surveys, Rev. 23
 RCI-102, Contamination and Hot Particle Control, Rev. 11
 RCI-103, Radioactive Material Control, Rev. 27
 RCI-152, Radiological Postings, Rev. 2
 RCTP-106, Special Dosimetry Operations, Rev. 1
 RCDP-3, Administration of Radiation Work Permits (RWPs), Rev. 2
 SPP-5.1, Radiological Controls, Rev. 6

Records and Data Reviewed

RWP 08107010, U1C8 Outage – Access to Non-contaminated Areas (Aux Building & Annulus)
 RWP 08108010, U1C8 Outage – Access to High Rad & Contaminated Areas (Lower Containment)
 RWP 08109010, U1C8 Outage – Access to Rad & Contaminated Areas (Upper Containment)
 RWP 08109188, U1C8 Outage – Split Pin Modification Work
 RWP 08106040, U1C8 Outage – Westinghouse Eddy Current Testing (Arm Only)
 RWP 08106041, U1C8 Outage – Westinghouse Eddy Current Testing (Half Jump Entry)
 RWP 08106042, U1C8 Outage – Westinghouse Eddy Current Testing (Full Jump Entry)
 RWP 08106026, U1C8 Steam Generator – Refurbishment of LHRA Vacuums/HEPA Units
 Survey 022508-37, North General Area 757'. 2/25/2008, 06:45.
 Survey 022508-38, South General Area 757'. 2/25/2008, 07:20.
 Survey 022508-43, South General Area 757'. 2/25/2008, 08:00.
 Survey 022608-16, Unit 1 Containment Bldg. U/C G/A 802'. 2/25/2008, 23:00.
 Survey 022308-37, Unit 1 Containment Bldg. U/C G/A 802'. 2/23/2008, 13:30.
 Survey 022508-46, Unit 1 Containment Bldg. U/C G/A 802'. 2/25/2008, 07:00.
 Survey 022308-22, West General Area 713'. 2/23/2008, 03:04.
 Survey 022308-23, North General Area 713'. 2/23/2008, 03:24.
 Survey 022308-21, East General Area 713'. 2/23/2008, 02:47.
 Survey 022408-23, North General Area 737'. 2/24/2008, 02:31.
 Survey 022408-22, East General Area 737'. 2/24/2008, 02:15.
 Survey 022408-21, West General Area 737'. 2/24/2008, 01:49.
 Survey 021708-26, Aux. Bldg. 692' G/A North. 2/17/2008, 09:00.
 Survey 021808-43, Aux Bldg. 692' G/A East. 2/18/2008, 17:46.
 Survey 022508-43, Aux. Bldg. 676' G/A. 02/24/2008, 12:15.
 Survey 021608-48, Aux Bldg. 692' GA West. 2/16/2008, 17:32.
 Survey 111907-27, SRT Valve Gallery 692', 11/19/07

Survey 013108-11, SRT Valve Gallery 692', 1/31/08
 Survey 062607-16, 729' Railroad/Truck Bay, 6/26/07
 Survey 2602081131, Plant Airborne Radiation Survey, 2/26/08
 Air Sample ID 080226_0770-RI, Vacuum Change, 2/26/08
 Active Hot Spot Database Report, 2/27/08
 Radiological Incident Reports (personnel contamination events): 20060225,
 20070002, 20080002, 20080003, 20080005, 20080006, 20080010, 200800011,
 20080013, 20080030

Corrective Action Program (CAP) Documents

SSA0702, Radiological Protection and Control Audit, 2/15/08
 PER 127058, Inaccessible HRA did not have expected posting, 7/2/07
 PER 106200, High radiation area posting, 6/30/06
 PER 123568, Radiation protection response, 4/19/07
 PER 123995, High radiation and locked high radiation areas, 4/27/07
 PER 128778, Radiation area postings, 8/13/07
 PER 129341, Rad material storage area not being tracked on RCI-103 log sheet, 8/24/07
 PER 129778, RP surveys, 9/2/07

Section 20S2: ALARA Planning and Controls

Procedures, Instructions, Guidance Documents, and Operating Manuals

ALARA Pre-Planning Report (APR) 08-015, Work Associated with the Installation, Inspection and Removal of Temporary Radiation Shielding
 APR 08-021, Steam Generator Eddy Current Testing to Support Unit 1 Cycle 8 Refueling Outage
 APR 08-021, Revision (Rev.) 0, Addendum 1, ECT Vacuums
 APR 08-023, Work Associated with Reactor Pressure Vessel Head Disassembly and Assembly and Associated Refuel Floor Support Activities
 APR 08-024, Work Associated with Reactor Refueling, Fuel Handling, Fuel Inspection and In-Mast Sipping, Ultrasonic Fuel Cleaning, Area Setup, and Equipment Testing and Inspection, and Equipment Trouble Shooting and Maintenance
 APR 08-024, Rev. 0, Addendum 1, Decon and Removal of the Ultrasonic Fuel Cleaning Pumps
 APR 08-031, Reactor Coolant Pump Routine Electrical/Mechanical Maintenance and Seal Replacement
 APR 08-038, Work Associated with Reactor Pressure Vessel Head Volumetric Inspection and Support Activities
 APR 08-039, Work Associated with the Replacement of the Control Rod Drive Mechanism Guide Tube Support Pins (Split Pins) and Support Activities
 APR 08-040, Support for Alloy 600 MSIP Associated with the Unit 1 Pressurizer (PZR) Spray Line, Safety Valve Nozzles, PORV Nozzles, and Surge Line Nozzle
 APR 08-045, U1C8 Refueling Outage – Keyway Access
 RCI-128, ALARA Program Implementation, Rev. 12
 TVA, NPG SPP, SPP-5.1, Radiological Controls, Rev. 6
 TVA, TVAN SDP, RCDP-1, Conduct of Radiological Controls, Rev. 2
 TVA, TVAN SPP, SPP - 5.2, ALARA Program, Rev. 3
 TVA, WBNP, Chemistry Manual, Chapter 5.09, Shutdown Primary Control Chemistry, Rev. 18
 TVA, WBNP, RCI-100, Control of Radiological Work, Rev. 31
 TVA, WBNP, RCI-153, Radiation Work Permits, Rev. 0
 TVA, TVAN RCTP-105, Personnel Inprocessing and Dosimetry Administrative Processes, Rev. 0

Records and Data

Dose Records of all declared pregnant workers (3) during the period 01/01/2006 to 12/31/2007
Radiation Work Permit (RWP) Number (No.) 08108090, U1C8 Outage – (High Radiation Areas and Contamination Areas) RCP Seal and Cartridge Replacement, Seal Spring Replacement and Other Associated Work.

RFO8 ALARA Summary, Dated 02/28/08

RWP No. 08106040, U1C8 - Westinghouse SG Eddy Current Testing

RWP No. 08108140, U1C8 - (High Radiation Areas and Contamination Areas) Shielding Installation/Removal, Support Activities and Shielding Inspection in Lower Containment

RWP No. 08108081, U1C8 Outage - (High Radiation Areas and Contamination Areas) Eddy Current Testing of Seal Table Thimble and Associated Work. Thimble Tube Removal Not Allowed on this RWP

RWP No. 08109951, (Contaminated, Non-Contaminated Areas and Locked High Radiation Areas) U1C8 Outage 757' Auxiliary Building Removal of Ultrasonic Cleaning Equipment from the Transfer Canal and Shipment of Components and Associated Activities

RWP No. 08009171, U1C8 - Reactor Disassembly/Re-Assembly. Work Includes – Removing and Installing Seismic Ties, Cavity Safety Barriers, Tensioner Hoist and Walkboard, Installation, Testing and Removal of Reactor Cavity Seal, CRDM Missile Shields Removal and Installation, Removal of Protective Cover for Cavity Annulus, RPV Head Cables and Thermocouples Removal and Installation, Removal and Installation of CRDM Ducts, Removal and Installation of RVLIS and RPV Head Vent Support (Install RAS Pump to Evacuate and Sample the RPV Head), Removal and Installation of PRV Head Studs, Clean RPV Flange and Stud Holes and Final Preps for Head Lift

RWP No. 08109189, U1C8 - PZR Weld MSIP - Upper Nozzles Only - Perform MSIP of the Upper Nozzles on the U-1 PZR, Including Staging of Equipment, Area Set Up, Insulation Removal, UT Inspections, and Associated Support Work

Watts Bar Radiological Survey No. 022408-56, WBN216.PCX - U1 RCP (Left Side View), Dated 02/25/08

WBNP 2006 Annual ALARA Report

WBNP - ALARA Committee Meeting Minutes Dated 01/17/07, 02/21/07, 04/18/07, 06/13/07, 01/17/08, 09/26/07, 11/01/07, and 12/19/07

WBNP FY 2006, 2007 and 2008 Exposure Dose Goals

WBNP Steam Generator Replacement Outage ALARA Report, Unit 1 Cycle 7

WBN U1C8 RCS Cobalt-58 Trending Graph

Corrective Action Program Documents

PER 119196, Lessons learned for APR in accordance with RCI-128, 02/02/07

PER 121569, APR review issues noted during Self Assessment SA-WBN-RP-07- 002, 03/22/07

PER 128601, An ALARA issue regarding the U1 raceway where scaffolding was stored under the transfer canal which blocks this exit or route and cause an individual to traverse the raceway twice in lieu of once during the performance of an inspection or walkdown, 08/15/07

PER 132222, RP initiated stop work authority activity to load a resin HIC into a shipping cask in the aux building railroad bay due to dose rates exceeding projected levels stated on the ALARA preplan and RWP, 10/22/07

PER 133825, APR documentation, Issues identified in NA Audit SSA0702, 11/14/07

PER 139009, CEDE revision notification to NRC, 02/26/08

PER 139151, Step off pad posting, 02/27/08

WBN-RP-07-002, Self-Assessment Report, Radiation Protection Department

Snapshot Self Assessments: WBN-RP-07-003, Radiographic Operations, 05/01/07;

WBN-RP-08-001, Implementation of RP Initiative on RCA Bus Ticket, 09/28/07

NA-WB-07-008, Nuclear Assurance - Quarterly Oversight Report for the Period of July 1, 2007 to September 30, 2007

Section 2PS2: Radioactive Material Processing and Transportation

Procedures, Guidance Documents and Manuals

Process Control Program (PCP), Rev. 1
 Radioactive Material Shipment Manual (RMSM), Vol. I, II and III, Rev.38
 RWTP-100, Radioactive Material/Waste Shipments, Rev. 4
 RWTP-101, 10 CFR Part 61 Waste Characterization, Rev. 1
 RWTP-102, Use of Casks, Rev. 1
 RCI-116, Bead Resin/Activated Carbon Dewatering Procedure for CNS-14-215 or Smaller Liners Prior to Shipment, Rev 5
 RCI-117, High Integrity container (HIC) Handling Procedure, Rev. 2
 RCI-125, Operation of the Mobile Demineralizers, Rev. 8
 HPT 007.001, Rev. 19. Health Physics (Radcon) Technician Training Program.

Records and Data

2007 and 2008 Shipping Log
 Shipping Packages: 08-029, 08-001, 07-064, 07-062, 07-052, and 07-0051
 10 CFR Part 61 Waste Stream Reports dated: 9/26/07, 11/3/06, 7/9/07, and 6/29/07
 Course Outline, Advanced Radioactive Waste Packaging, Transportation, and Disposal and IATA Training, January 29-31, 2007
 HPT 007.001, Health Physics Technician Training: Transportation and Shipping of Radioactive Material, Rev. 19
 Survey 021008-11, Ultrasonic fuel cleaning filter rack and pumps
 Survey 020408-20, Rad Material Shipment Truck with Flatbed Trailer
 Survey 020608-1, Decon building, verification of boundaries around Areva box #0455
 Survey 020708-4, 757' Refuel floor north end, unpacking of Areva box #0455
 Survey 030208-36, Rad Material Shipment Truck with Flatbed trailer
 Survey 030208-39, Outgoing shipment to Areva
 Survey 030708-5, Areva shipping box 0454 at Areva site
 Areva Vehicle Radiation/Contamination Survey Form, Equipment from Watts Bar, 3/3/08
 Areva Radioactive Container Shipping/Receiving Form, Equipment from Watts Bar, 3/3/08
 Areva Standard Survey Form, Particle investigation/Removal, 3/5/08
 Calibration Data Sheet, Eberline SAC-4, s/n 1114, 1/22/08
 Calibration Data Sheet, Eberline BC-4, s/n 896, 1/22/08
 Calibration Data Sheet, Eberline Teletector, s/n 29678, 1/30/08
 Calibration Data Sheet, Eberline Teletector, s/n 125565, 2/19/08
 Calibration Data sheet, Bicron Surveyor 50, s/n B379N, 11/9/07

CAP Documents

WBN-RP-04-005, Self-Assessment: Radioactive Waste Control, Liquid Effluents, 10/22/04
 SSA0702, Radiological Protection and Control Audit, 2/15/08
 PER 116614, Excepted package receipt, 12/13/06
 PER 119240, Anticipate exceeding radwaste goals FY2007, 2/7/07
 PER 121692, Illegible fax for radioactive material shipment WBN 07-016, 3/16/07
 PER 121729, Final shipment survey too high for shipment, 3/16/07
 PER 139447, Rad shipment of ultrasonic fuel cleaning equipment, 3/3/08

Section 40A1: Performance Indicator (PI) Verifications

Procedures and Records

SPP-3.1, Corrective Action Program, Rev. 12

SPP-3.4, Performance Indicator and MOR Submittal Using INPO Consolidated Data Entry, Rev. 6

Records and Data

Gaseous Radioactive Waste Release Permits, January - December 2007

Inoperable Monitors Report for 2007

Liquid Radioactive Waste Release Permits, January 2007 – January 2008

Performance Indicator and MOR Submittals, January – December 2007

Access Control Alarm Report, January 1, 2007 – January 11, 2008

PER 121240, Three dose rate alarms while moving filter, 3/9/07

PER 134133, Unexpected dose rate alarm, 11/21/07

Section 40A5: Other Activities

Procedures

54-ISI-30-04, "Written Practice for the Qualification and Certification of NDE Personnel," Rev. 4

54-PT-200-08, "Color Contrast Solvent Removable Liquid Penetrant Examination of Components," Revision 8

54-ISI-604-004, "Automated Ultrasonic Examination of Open Tube RPV Closure Head Penetrations," Revision 4

54-ISI-603-003, "Automated Ultrasonic Examination of RPV Closure Head Penetrations Containing Thermal Sleeves," Revision 3

54-ISI-605-004, "Automated Ultrasonic Examination of RPV Closure Head Small Bore Penetrations," Revision 4

51-9070923-000, "RPV Head Penetration Inspection Plan and Coverage Assessment for Watts Bar Unit 1," Revision 0

BP-257, "Integrated Material Issues Management Plan," Revision 7

Engineering Documents

MDQ 00106820070114, "Calculation for the Determination of Effective Degradation Years (EDY) for the Watts Bar Unit 1 Reactor Pressure Vessel Head Susceptibility," Revision 0

Dominion Engineering Calculation C-3217-00-01, "CRDM and Instrument Column Nozzle Stress Analysis for Watts Bar Unit 1," Revision 0

Corrective Action Documents

PER 138716, Inspection of the Penetrations above the RPVH for Boric Acid Leakage

PER 138277, Inspection Results from RPVH Canopy Seal Inspection

Work Orders

WO 02-012251-000, "Inspect Canopy Seal Welds for Evidence of Boron Leakage," Revision 0

WO 04-813099-000, "Inspect Canopy Seal Welds for Evidence of Boron Leakage," Revision 0

WO 05-817795-000, "Inspect Canopy Seal Welds for Evidence of Boron Leakage," Revision 0

WO 07-815415-000, "Inspect Canopy Seal Welds for Evidence of Boron Leakage," Revision 0

Other Records

EPRI Letter from Mr. Robert M Barnes (Project Manager) to Mr. Joel Whitaker (NDE Specialist Level III) dated October 8, 2007 regarding vendor's equipment demonstration

Personnel Certification Records for vendor's NDE examiners
UT Transducer Reports and/or Acceptance Test Report for Serial Nos.: 2928-08001 and 2929-08001 (rotating probe), and S1050NL (blade probe)
Calibration data sheets CDS-1 (open bore), CDS-4 (blade probe), and CDS-2 (open bore, vent line)
PT examination Report: NDE Report – 21908, "RPV Head Vent Line"
Certificate of Calibration 26522, μ Tomoscan Serial 150197, VH-8978
Fabrication Drawing for Calibration Block 6011137-B
PT Consumable Certification Records for Batch Nos. 07L03K, 04C11K, and 04G11K
Certificate of Calibration for Digital Thermometer VH-10548 and Light Meter VH-10742