



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8931**

January 27, 2003

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

**SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC INTEGRATED INSPECTION  
REPORT 50-259/2002-04, 50-260/2002-04, 50-296/2002-04**

Dear Mr. Scalice:

On December 28, 2002, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Browns Ferry 1, 2, and 3 reactor facilities. The enclosed integrated inspection report documents the results of the inspection which were discussed on January 8, 2003, with Mr. Ashok Bhatnager 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 finding that has potential safety significance greater than very low significance. Although the issue did present an immediate safety concern, the safety concern was resolved promptly and appropriately by licensee response actions.

Since the terrorist attacks on September 11, 2001, the USNRC has issued two Orders (dated February 25, 2002, and January 7, 2003) and several threat advisories to licensees of commercial power reactors to strengthen licensee capabilities, improve security force readiness, and enhance access authorization. The USNRC also issued Temporary Instruction 2515/148 on August 28, 2002, that provided guidance to inspectors to audit and inspect licensee implementation of the interim compensatory measures (ICMs) required by the February 25<sup>th</sup> Order. Phase 1 of TI 2515/148 was completed at all commercial nuclear power plants during calendar year (CY) '02, and the remaining inspections are scheduled for completion in CY '03. Additionally, table-top security drills were conducted at several licensees to evaluate the impact of expanded adversary characteristics and the ICMs on licensee protection and mitigative strategies. Information gained and discrepancies identified during the audits and drills were reviewed and dispositioned by the Office of Nuclear Security and Incident Response. For CY '03, the USNRC will continue to monitor overall safeguards and security controls, conduct inspections, and resume force-on-force exercises at selected power plants. Should threat conditions change, the USNRC may issue additional Orders, advisories, and

temporary instructions to ensure adequate safety is being maintained at all commercial power reactors.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure 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/*

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

Docket Nos. 50-259, 50-260, 50-296  
License Nos. DPR-33, DPR-52, DPR-68

Enclosure: NRC Inspection Report 50-259/2002-04, 50-260/2002-04, 50-296/2002-04  
w/Attachment

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TVA

3

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-259, 50-260, 50-296

License Nos: DPR-33, DPR-52, DPR-68

Report Nos: 50-259/02-04, 50-260/02-04, 50-296/02-04

Licensee: Tennessee Valley Authority (TVA)

Facility: Browns Ferry Nuclear Plant, Units 1, 2, & 3

Location: Corner of Shaw and Nuclear Plant Roads  
Athens, AL 35611

Dates: September 22 - December 28, 2002

Inspectors: B. Holbrook, Senior Resident Inspector  
J. Starefos, Resident Inspector  
W. Bearden, Senior Resident Inspector - Unit 1 Recovery Project  
P. Taylor, Senior Project Engineer (Section 1R17)  
E. Testa, Senior Health Physicist (Sections 2OS1 and 2OS2)  
K. Davis, Physical Security Inspector (Section 4OA5.2)  
D. Jones, Senior Health Physicist (Section 4OA5.3)

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

Enclosure

## SUMMARY OF FINDINGS

IR 05000259/2002-004, 05000260/2002-004, 05000296/2002-004; Tennessee Valley Authority; 09/22/2002 - 12/28/2002; Browns Ferry Nuclear Plant, Units 1, 2 and 3; Event Follow-up.

The report covered a three-month period of inspection by resident inspectors and announced inspections by a regional senior project engineer, physical security inspector, and two senior health physicists. One unresolved item with a potential safety significance greater than Green was identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

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

Cornerstone: Mitigating System

- TBD. Troubleshooting associated with the in-service battery charger on Battery Board #3 caused a loss of the charger and blown fuses in the Unit 2 Division I and the Unit 3 Division II inverters. The blown fuses in the Unit 3 Division II inverter resulted in making the high pressure coolant injection system inoperable.

This finding is unresolved pending completion of a significance determination. The finding is greater than minor because it is associated with Unit 3 high pressure coolant injection (HPCI) system performance and degraded the ability to meet the mitigating system cornerstone objective. Also, the finding has potential safety significance greater than very low significance because of the importance of the HPCI system in a stuck open relief valve event scenario. (Section 4OA3.1)

### B. Licensee Identified Findings

None

## Report Details

### Summary of Plant Status

Unit 1 has been shut down since March 19, 1985, and has remained in a long-term lay-up condition with the reactor defueled. The licensee has initiated long-term recovery actions to return the unit to operational condition.

Unit 2 operated at or about rated thermal power (RTP) with the following exceptions: Unit 2 power was reduced to about 60% RTP on October 18, 2002, due to an oil leak on reactor recirculation system motor generator set B. The unit was shutdown on October 19, 2002, as scheduled, for a midcycle outage to replace leaking fuel. The unit was restarted on October 28, 2002, and 100% RTP was achieved on November 4. Unit power was reduced to 76% RTP on November 12, 2002, to repair a high pressure feedwater heater level control valve. Unit power was returned to 100% RTP on November 15, 2002. The unit began end-of-cycle coastdown on about November 23, 2002. Unit power was at 88% RTP at the end of the inspection period.

Unit 3 operated at or about RTP with one exception throughout the inspection period. A trip of reactor recirculation pump B on October 22, 2002, caused Unit 3 power to be reduced to about 66% RTP. The recirculation pump trip occurred while operators were preparing to remove an oil pump from service on the motor generator set to repair a leaking oil seal. Unit power was returned to 100% RTP later the same day.

## **1. REACTOR SAFETY**

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

#### 1R01 Adverse Weather Protection

##### a. Inspection Scope

The inspectors reviewed licensee procedure 0-GOI-200-1, Freeze Protection Inspection, to verify the licensee's readiness for cold weather susceptibilities. The inspectors walked down portions of the residual heat removal service water (RHRSW) system for each unit, control bay chillers, and the plant intake structure to verify that they were not susceptible to adverse weather problems. The inspectors' walkdown was to verify that portable space heaters and portable weather barriers were in place; insulation on piping systems was intact, specific components contained freeze protection caution tags for configuration control, and piping heat trace systems were in standby readiness. The inspectors observed local switch position and heat trace electrical potential indicator lights to verify that they were as required by the above procedure. The inspectors also reviewed open Work Orders (WO), and Problem Evaluation Reports (PERs), to verify that the licensee was identifying and correcting problems associated with equipment used to protect against cold weather-related problems.

In addition, the inspectors reviewed licensee actions during actual cold weather conditions when the outside temperature was approximately 25°F (degrees Fahrenheit), to verify that cold weather procedures were implemented and that procedure requirements were met. Procedure attachments that required specific equipment checks, such as heat trace and portable heater operation, status and condition of

weather barriers including windows and doors, local switch and valve position, and condition of local instrumentation were reviewed to verify that equipment checks were initiated and completed as required. The inspectors also selected specific procedure sections and walked down plant equipment, (portions of RHRSW, emergency equipment cooling water, and control bay chillers) to verify that equipment status was as required by procedure.

b. Findings

No findings of significance were identified.

1R04 Partial Equipment Alignment

a. Inspection Scope

The inspectors performed a partial walkdown of three safety systems to verify redundant or diverse train operability, as required by the plant Technical Specifications (TSs). In some cases, the system was selected because it was considered an unacceptable combination from a Probabilistic Safety Assessment perspective for the equipment to be removed from service while another train or system was out of service. The inspectors' walkdown was to verify that selected breaker, valve position, and support equipment were in the correct position for support system operation. The walkdown was also to identify any discrepancies that impact the function of the system that could lead to increased risk. Also, the inspectors' walkdown was to verify that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the availability and functional capability of mitigating systems or barriers. Inspectors' observations of equipment and component alignment for the partial walkdowns were compared to the alignment specified in: Procedure Operating Instruction (OI) 2-OI-74, Residual Heat Removal system; Drawing 2-47E811-1, RHR System Flow; 3-OI-75, Core Spray; Drawing 3-47E814-1, Core Spray System Flow; 3-OI-73, High Pressure Coolant Injection (HPCI) System; and Drawing 3-47E812-1, Flow Diagram HPCI System.

- Unit 2 RHR system Loop I LPCI function during RHR pump 2D planned maintenance
- Unit 3 core spray system Loop I during core spray loop II planned maintenance
- Unit 3 HPCI during control rod drive pump 3B planned maintenance

b. Findings

No findings of significance were identified.



1R05 Fire Protectiona. Inspection Scope

The inspectors reviewed licensee Standard Programs and Processes, (SPP)-10.10, Control of Transient Combustibles, and SPP-10.9, Control of Fire Protection Impairments, and conducted a walkdown of the following six fire areas to verify a selected sample of the following: licensee control of transient combustibles and ignition sources, the material condition of fire equipment and fire barriers, operational lineup, and operational condition of selected components. Also, the inspectors' review was to verify that selected fire protection impairments were identified and controlled in accordance with the procedure SPP-10.9. In addition, the inspectors reviewed the Site Fire Hazards Analysis and applicable Pre-fire Plan drawings to verify that the necessary fire fighting equipment, such as fire extinguishers, hose stations, ladders, and communications equipment, was in place. Pre-fire Plan drawings reviewed are listed in the attachment.

- Fire Zone 2-1 (Unit 2 reactor building elevation 519 and 565 west)
- Fire Zone 2-3 (Unit 2 reactor building elevation 593 north)
- Fire Area 25 (river intake structure only)
- Fire Area 19 (U3 battery and battery board room)
- Fire Area 3 (U3 reactor building EI.519)
- Fire Area 3 (U3 reactor building EI.565)

b. Findings

No findings of significance were identified.

1R11 Licensed Operator RequalificationResident Inspector Quarterly Review of Testing and/or Training Activitiesa. Inspection Scope

The inspectors observed an operations crew performance during Simulator Evaluation Guide, OLP177.072, Core Spray Pump Failure, Partial Loss of Annunciators, Loss of Feedwater, ATWS, RCIC Isolation, HPCI Steam Leak and Failure to Isolate. The inspectors reviewed licensee procedures TRN-11.4, Continuing Training For Licensed Personnel; TRN-11.9, Simulator Exercise Guide Development and Revision; and OPDP-1, Conduct Of Operations, to verify the conduct of training; that the exercises contained high-risk operator actions, the formality of communication, procedure usage, alarm response, control board manipulations, and supervisory oversight were in accordance with the above procedures. The inspectors also reviewed licensee procedure SPP-3.5, Regulatory Reporting Requirements, to verify that the event action level performed during the training was correctly identified and reported. The inspectors also reviewed previously identified deficiencies to verify that they were included in the current training. The inspectors attended the post-exercise critiques to verify that the licensee identified issues were comparable to issues identified by the inspectors.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule (MR) Implementation

a. Inspection Scope

The inspectors reviewed the two performance problems listed below, for selected structures, systems, and components (SSCs). The inspectors reviewed PERs, Operator logs, and licensee Cause Determination Evaluations (CDEs) relative to the problems to assess the effectiveness of the licensee's MR Implementation. The inspectors compared the licensee's performance against site procedure SPP-6.6, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting -10 CFR 50.65, Technical Instruction 0-TI-346, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting -10 CFR 50.65, and SPP 3.1, Corrective Action Program. The inspectors review was to verify that: (1) MR scoping; (2) characterization of failed SSCs; (3) safety significance classifications; (4) 10 CFR 50.65 (a)(1) or (a)(2) classifications; and (5) the appropriateness of performance criteria for SSCs classified as (a)(2) or goals and corrective actions for SSCs classified as (a)(1) were in accordance with the above procedures and 10 CFR 50.65 requirements.

- Inverter failures on Unit 2 and 3, CDE 2002-10
- Valves 2-FCV-74-802 and 2-FCV-74-803, primary containment isolation valves, failed two consecutive as-found leak rate tests, CDE dated May 16, 1999

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

For the six emergent work and equipment issues listed below, the inspectors' reviewed to verify that the licensee had taken the necessary steps to plan and control the emergent work activities to effectively manage and minimize risk. The inspectors' reviewed that risk assessments were being performed as required by 10 CFR 50.65(a)(4). The inspectors reviewed licensee procedures SPP-6.1, Work Order Process Initiation, SPP-7.1, Work Control Process, and 0-TI-367, BFN Dual Unit Maintenance, and compared licensee performance to the procedure to verify that procedure requirements were met. Also, the review was to evaluate the adequacy of the licensee's risk assessments and the implementation of compensatory measures.

- Units 1, 2, and 3: control room emergency ventilation system "A" inoperable due to damper response, WO 02-015638-000 (emergent)
- Units 1, 2, and 3: 250V battery charger #3, WO 02-012527-000 (emergent)
- Unit 3, RHR pump 3C motor breaker shutter not operating properly, WO 02-012040-000 (emergent)

- Unit 1, RHR temperature annunciator window in alarm, WO 02-015309-000 (emergent)
- Unit 3, control bay chiller 3B emergency equipment cooling water leak, WO 02-013245-000 (emergent)
- Unit 2, main turbine stop valve #2 limit switch degradation, WO 02-011834-000 (emergent)

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following five operability evaluations to verify the technical adequacy and ensure that the licensee had adequately assessed TS operability. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) to verify that the system or component remained available to perform its intended function. In addition, the inspectors reviewed implemented compensatory measures to verify that the compensatory measures worked as stated and the measures were adequately controlled. Where applicable, the inspectors reviewed licensee procedure SPP-3.1, Corrective Action Program, Appendix D, Guidelines For Degraded/Non-conforming Condition Evaluation and Resolution of Degraded/Non-conforming Conditions, to ensure that the licensee's evaluation met procedure requirements. The inspectors also reviewed a sampling of PERs to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations.

- Unit 2 turbine stop valve #2 limit switch problem required RPS channels A1 and B2 to be placed in trip condition
- Unit 2 primary containment isolation valve 2-FCV-64-20 exceeded the maximum closing time (WO 02-011225-000)
- Unit 3 HPCI stop valve, 3-FCV-73-10, erratic operation during surveillance testing (PER 02-011069-000)
- Units 2 & 3 cracked welds on the intake air silencer to the emergency diesel generator turbocharger mounting pads (PER 02-012165-000)
- Units 2 & 3 oscillation power range monitor declared inoperable following 10 CFR Part 21 notification from General Electric (PER 02-015282-000)

b. Findings

No findings of significance were identified.

1R16 Operator Work-Arounds (OWA)a. Inspection Scope

The inspectors reviewed the status of OWAs for Units 2 and 3 to determine if the functional capability of the system or operator reliability in responding to an initiating event was affected. The review was to evaluate the effect of the OWA on the operator's ability to implement abnormal or emergency operating procedures during transient or event conditions. The inspectors compared their observations and licensee actions to the requirements of Operations Directive Manual 4.11, Operator Work Around Program and TVAN Standard Department Procedure OPDP-1, Conduct of Operations. PER 02-006284-000 was also reviewed to determine licensee corrective actions for minor issues regarding procedural consistency identified during a previous inspection of OWAs. The two OWAs reviewed were:

- Unit 3: 3-078-OWA-2002-0075, Refueling bellows leakage light is lit on remote panel without corresponding control room annunciator in alarm (WO 02-004306-000 and WO 02-003250-000)
- Unit 2: 2-099-OWA-2002-0126, Verifying relays energized while turbine stop valve #2 limit switch inputs to RPS deenergized (WO 02-011834-000)

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modification - Annual Reviewa. Inspection Scope

The inspectors reviewed licensee actions and the permanent plant modification to replace the existing Unit 2 HPCI and reactor core isolation cooling (RCIC) flow controllers with new digital electronic programmable flow controllers. The inspectors reviewed licensee procedures SPP-9.3, Plant Modifications and Engineering Change Control; SPP-7.1, Work Control Process; SPP-8.3, Post-modification Testing; and SPP-8.1, Conduct of Testing, to verify that the risk-significant plant modification, Design Change Notice (DCN) 50472A, Replace Existing HPCI Flow Controller, 2-FIC-073-0033, (WO 00-006638-001) and Replace Existing RCIC flow Controller, 2-FCV-071-0036A, (WO 00-006638-002) was developed, reviewed, and approved per the procedure requirements. The inspectors reviewed the post-modification work and test package following the DCN implementation to replace the RCIC flow controller with the unit on-line, to verify that the design basis, licensing bases, and TS-required performance for the system had not been degraded as a result of the modification. The inspectors also reviewed the same modification work package developed to replace the existing HPCI flow controller in January 2003, with the unit on-line.

b. Findings

No findings of significance were identified.

## 1R19 Post-Maintenance Testing (PMT)

### a. Inspection Scope

The inspectors evaluated the following five activities by observing testing and/or reviewing completed documentation to verify that the PMT was adequate to ensure system operability and functional capability following completion of associated work. The inspectors reviewed licensee procedure SPP-6.3, Post-Maintenance Testing, to verify that testing was conducted in accordance with procedure requirements. For some testing, portions of MMDP-1, Maintenance Management System, were referenced.

- Unit 3: PMT following core spray pump "D" motor bridge and megger test, per WO 02-009398-000
- Unit 1, 2, and 3 control room emergency ventilation train "A" damper maintenance, per WO 02-15638-000
- Unit 1 to Unit 2 support: Clean RHR heat exchanger 1D, WO 02-005085-000, WO 02-005086-000
- Unit 3: RCIC valve 3-FCV-71-17 fast stroke time, WO 02-006317-000 and PER 02-006220-000
- Unit 3: Inspect and adjust as necessary HPCI valve 3-FCV-0018, WO 02-11068-001, and PER 02-11069-000

### b. Findings

No findings of significance were identified.

## 1R20 Refueling and Other Outage Activities

### a. Inspection Scope

During the Unit 2 mid-cycle outage from October 28 - November 4, 2002, to replace leaking fuel assemblies, the inspectors observed portions of the preparation activities for shutdown and monitored licensee controls over the outage activities listed below. Procedures reviewed are included in the attachment to this report.

- Monitoring of decay heat removal processes
- Reactor water inventory controls including flowpaths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss
- Controls over activities that could affect reactivity
- Refueling activities including fuel handling and monitoring of increased iodine in the reactor cavity during floodup
- Reactor cooldown rate documentation
- Primary containment drywell structure tour prior to startup

### b. Findings

No findings of significance were identified.

1R22 Surveillance Testinga. Inspection Scope

The inspectors either witnessed portions of surveillance tests or reviewed test data for the seven risk-significant SSC, listed below, to verify that the tests met TS surveillance requirements, UFSAR commitments, and in-service testing (IST) and licensee procedure requirements. The inspectors' review was to confirm that the testing effectively demonstrated that the SSCs were operationally capable of performing their intended safety functions. IST data was compared against the requirements of licensee procedures 0-TI-362, Inservice Testing of Pumps and Valves, and 0-TI-230, Vibration Monitoring and Diagnostics. The surveillances either witnessed or reviewed included:

- 2-SI-4.4.A.1, Standby Liquid Control Pump Functional Test
- 2-SI-3.2.30, MSIV Alternate Leakage Path - Cold Shutdown Testing (IST)
- 2-SR-3.6.1.3.5 (SD), Valves Cycled During Cold Shutdown
- 2-SR-3.5.1.5, Reactor Recirculation Pump Discharge Valve Cycling
- 2-SI-3.2.12, Verification of Fail-Safe Position for MSIVs
- 2-SR-3.6.1.3.6, Main Steam Isolation Valve Fast Closure Test
- 3-SR-3.5.1.6(CS II), Core Spray Flow Rate Loop II

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modificationsa. Inspection Scope

The inspectors reviewed licensee procedures 0-TI-405, Plant Modifications and Design Change Control, 0-TI-410, Design Change Control, SPP-9.5, Temporary Alterations, and the two temporary modifications listed below to ensure that procedure and regulatory requirements were met. The inspectors reviewed the associated 10 CFR 50.59 screening against the system design bases documentation to verify that the modifications had not affected system operability/availability. The inspectors reviewed selected completed work activities and walked down portions of the systems to verify that the installation was consistent with the modification documents and Temporary Alteration Control Form (TACF).

- TACF 2-02-003-073 R0, remove steam trap piston, WO 02-10234-000, and 02-10234-001
- TACF 2-02-006-073 R0, install pressure monitoring instruments, WO 02-06650-000, and 02-06743-000

b. Findings

No findings of significance were identified.

## 2. RADIATION SAFETY

### Cornerstones: Occupational Radiation Safety (OS) and Public Radiation Safety (PS)

#### 2OS1 Access Controls To Radiologically Significant Areas

##### .1 External Occupational Exposure Control and Personal Dosimetry - Unit 1 Recovery

###### a. Inspection Scope

Licensee activities for controlling worker access to radiologically-significant areas and tasks associated with the Unit 1 (U1) recovery activities were evaluated. The inspectors directly observed implementation of administrative and physical access controls; appraised radiation worker and health physics technician (HPT) knowledge and proficiency in implementing radiation protection activities; and assessed procedural guidance for the control of access to radiologically-significant areas.

During the review, the inspectors discussed and assessed procedure and administrative guidance documents for posting areas and labeling containers, airborne radioactivity control, special radiological controls, development and use of Radiation Work Permits (RWPs), issuance of dosimetry, and contamination control.

During facility tours, the inspectors directly observed the posting of areas and labeling of containers in the U1 Drywell and Reactor Building. Area postings and controls were evaluated for consistency with procedural guidance. Independent dose rate measurements were conducted by the inspectors during the drywell tour.

The inspectors observed job task radiation controls including ventilation established for pipe cutting and demolition activities. Work-side air sample and alpha contamination analysis and evaluations were reviewed and discussed in detail for the observed tasks. Use and operation of exit portal monitor (PM)-7 equipment located at the East and West exits were observed during shift change during maximum personnel traffic. The inspectors evaluated the operation and sensitivities for ten Personnel Contamination Monitors (PCM-1B), two PCM-2 RCA whole body friskers, six Small Article Monitors (SAM-11) and the worker proficiency in the use of the instruments. The most recent calibration data for these monitors were reviewed and evaluated.

Radiation protection program guidance and implementation were evaluated against Title 10 Code of Federal Regulations (10 CFR) 19.12; 10 CFR 20, Subparts B, C, F, G, H, and J; Technical Specification (TS) Section 5.4, Procedures; and approved licensee procedures. Licensee guidance documents, records, and data reviewed within this inspection area are listed in Section 2OS1 of the report Attachment.

###### b. Findings

No findings of significance were identified.

.2 Internal Exposure Control and Assessment

a. Inspection Scope

Licensee corrective action program PERs associated with access controls were reviewed. The inspectors assessed the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with licensee procedure SPP 3.1, Corrective Action Program. Licensee documents reviewed and evaluated in detail during inspection of this program area are identified in Section 2OS1 of the report Attachment.

b. Findings

No findings of significance were identified.

2OS2 Maintaining Occupational Exposure AS Low As Reasonably Achievable (ALARA)

.1 As Low As Reasonably Achievable (ALARA)

a. Inspection Scope

During the week of December 2, 2002, the inspectors evaluated "As Low As Reasonably Achievable" (ALARA) program guidance and its implementation for ongoing U1 recovery activities. Development of dose expenditure goals for selected recovery tasks were reviewed and discussed with site management. The inspectors reviewed applicable, ALARA Plans, a Health Physics Self-Assessment, and ALARA Planning Work Sheets.

The inspectors reviewed and discussed dose rate and cumulative dose expenditure data trends associated with selected systems, equipment, and tasks. For selected recovery activities, the inspectors compared current dose rate and dose expenditure results with data used in planning estimates. The inspectors evaluated selected data associated with dose reduction initiatives including U1 decontamination and flushing chemistry, temporary shielding, and cobalt reduction initiatives for valve replacements.

Knowledge of ALARA program guidance and staff proficiency in program implementation were appraised through observation of selected work activities, comparison of estimated and current dose expenditure data for selected tasks, and discussions of selected outage tasks with responsible supervisors and managers.

Program implementation and results were reviewed against the U1 recovery ALARA work plans, Updated Final Safety Analysis Report (UFSAR), 10 CFR Part 20 requirements, and procedural guidance listed in the Attachment to this report.

b. Findings

No findings of significance were identified.



.2 Problem Identification and Resolution

a. Inspection Scope

Licensee PER documents associated with dose reduction initiatives and ALARA activities were reviewed and assessed. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with SPP 3.1, Corrective Action Program. Specific documents reviewed and evaluated are listed in the report Attachment.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

40A1 Performance Indicator (PI) Verification

Cornerstone: Initiating Events

.1 Unit 2 and Unit 3 Scrams With Loss of Normal Heat Removal

a. Inspection Scope

The inspectors reviewed Procedure SPP-3.4, Performance Indicator for NRC Reactor Oversight Process, for Compiling and Reporting PI's to the NRC. The inspectors reviewed raw PI data for scrams with loss of normal heat removal collected from monthly operating reports and licensee event reports (LERs) from the fourth quarter 2001 through the third quarter 2002. The inspectors compared graphical representations, from the most recent PI report to the raw data to verify that the data was correctly reflected in the report. The inspectors reviewed Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline, Revisions 1 and 2, to verify that industry reporting guidelines were applied.

b. Findings

No findings of significance were identified.

Cornerstone: Mitigating Systems

.2 Unit 2 and Unit 3 Safety System Unavailability: High Pressure Injection Systems - Unit 2 and Unit 3 HPCI

a. Inspection Scope

The inspectors reviewed the licensee's procedures and methods for compiling and reporting PIs. The inspectors reviewed Procedure SPP-3.4, Performance Indicator for NRC Reactor Oversight Process for Compiling and Reporting PIs to the NRC, and

reviewed raw PI data collected for the Unit 2 and Unit 3 HPCI from October, 2001, through September, 2002, and compared graphical representations from the most recent PI report to the raw data to verify the data was correctly included in the report. The inspectors reviewed licensee procedure SPP 6.6, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting - 10 CFR 50.65; category A and B PERs; engineering evaluations and associated PERs; and licensee records to verify that the PI data was appropriately captured for inclusion into the PI report, and that the PI was calculated correctly. The inspectors compared their observations with licensee procedures, listed above, and NEI 99-02, to verify that licensee procedure requirements and industry reporting guidelines were applied.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems - Selected Issue Follow-up (Quarterly)

a. Inspection Scope

The inspectors reviewed PER 98-013383-000, an "A" level (the highest action level) PER, dated November 12, 1998, to assess licensee actions. The 1998 PER was still open awaiting final resolution by completion of a design change on both units. The PER documented that Unit 3 valve 3-CKV-74-792, a primary containment isolation valve, failed two consecutive as-found leak rate tests due to crud buildup on the seating surfaces of the valve. The failures occurred in March, 1997, and September, 1998. In addition, Unit 2 valves 2-FCV-74-802 and 2-FCV-74-803, primary containment isolation valves, failed two consecutive as-found leak rate tests for the same reason, and were included in PER 98-013383-000 for corrective action. The Unit 2 failures occurred in September, 1997, and April, 1999. The inspectors reviewed the problems to evaluate the effectiveness of the licensee's corrective actions for important safety issues. Specifically, the inspectors' review was to assess whether the issue was identified in a timely manner; documented accurately and completely; properly classified and prioritized; adequately considered for extent of condition, generic implications, common cause and previous occurrences; adequate to identify root causes; and identify appropriate corrective actions to prevent recurrence. Also, the inspectors' review was to assess whether the issues were processed in accordance with licensee Procedure SPP-3.1, Corrective Action Program.

b. Findings

No findings of significance were identified.

#### 4OA3 Event Follow-up

##### .1 Loss of Battery Board 3 In-Service Charger and Unit 3 Division II Inverter

###### a. Inspection Scope

The inspectors reviewed the licensee's actions in response to a loss of the Unit 2 Division I and the Unit 3 Division II inverters on October 22, 2002. The inspectors observed portions of the control room operator actions to address the cause of the event and evaluate system and plant impacts. The inspectors independently reviewed abnormal operating instructions (AOIs) 2-AOI-57-11 and 3-AOI-57-11, Loss of Power to an ECCS ATU Panel/ECCS Inverter, Revision 6, for both procedures, to confirm that the expected control room indications were impacted.

###### b. Findings

Introduction: A finding was identified in that troubleshooting associated with the in-service battery charger on Battery Board #3 caused a loss of the charger and blown fuses in the Unit 2 Division I and the Unit 3 Division II inverters. The blown fuses in the Unit 3 Division II inverter caused a failure of the high pressure coolant injection (HPCI) system, having safety significance greater than very low significance. This is an unresolved item (URI) pending completion of the significance determination process (SDP).

Description: The licensee was performing troubleshooting on a battery charger supplying Battery Board #3 when a loss of the in-service charger occurred. Fuses were blown in the Unit 2 Division I and the Unit 3 Division II inverters. Although the loss of the Division I inverter resulted in a loss of instrumentation, control, and control room indication for specific systems on Unit 2, the impact was limited because the unit was in Mode 5 - Refueling, at the time of the event. The impact on Unit 3 was the loss of the Division II inverter resulting in a loss of torus temperature monitoring instrumentation, HPCI control and instrumentation, and turbine high water level trip logic, channel B. The total time, from power loss to restoration, for this condition on Unit 3 was 2 hrs, 25 minutes. The inspectors reviewed the SDP as it applied to the Unit 3 loss of HPCI for a time duration of 2 hrs, 25 minutes.

Analysis: The finding is considered to be greater than minor because the loss of HPCI had an actual impact on safety. Although the issue did present an immediate safety concern, the concern was promptly and appropriately addressed by immediate operator response actions. The finding was determined to affect the Mitigating System Cornerstone because it affected the operability, availability, reliability, or function of a system or train in a mitigating system (HPCI). The SDP Phase 1 screening worksheet was completed for the Mitigating Systems Cornerstone which concluded that a Phase 2 analysis was appropriate because the finding represented an actual loss of safety function of the HPCI system.

Enforcement: Pending determination of the safety significance, this finding is identified as URI 50-296/02-04-01, Troubleshooting Results in Unit 3 HPCI Failure.

.2 (Closed) LER 50-260/2002-002-00, Automatic Scram Resulting From Main Bank Transformer Bushing Fault.

This LER reported a Unit 2 automatic scram that occurred on July 27, 2002, due to a ground fault on a main bank transformer bushing. The ground fault tripped the main generator which tripped the main turbine that resulted in a direct scram of the reactor. The licensee determined the root cause of this event to be thermal degradation of the bushing internal condenser, resulting in the paper insulation reaching its end-of-life. This resulted in a ground fault on the low-side bushing of main bank transformer 2A. Plant response is discussed in Section 40A3 and personnel performance is discussed in Section 1R14 of NRC Inspection Report 2002-03. The scram was uncomplicated and plant and equipment responded as designed. This event was entered in the licensee's corrective action program as PER 02-008243-000. No violations of regulatory requirements were identified.

.3 (Closed) LER 50-296/2002-004-00, Loss of High Pressure Coolant Injection (HPCI) Flow Controller Power Supply.

This LER reported a loss of power supply to the HPCI flow controller on Unit 3 during electrical maintenance troubleshooting activities on October 22, 2002. The troubleshooting resulted in a condition that could have prevented the fulfillment of the HPCI system functions of removing residual heat and mitigating the consequences of an accident. This event was entered in the licensee's corrective action program as PER 02-12529-000. The inspectors review of the event is discussed in Section 40A3.1 of this report.

40A5 Other

.1 Unit 1 Layup and Equipment Preservation Program Inspection

a. Inspection Scope

The inspectors used the applicable guidance in NRC Inspection Procedure 92050 to verify that the licensee was following the prescribed program established to preserve Unit 1 safety-related equipment, which is in long term layup. The inspectors reviewed licensee procedures 0-TI-373, Plant Layup and Equipment Preservation, and CI-134, Chemistry Layup Monitoring, to verify that equipment checks and monitoring were completed at the specified frequency. The inspectors reviewed the preventive maintenance (PM) program for the standby liquid control (SLC) system, RCIC, and control rod drive system to verify that PM activities were completed as scheduled. The inspectors reviewed procedures 1-GOI-100-13.5, Layup of SLC System, 1-GOI-100-13.8.B, Layup of Reactor Core Isolation Cooling System, and 1-GOI-100-13.11.A, Control Rod Drive Layup Using Reactor Water Cleanup System, and completed a plant and main control room walkdown of the systems to verify that valve and switch position, component tagging, and layup preservation equipment were as specified by the applicable procedure.

The inspectors also reviewed a sampling of PERs to verify that equipment problems were identified and corrected as required by procedure APP-3.1, Corrective Action Program. In addition, the inspectors discussed the equipment layup program with plant management, personnel responsible for implementing the layup program, and Unit 1 recovery personnel to assess department interface and equipment transition plans.

b. Findings

No findings of significance were identified.

.2 Temporary Instruction (TI) 2515/148, Appendix A, Pre-inspection Audit for Interim Compensatory Measures (ICMs) at Nuclear Power Plants

a. Inspection Scope

The inspectors conducted an audit of the licensee's actions in response to an order dated February 25, 2002, which required the licensee to implement certain interim security compensatory measures. The audit consisted of a broad-scope review of the licensee's actions in response to the order in the areas of operations, security, emergency preparedness, and information technology as well as additional elements prescribed by the TI. The inspectors selectively reviewed relevant documentation and procedures; directly observed equipment, personnel, and activities in progress; and discussed licensee actions with personnel responsible for development and implementation of the ICM actions. These activities were reviewed against the requirements of the order; the provisions of TI 2515/148, Appendix A; the licensee's response to the order; and the provisions of the NRC-endorsed NEI Implementation Guidance, dated July 24, 2002. A more in-depth review of the licensee's implementation of the February 25, 2002 Order, utilizing Appendix B and C of TI 2515/148 will be conducted in the near future.

b. Findings

No findings of significance were identified.

.3 (Closed) Inspector Follow-up Item (IFI) 50-259/01-08-01, 50-260/01-08-01, and 50-296/01-08-01, Follow up on licensee's actions with regard to 1977 exposure data being entered into the reconstructed RADPERS database as 1973 data

a. Inspection Scope

During an inspection of the Radiological Exposure Records Reconciliation Project (RERRP), conducted at the licensee's corporate offices February 25 - March 1, 2002, inaccuracies were detected in the 1999 reconstructed Radiological Hygiene Personnel Exposure (RADPERS) database. Those detected inaccuracies involved incorrect entry of 1977 personnel exposure data into the 1999 reconstructed RADPERS database as 1973 exposures and was documented in PER 02-000061-000 to investigate this apparent anomaly. Licensee investigation determined that similar inaccuracies also existed in the RADPERS database for the year 1975.

Corrective actions involved recreating the reconstructed RADPERS database for the years 1973 and 1975, and comparing the 2002 recreated RADPERS exposure data to the Exposure Data Repository (EDR), the official dose records system, to determine whether any additional missing exposure data or dose mismatches existed. Five new line items for individuals missing exposure data and 20 line items for apparent dose mismatches were identified by that comparison.

The inspectors reviewed the licensee's final corrective actions during an inspection conducted December 2 - 4, 2002. The inspector reviewed hard copies of the original RADPERS records to evaluate the five instances of individuals with missing exposure records.

The discrepancies, resulting from data transcription errors, were reviewed, and the inspectors verified that current EDR data was accurate. The inspectors reviewed records for 10 of the 20 dose mismatches and verified that the issues were resolved and documented as necessary. Exposure data for five individuals whose 1977 exposure results had been entered as 1973 exposures in the 1999 reconstructed RADPERS database were reviewed, and the inspectors verified that the problems had been corrected in the 2002 reconstructed RADPERS database. In addition, 10 additional samples of personnel dose records not identified as discrepant by the RERRP were reviewed for evaluated consistency between the EDR and the original RADPERS databases.

b. Findings

No findings of significance were identified.

40A6 Management Meetings

Exit Meeting Summary

On January 8, 2003, the resident inspectors presented the inspection results to Mr. Ashok Bhatnager and other members of his staff, who acknowledged the findings. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

**SUPPLEMENTARY INFORMATION**  
**PARTIAL LIST OF PERSONS CONTACTED**

Licensee

T. Abney, Nuclear Site Licensing & Industry Affairs Manager  
A. Bhatnagar, Site Vice President  
L. Clardy, Site Nuclear Assurance Manager  
J. Corey, Radiation Protection and Chemistry Manager  
R. Jones, Nuclear Plant Manager  
J. Lewis, Nuclear Plant Operations Manager  
T. Niessen, Jr., Engineering & Site Support Manager  
J. Ogle, Site Security  
R. Rogers, Maintenance & Modifications Manager  
M. Skaggs, Assistant Plant Manager  
R. Wiggall, Site Engineering Manager

**LIST OF ITEMS OPENED AND CLOSED**

Opened

50-296/02-04-01	URI	Troubleshooting Results in Unit 3 HPCI Failure. (Section 40A3.1)
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Closed

50-260/02-002-00	LER	Automatic Scram Resulting from Main Bank Transformer Bushing Fault (Section 40A3.2)
50-296/02-004-00	LER	Loss of High Pressure Coolant Injection Flow Controller Power Supply (Section 40A3.3)
50-259,260,296/01-08-01	IFI	Follow up on Licensee's Actions with Regard to 1977 Exposure Data Being Entered into the Reconstructed Radpers Database as 1973 Data (Section 40A5.3)

## **PARTIAL LIST OF DOCUMENTS REVIEWED**

### Section 1R05

Fire Hazards Analysis, Volume 1 and 2  
Fire Hazards Analysis, Table 9.3.11.E, Fire Rated Doors  
Fire Hazards Analysis, Table 9.3.11.F, Fire Rated Dampers  
Fire Hazards Analysis, Table 9.3.11.G, Emergency Lighting  
Procedures 3-SI-4.11.A.1.(1) and (2), (for detector location)  
Fire Pre-plans, RX2-519 NW, RX2-519, RX2-519SW, RX2-593, IS-565, RX3-565, RX3-519SE,  
RX3-519SW, RX3-519NW, RX3-519NE, RX3-519, CB3-593  
Drawing 47W216-55R4  
Fire Protection Impairment Permit 02-00259

### Section 1R20

Procedure 2-OI-74, Residual Heat Removal System  
Procedure 2-OI-75, Core Spray System  
Procedure 2-SR-3.4.9.1(1), Reactor Heatup and Cooldown Rate Monitoring

### Section 2OS1

#### Procedures, Instructions, and Guidance Documents

Radiological Control Instruction (RCI) RCI 1.1 Radiological Control Instruction, Revision (Rev.)  
101  
Standard Programs and Processes (SPP) SPP-5.1 Radiological Controls, Revision 4  
Radwaste Technical Procedure (RWTP)-101 10CFR61 Waste Characterization, Rev. 0  
RWTP-100 Radioactive Material/ Waste Shipments, Rev. 0  
Radiological Control Department Procedure (RCDP) RCDP-7 Bioassay and Internal Dose  
Program, Rev. 0  
Component Calibration Instruction (CCI) CCI-0-RE-00-238 Eberline Instrument Corporation  
PCM-2 Personnel Contamination Monitor, Rev. 1  
CCI-0-RE-00-237 Eberline Instrument Corporation PCM-1B Personnel Contamination Monitor,  
Rev. 15  
Radiation Protection Instrument Program Implementing Procedure (INST-IP) INST-IP-20  
Radiation Protection Program Implementing Procedure NO.20 Bicon-NE Small Article Monitor  
(SAM-11) Calibration, Response Check and Operating Procedure, Rev. 52  
Dosimetry Implementing Procedure NO.4 In Vitro Bioassay Sampling IP-4, Rev. 32  
System Instrument Instruction (SII) SII-0-XX-00-300 PM-7 Portal Monitor, Rev. 2  
SPP 3.1 Corrective Action Program, Rev. 4  
RCI 11.1 Radiation Protection Instrument Program Implementation, Rev. 52  
RCI 8.1 Internal Dosimetry Program Implementation, Rev. 32

#### Radiation Work Permit (RWP) Documents

Unit 1 #02040382 Radwaste Building All Elevations  
Unit 1 #02040383 Radwaste Building All Elevations  
Unit 1 #02110000 Unit 1 Areas All Elevations  
Unit 1 #02110001 Unit 1 Areas All Elevations  
Unit 1 #02110852 Unit 1 Areas All Elevations  
Unit 1 #02111021 Unit 1 Drywell All Elevations  
Unit 1 #02111022 Unit 1 Drywell All Elevations



Unit 1 #02111030 Unit 1 Reactor Building All Elevations  
 Unit 1 #02111031 Unit 1 Reactor Building All Elevations  
 Unit 1 #02111040 Unit 1 Turbine Building All Elevations

#### Records, Worksheets, and Data

Unit 1 Work area air sample results and internal dose assessments from January 1 - December 1, 2002

PCM-1B Work Orders (WO) for Personnel Contamination Monitor (PCM)-18 Calibrations:

WO 02-001869-000, WO 02-001867-000, WO 02-008366-000, WO 02-008367-000,  
 WO 02-004573-000, WO 02-003963-000, WO 02-004572-000, WO 02-004571-000,  
 WO 02-002181-000, WO 02-009036-000

Work Orders for PCM-2 Calibrations: WO 02-003273-000, WO 02-001870-000

Tag Numbers for Small Article Monitor (SAM)-11 Calibrations: TVA TAG 860067, dated 10-31-02; TVA TAG 860068, dated 12-01-02; TVA TAG 860069, dated 10-10-02; TVA TAG 841990, dated 11-06-02; TVA TAG 841991, dated 07-02-02; TVA TAG 841992, dated 10-15-02

Work Orders for Portal Monitor (PM)-7 Calibrations: WO 02-009052-000, WO 02-006571-000,  
 WO 02-005449-000, WO 02-005449-000, WO 02-003026-000, WO 01-011700-000

#### Corrective Action Program Documents

PER 02-000018-000, Failure to properly Post Unit 1 Refuel Floor C-Zone as Airborne

PER 02-000607-000, Radcon Technician Injury

PER 02-000974-000, Sealand Container Contamination

PER 02-001433-000, Relief Valve On Skid Lifted Floor Contaminated

PER 02-002132-000, Worker Alarmed East Portal Exit

PER 02-007101-000, Two Workers Traveling Through Turbine Building Found To Have Level 1 PC

Self-Assessment Restart-Restart Integration (RES\_REI) -02-001 RadCon Support Of The Unit 1 Pipe Demolition Work 09/09-11/02

#### Section 2OS2

#### Procedures, Instructions, and Guidance Documents

RCDP-7 Bioassay and Internal Dose Program Rev. 0

#### Records, Worksheets, and Surveys

ALARA Planning Report 02-0018 Unit 1 Asbestos Abatement, Rev. 1

ALARA Planning Report 02-0053 Unit 1 Drywell Piping Demolition, Rev. 1

ALARA Planning Report 02-0036 Unit 1 Engineering and Support Walkdowns, Rev. 0

ALARA Planning Report 02-0054 Unit 1 Drywell "A" and "B" Recirculation Pump Demolition, Rev. 0

ALARA Planning Report 02-0041 Unit 1 Radcon Surveys, Inspections and Support Activities, Rev. 0

Corrective Action Program Documents

PER 02-012018-000, Electronic Dosimeters Improperly Worn

PER 02-012368-000, Employee Exited RCA Without Using Proper PCM Instrument

PER 02-013084-000, Dose Rates Higher Than Anticipated For Unit 1 "A" Recirculation Pump  
Impeller

Self-Assessment RES-REI-02-001 Radcon Support of the Unit 1 Pipe Demolition Work  
09/09-11/02