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

April 23, 2001

EA 01-066

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 50-259/00-06, 50-260/00-06 AND 50-296/00-06

Dear Mr. Scalice:

On March 24, 2001, the NRC completed an inspection at your Browns Ferry Nuclear Plant, Units 1, 2, and 3. The enclosed report documents the inspection findings which were discussed on March 29, 2001, with Mr. A. Bhatnagar and other members of your staff.

This 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.

Based on the results of this inspection, the inspectors identified one issue of very low safety significance (Green), that also was determined to involve a violation of NRC requirements. However, because of its very low safety significance and because it has been entered into your corrective action program, the NRC is treating this issue as a non-cited violation, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny this non-cited violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, 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 Browns Ferry.

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/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Paul E. Fredrickson, 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
(w/attachment) 50-259/00-06, 50-260/00-06,
50-296/00-06

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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.:	50-259/00-06, 50-260/00-06, 50-296/00-06
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:	December 24, 2000 through March 24, 2001
Inspectors:	W. Smith, Senior Resident Inspector J. Starefos, Resident Inspector E. DiPaolo, Resident Inspector D. Thompson, Physical Security Inspector D. Jones, Senior Health Physicist E. Testa, Senior Health Physicist
Approved by:	P. E. Fredrickson, Chief Reactor Projects Branch 6 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000259-00-06, IR 05000260-00-06, IR 05000296-00-06, on 12/24/2000-3/24/2001, Tennessee Valley Authority, Browns Ferry Nuclear Plant, Units 1, 2 and 3. Surveillance testing.

The inspection was conducted by resident inspectors, a regional security specialist, and a regional health physicist. The inspection identified one Green finding, which was also a non-cited violation. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 "Significance Determination Process," (SDP), and as discussed in the attached summary of the NRC's Reactor Oversight Process. Findings for which the SDP does not apply are indicated by "No Color" or by the severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at http://www.nrc.gov/NRR/OVERSIGHT/index.html.

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

Green. A non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI (Test Control) was identified for not properly evaluating quarterly residual heat removal (RHR) system flow rate test results on Units 2 and 3. Flow rate tests performed since the implementation of temporary alterations on July 27, 2000, which maintained the systems' minimum flow bypass valves in the open position during normal operations, were not properly evaluated to ensure that Technical Specification (TS) required system parameters would be satisfied with the systems in service.

This finding was considered to be of very low safety significance because subsequent evaluation of the test data showed that TS surveillance requirements were satisfied and no loss of safety function of the RHR system occurred (Section 1R22).

B. Licensee Identified Violations

None

Report Details

Unit 1 has been shut down since March 19, 1985, and remained in a long-term lay-up condition with the reactor defueled.

Unit 2 operated at or near full power until March 18, 2001, when the unit was shut down for the eleventh cycle refueling outage (U2C11). At the end of this inspection period, Unit 2 was shut down, cooled down, and in the refueling mode of operation.

Unit 3 operated at or near full power.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity and Emergency Preparedness

1R01 Adverse Weather Protection

b. Inspection Scope

The inspectors performed a review of plant design features and licensee procedures intended to protect mitigating systems from high winds and tornados. A sampling of risk-significant and susceptible systems and equipment were selected. These included the Units 1 and 2 emergency diesel generators (EDGs), the Unit 3 EDGs, the emergency equipment cooling water/residual heat removal service water (EECW/RHRSW) pumps, and the refueling floor overhead crane. The adequacy of protection from high winds and high wind generated missiles of equipment outside structures was also reviewed. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), Amendment 18 and plant Technical Specifications (TS) in preparing for the inspection. The inspectors verified that the operator action defined in Abnormal Operating Instruction (AOI) 0-AOI-100-7, Tornado, Revision 18, were consistent with plant's design basis assumptions.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

a. Inspection Scope

The inspectors performed a partial walkdown of the below-listed systems to verify redundant train operability while one train was out of service:

- Unit 2 high pressure coolant injection (HPCI) system during reactor core isolation cooling system (RCIC) outage of January 2-3, 2001
- Unit 2 core spray (CS) system during RHR system pump and heat exchanger 2B outage on March 7, 2001

- Unit 2 RHR system Loop I while Loop II was inoperable for surveillance testing on March 15, 2001
- Unit 2 RHR system Loop II subsystems in shutdown cooling mode while Loop I was inoperable for maintenance and testing on March 21 and 22, 2001

A complete walkdown of Unit 3 RHR system Loop II was performed. The inspector reviewed the UFSAR, associated attachments and procedures of Operating Instruction 3-OI-74, Residual Heat Removal System, Revision 44, and system drawings to determine correct system lineup. The inspector reviewed outstanding design and equipment issues through review of (1) the operator workaround list, (2) the temporary alteration control form (TACF) list (3) outstanding, deferred, and canceled maintenance work requests, (4) operator turnover sheets, and (5) engineering operability evaluations. Related problem evaluation reports (PERs) were reviewed to verify that the licensee had properly identified and resolved equipment alignment problems that could impact the mitigating system availability.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors toured the below-listed plant areas to evaluate, as appropriate, conditions related to: (1) licensee control of transient combustibles and ignition sources; (2) the material condition and operational status of selected fire protection systems, equipment and features; and (3) the fire barriers used to prevent fire damage or fire propagation.

- Fire Area (FA) 9, 4 kilovolt shutdown board room 2C
- FA-10, 480 volt shutdown board room 2A
- FA-11,480 volt shutdown board room 2B
- FA-14, 480 volt shutdown board room 3A
- FA-15, 480 volt shutdown board room 3B
- FA-16, Cable spread room, Units 1, 2 & 3 on EL593
- FA-17, Unit 1 battery and battery board room
- FA-20, Units 1 and 2 EDG building

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

a. Inspection Scope

The inspectors performed a review of plant design features and licensee procedures intended to protect plant equipment from flooding events. The inspectors reviewed UFSAR Amendment 18, the Browns Ferry Unit 2 Individual Plant Examination, Appendix E, Revision 1, the Browns Ferry Individual Plant Examination of External Events, July 1995, and Emergency Operating Instruction 3, Secondary Containment Control, Revision 9, in preparing for the inspection. The inspectors performed a walkdown of risk-significant areas, susceptible systems and equipment. These areas included the site's intake structure, the Unit 3 EDG building, and a sampling of the Units 1, 2, and 3 reactor building elevations 565' and below. Plant procedures for coping with flooding events, Procedure 0-AOI-100-3, Flood Above Elevation 558', Revision 23, and Procedure 0-AOI-100-4, Breach of Wheel Dam, Revision 9, were reviewed to verify that the actions were consistent with the plant's design basis assumptions.

The inspectors reviewed the latest performance of licensee established preventive maintenance activities on flood protection devices per Mechanical Preventive Instruction (MPI)-0-000-INS001, Inspection of Flood Protection Devices, Revision 4, and Electrical Preventive Instruction (EPI)-0-077-SWZ002, Functional Check of the Reactor Building Flood Level Switches, Revision 3. In addition, the status of outstanding work orders on the plant's watertight doors was also reviewed.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance

c. Inspection Scope

On March 8, 2001, the inspectors observed portions of the licensee's inspection of Unit 2 RHR heat exchanger 2B to verify that any potential heat exchanger deficiencies which could mask degraded performance were identified, to verify that inspection results were appropriately categorized against pre-established engineered acceptance criteria and were acceptable, and to ensure the frequency of inspection was sufficient, given the site-specific potential for fouling.

d. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program

a. Inspection Scope

On February 14, 2001, the inspector observed reactor operator and senior reactor operator requalification training activities in the plant simulator. The inspectors observed crew performance in terms of the group dynamics involved in the accomplishment of a properly controlled reactor shutdown in support of the refueling outage scheduled for Unit 2 in March 2001. The inspectors also observed a loss of shutdown cooling event and the recovery implemented by the crew. The results of this inspection were discussed with the instructor in charge of the training.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule Implementation

a. Inspection Scope

For the equipment issues described below, the inspectors reviewed the licensee's implementation of the Maintenance Rule (10 CFR 50.65) to assess the effectiveness of the licensee's maintenance efforts that apply to scoped structures, systems, and components (SSCs):

- Unit 3 low pressure coolant injection (LPCI) motor-generator set voltage regulator failure occurring on December 9, 2000
- EDG 3C governor failure during post-maintenance surveillance testing on March 9, 2000
- Unit 3 primary containment isolation valve (PCIV) 3-FCV-43-14 failure occurring on August 21, 2000
- Unit 3 backup control system component failure (3-LI-3-46B) occurring on March 3, 1998, July 31, 1998, April 28, 1999, and December 22, 1999

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessment

a. Inspection Scope

The objectives of this inspection were to verify that risk assessments were being performed when and as required by 10 CFR 50.65(a)(4). The inspectors evaluated the adequacy of the licensee's risk assessments and the implementation of compensatory measures for the planned maintenance activities listed below. The inspectors also verified that, upon identification of the emergent equipment maintenance listed below, the licensee had taken the necessary steps to plan and control the resulting emergent work activities to effectively manage and thus minimize that risk. For some emergent

work, the inspectors verified that timely reassessment of the resultant plant risk was performed.

- Unit 2 control rod drive pump 1B and Unit 3 control rod drive subsystem 3B concurrent outages of January 8, 2001 (emergent)
- Unit 2 CS loop II outage concurrent with Unit 1 RHR crosstie to Unit 2 outage of January 11-13, 2001 (planned)
- Unit 2 standby liquid control pump A failed flow rate testing on February 20, 2001 (emergent)
- Unit 2 control rod drive pump 1B outage concurrent with Unit 2 RHR train 2B outage of March 7-8, 2001 (planned)
- Unit 3 emergency core cooling system (ECCS) division I inverter fuse failure on March 13, 2001 (emergent)

b. Findings

No findings of significance were identified.

1R14 Nonroutine Evolution/Event

a. Inspection Scope

The inspectors observed operator performance during the Unit 2 reactor shutdown for the Cycle 11 refueling outage on March 18, 2001. Portions of the establishment of conditions for noble metals application to the reactor coolant system were also reviewed. Operator performance during the evolution and to abnormal conditions encountered was reviewed to determine if the operator response was in accordance with procedures and training. Operating logs and other documentation of the planned nonroutine plant evolution were also reviewed by the inspectors.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following operability evaluations affecting mitigating systems or barrier integrity to ensure that operability was properly justified and the component or system remained available such that no unrecognized increase in risk occurred:

- Unit 2 CS sparger differential pressure decreasing trend (Work Order (WO) 00-013120-000) evaluated by Engineering Work Request 97-075-094
- Missing nut on terminal No. 4 of HPCI relay No. 2-RLY-73-23A-24X evaluated under PER 01-000618-000
- Unit 3 RHR pump C suction vent line leak evaluated under PER 01-001321-000
- Unit 3 RCIC system and Unit 1 battery operability determinations following

Unit 3 ECCS division I inverter's return to service with compensatory measures (PER 01-002302-000)

- Unit 2 standby liquid control pump 2B following a capacity test of pump 2A failed to meet acceptance criteria due to foreign material intrusion in the pump 2A suction valves on February 20, 2001 (PER 01-001687-000)

b. Findings

No findings of significance were identified.

1R16 Operator Workarounds

a. Inspection Scope

The inspectors reviewed the status of operator workarounds for both units to determine if the functional capability of the system or operator reliability in responding to an initiating event was affected. This included evaluating the effect of the operator workaround on the operator's ability to implement abnormal or emergency operating procedures. The following operator workarounds were selected and reviewed in detail:

- Priority 2: Unit 3 RHR pump seal leakage alarm sealed in with pump not running and seals not leaking. Operators monitor seals for leakage until alarm is repaired
- Priority 2: Units 1 and 2 EDG A low air pressure alarm sealed in locally due to faulty pressure switch. Operators monitor air bank pressures every four hours while alarm is sealed in.
- Priority 2: Various area radiation monitors inoperable due to failed power supply. Radiological controls technicians survey area radiation levels twice per shift. This effected Unit 2 Emergency Operating Instruction 3, Secondary Containment Control, Revision 9.

The inspectors also reviewed the cumulative effects of operator workarounds on the ability of operators to respond in a correct and timely manner to plant transients and accidents. Where applicable, the cumulative effects on the reliability and availability of a system were reviewed.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

Design Change Notice (DCN) T 40741A, Stage 5, was reviewed to verify that the design bases, licensing bases, and performance capability of the associated equipment was not degraded by the modification. The modification, which replaced the control solenoid valve for PCIV 2-FSV-075-0057 with different model, was implemented with the plant in Mode 1 (power operation). Plant conditions were reviewed during the modification to ensure that the plant remained in a safe condition.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed the performance of the following activities to verify that the post maintenance test (PMT) addressed the nature of the work done and was adequate to verify system operability and functional capability:

- Unit 2 HPCI system motor operated valve electrical maintenance PMTs per WO 00-009211-000, WO 00-09212-000, and WO 00-009213-000, performed January 19, 2001
- Unit 3 RCIC steam inlet trap repair PMT per WO 00-007858-000, performed on January 24, 2001
- EDG 3B governor speed adjust motor replacement PMT per WO 01-000907-000, performed on January 29, 2001
- Unit 3 standby gas treatment train B operating relay replacement PMT per WO 01-001101-000, performed February 1, 2001

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities

a. Inspection Scope

The inspectors reviewed the licensee's Outage Safety Plan and contingency plans for Unit 2 refueling outage U2C11 to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the refueling outage, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the below-listed outage activities:

- Licensee configuration management, i.e., maintenance of defense-in-depth commensurate with the outage safety plan for key safety functions and compliance with the applicable TS when taking equipment out of service.
- Implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing.
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and an accounting for instrument error.
- Controls over the status and configuration of electrical systems to ensure that TS and outage safety plan requirements were met, and controls over switchyard activities.

- Monitoring of decay heat removal processes.
- Controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system.
- Reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss.
- Controls over activities that could affect reactivity.
- Maintenance of secondary containment as required by TS.
- Refueling activities, including fuel handling.
- Licensee identification and appropriate resolution of problems related to refueling outage activities.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

The inspectors witnessed surveillance tests and/or reviewed test data of selected risk-significant SSCs, listed below, to assess, as appropriate, whether the SSCs met TS, UFSAR, and licensee procedure requirements, and to determine if the testing effectively demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions:

- Surveillance Procedure (SP) 2-SR-3.5.1.6(CS I), Revision 8, Core spray (CS) Loop I flow rate ASME Section XI test, performed on December 29, 2000
- SP 2-SR-3.3.1.1.10(3B), Revision 3, Reactor Protection System High Reactor Pressure Instrument Channel B1 Calibration, performed on January 9, 2001
- SP 3-SR-3.8.1.1(3B), Revision 8, EDG 3B Monthly Operability Test, performed on January 29, 2001
- SP 3-SR-3.3.6.2.4 (RX), Revision 5, Reactor Zone Isolation Logic System Functional Test, performed February 1, 2001
- SP 3-SR-3.3.1.1.10(3D), Revision 4, Reactor Protection System High Reactor Pressure Instrument Channel B2 Calibration, performed on February 12, 2001
- SP 3-SR-3.5.1.6(RHR I), Revision 10, Quarterly RHR System Rated Flow Test Loop I, performed March 2, 2001

b. Findings

A finding of very low safety significance (Green) was identified by the inspectors for not properly evaluating quarterly RHR system flow rate test results on Units 2 and 3. This finding was also a non-cited violation of 10 CFR Part 50, Appendix B, Criterion XI (Test Control).

As documented in NRC Inspection Report 50-259,260,296/00-08, dated August 8, 2000, an NRC Fire Protection Inspection Team identified a 10 CFR Part 50, Appendix R issue that could result in the RHR system pumps being subjected to a potentially harmful amount of running time at zero flow conditions. As a result, the licensee entered the appropriate Appendix R limiting condition for operation (LCO). The licensee submitted LER 50-260/2000-002-00, dated August 23, 2000, on that issue.

The licensee developed temporary alterations which removed power from the RHR system minimum flow bypass valves with the valves in the open position. This was done as a compensatory measure to prevent the valves from spuriously closing and causing damage to the RHR pumps during a postulated Appendix R event. This allowed the licensee to exit the Appendix R LCO. On July 26, 2000, the licensee performed testing in accordance with Technical Instruction (TI) 0-TI-409, RHR System Rated Flow Test, Revision 0. Procedure 0-TI-409 implemented RHR system flow rate testing on Units 2 and 3 to ensure that TS-required LPCI mode parameters (i.e., developed flows and pressures) would be satisfied with the minimum flow valves remaining in the open position. Testing was performed only in the LPCI mode because it was the most limiting mode of operation for the RHR system. System testing demonstrated satisfactory results and on July 27, 2000, the licensee implemented the temporary alterations on Units 2 and 3 (TACF 2-00-012-074 and TACF 3-00-008-074).

During a review of SP 3-SR-5.5.1.6(RHR I), which was performed on March 2, 2001, the inspectors noted that pump flow testing to satisfy American Society of Mechanical Engineers (ASME) Section XI and TS surveillance requirements for the LPCI mode of operation was performed with power restored to the RHR system minimum flow valves and the valves in the closed position. The inspectors questioned the appropriateness of satisfying TS surveillance requirements with the minimum flow valves closed, because the data collected would not reflect the system operating configuration with the TACFs in effect.

The licensee agreed that obtaining system operating data in the configuration without the TACFs in effect was inappropriate. The licensee initiated PER 01-002088-000 on March 6, 2001. The licensee reviewed RHR system test data obtained during previous testing since implementing the TACFs on the respective units. Evaluation of the data confirmed there was sufficient margin such that the LPCI modes of the RHR systems on Units 2 and 3 remained operable and that the TS surveillance requirement for system flow and pressure (i.e., TS SR 3.5.1.6) had been satisfied. For subsequent RHR system tests, the licensee planned to perform Procedure 0-TI-409 following RHR system flow rate tests until final corrective actions for the Appendix R issue were complete.

If left uncorrected, this issue would become a more significant safety concern because over time, system characteristics could reasonably degrade such that failure to achieve TS minimum flow and pressure for the LPCI mode of the RHR systems could go undetected because of nonconservative test acceptance criteria. Failure to account for the effects of the temporary alterations could credibly affect the operability, availability, and function of the Units 2 and 3 RHR systems. This finding was considered to be of very low safety significance (Green) because subsequent evaluation of the test data showed that TS surveillance requirements were satisfied and no loss of safety function of the RHR system occurred.

10 CFR Part 50, Appendix B, Criterion XI requires, in part, that a test program shall be established to assure that all testing required to demonstrate that SSCs will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. Test results shall be documented and evaluated to assure that test requirements have been satisfied. From July 27, 2000, until March 6, 2001, results from operational tests performed on the Units 2 and 3 RHR systems were not adequately evaluated, or provided with suitable acceptance criteria, to assure that the systems would perform satisfactorily in service. This violation is being treated as a non-cited violation (NCV), consistent with Section VI.A.1 of the NRC Enforcement Policy, and is identified as NCV 50-260,296/00-06-01, Inadequate Evaluation of RHR System Flow Rate Test Results. This violation is in the licensee's corrective action program as PER 01-002088-000.

1R23 Temporary Plant Alterations (Modifications)

a. Inspection Scope

The inspectors conducted a review of the list of active and pending temporary plant alterations provided by the licensee. The following temporary alterations were selected because the system was determined to be a key system from a probabilistic safety assessment perspective. The 10 CFR 50.59 screening, and selected sections of the UFSAR and TS were reviewed to verify that the alterations did not adversely affect the safety functions of important safety systems:

- TACF 3-2000-009-231, Power supply to Unit 3 instrument and control bus A transformer, 480 volt shutdown board 3A compartment 2B has a 600 ampere frame breaker installed vice a 225 ampere frame breaker
- TACF 0-2000-003-023, Install weights to the top of RHRSW pump B1 for the purpose of tuning the resonant frequency of the component to resolve high vibration problems

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation

a. Inspection Scope

The inspectors observed an emergency preparedness training evolution performed on January 31, 2001. The inspectors reviewed the drill scenario narrative to identify the timing and location of classification, notification, and protective action recommendation (PAR) development activities. The drill was observed with a focus on the classification and notification activities by control room personnel and did not include a PAR activity. The inspectors verified the adequacy of the classification and notification activities. The licensee's drill critique were also attended and observed by the inspector.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety and Public Radiation Safety

2OS3 Radiation Monitoring Instrumentation

.1 Site Instrumentation

a. Inspection Scope

The inspectors evaluated the accuracy and operability of radiation monitoring instruments used for the protection of occupational radiation workers and the adequacy of the program for providing workers with self-contained breathing apparatus (SCBA). The licensee's programs for radiation monitoring and SCBA were evaluated against TS, implementing procedural requirements, and 10 CFR Part 20.

The inspectors reviewed calibration procedures and records for the most recent calibrations of six types of radiation monitoring instruments. Those instruments included a whole body counter, a personnel contamination monitor (PCM), a portal monitor, a RSO-50 ionization chamber, a hand held frisker, and an electronic dosimeter (ED). The inspectors verified that the calibrations for those selected instruments were current. The inspectors verified the accuracy of the alarm set points for the PCM and the portal monitor. The inspectors verified the accuracy of the instrument response for a whole body counter, a RSO-50 ionization chamber, a hand held frisker, and an ED through the use of selected calibration sources or the licensee's instrument calibration equipment.

The inspectors toured the plant and verified that SCBAs were available at selected locations and that equipment was available for refilling SCBA air bottles. The licensee's lesson plan for respiratory protection training was reviewed by the inspectors and determined to include provisions for training personnel in the use of SCBA, including air bottle change out. The training records for seven randomly selected individuals who were then currently on duty in the control room were reviewed. The inspectors verified that the selected individuals had been trained and qualified in the use of SCBA in accordance with the lesson plan.

The inspectors also evaluated the effectiveness of characterization and resolution of selected radiation monitoring related issues which had been entered into the licensee's corrective action program during April through December 2000.

The following licensee procedures were reviewed:

- DOS IP-1, Rev. 30, Canberra Abacos Plus Whole Body Counter Systems Calibration
- DOS IP-6, Rev. 30, Whole Body Count Measurement Quality Assurance

- CCI-0-RE-00-237, Rev. 14, Eberline Instrument Corporation PCM-1B Personnel Contamination Monitor
- SII-0-XX-00-300, Rev. 2, PM-7 Portal Monitor
- LSCP-0049, Rev. 6, Calibration Procedure for Bicron Model RSO-5, RSO-50, Revision 6, and RSO-500, Revision 6, Survey Meters
- LSCP-0044, Rev. 6, Calibration Procedure for the Bicron Surveyor 50
- LSCP-0078, Rev. 6, Calibration Procedure for Merlin Gerin (MG) DMC-90, 100, and 2000 Units
- HPT063.002, Rev. 4, Self-Contained Breathing Apparatus (SCBA) Training

b. Findings

No findings of significance were identified.

.2 Instrumentation at Western Area Radiological Laboratory (WARL) - Muscle Shoals

a. Inspection Scope

The inspectors evaluated (WARL) portable instrument shipment receipt, storage, inventory control, return shipment, calibration procedures, self-assessment and audit reports, problem evaluation reports, calibration data files, interviewed instrument technicians, the health physics supervisor, and lab manager to evaluate compliance with the Radioactive Material Control Program, UFSAR, TS, 10 CFR Part 20 requirements, Offsite Dose Calculation Manual (ODCM), and Radiological Environmental Monitoring Program (REMP). In addition the inspectors accompanied and observed an instrumentation technician performing calibration procedures on portable radiation survey instruments and electronic dosimeters.

Procedures evaluated included the following:

- RC-06 Servicing Contaminated Portable Survey Instrumentation, 1/16/01
- LSAP-0014 Training and Qualification of Instrument Technicians, Rev. 9
- CC-0001 Generic Criteria for Portable Radiation Survey Instrumentation, Revision R1
- RC-04 Procedures for Surveying WARL Facilities, Rev. 3
- LSCP-0078 Calibration Procedure for the MG DMC-90, 100, and 2000-Computer Assisted, Rev. 6
- LSCP-0117 Operating Procedure for use of Beta Sources, Rev. 5
- LSCP-0107 Operation Procedure for Neutron Sources, Rev. 3
- LSCP-0102 Operation of the Radiation Calibration Facility at the Western Area Radiological Laboratory, Rev. 5
- LSCP-0065 Calibration Procedure for the Bicron Micro-Rem, Rev. 0
- LSCP-0019 Calibration Procedure for Ludlum 12-4 with Neutron Detector, Rev. 6
- LSCP-0009 Overload Test for Survey Instrumentation, Rev. 5
- LSCP-0006 Calibration Procedure for Eberline Teletector 6112B, Rev. 5
- LSAP-0039 Program Description for Portable Survey Instrument Calibration, Rev. 0

Audit and self-assessment reports evaluated included the following:

- Audit Report No. SSA9901- Plant Support Functional Area Audit, April 15, 1999
- CRP-RP-00-003 Calibration Procedures, dated 3/01/00 to 4/01/00
- CRP-RP-00-001 Control of Radioactive Material, dated 11/15/99 to 12/15/99

PERs included the following: Corporate 00-000059-000, 00-000145-000,00-000220-000 and BFN 00-011259-000

b. Findings

No findings of significance were identified.

2PS3 Radiological Environmental Monitoring Program

a. Inspection Scope

At the WARL, the inspectors evaluated analytical environmental procedures, self-assessment reports, cross check comparison results, and daily instrument control charts; and interviewed chemists and chemistry technicians, lab supervisors, and the lab manager to evaluate compliance with the ODCM, REMP, UFSAR, TSs, and 10 CFR Part 20 requirements. In addition the inspectors accompanied and observed a chemist and several chemistry technicians performing analytical procedures including a National Institute of Standards & Technology Cross Check Sample.

Procedures evaluated included the following:

- QC-104 Sample Receiving and Log-In, Rev. 9
- SR-01 Radiochemical Determination of Strontium-89,90 in Environmental Samples, Revision 12
- I-01 Iodine-131 Activity Determination in Environmental Samples, Revision R7
- PPS-06 SR-89,90;NI-59,63;FE-55 and TRU(PU, NP and AM/CM Determinations, Revision 1
- PPS-01 Preparation of 10 CFR 61 Samples, Revision 0
- QC-26 Instrument Logbook and Control Chart Maintenance, Revision 1
- STD-01 Standardization of Carriers, Revision 6
- SP-01 Sample Preparation, Revision 7

Self-assessments and cross-checks evaluated included the following:

- CRP-ERMI-01-002 Radioanalytical Analysis of 10 CFR 61 and Radiological Effluent Samples, dated 1/16/2001 to 1/31/2001
- CRP-RP-00-002 Conduct of Radiological Environmental Monitoring Program (REMP), dated 6/1/2000 to 6/30/2000
- TVA Document Summary of Cross-Checks, dated February 2001
- National Institute of Standards & Technology Cross Check Sample Nos: 1343-9,1354-4,1368-7,1280-12, 1288-19, 1311-27, 1318-4, 1334-19

b. Findings

No findings of significance were identified.

3. SAFEGUARDS

Cornerstone: Physical Protection

3PP1 Access Authorization

a. Inspection Scope

The inspectors reviewed licensee procedures, fitness for duty (FFD) reports, and licensee audits; and interviewed five representatives of licensee management and five escort personnel concerning their understanding of the behavior observation portion of the personnel screening and FFD program. In interviewing these personnel, the inspectors reviewed the effectiveness of their training and abilities to recognize aberrant behavioral traits. The following are documents and procedures reviewed to evaluate licensee program for maintaining access authorization:

- Fitness for Duty Semi-Annual Report, January through October, 2000
- TVAN SSP-1.2, Fitness for Duty, Revision 4
- Fitness-for-Duty/Continual Behavior Observation General Employee Training
- Fitness-for-Duty/Continual Behavior Observation Supervisory Training
- Annual Audit FFD - Audit Report No.: SSA 0007, Security Safeguards Information and Fitness For Duty (FFD) Program, dated December 8, 2000.

b. Findings

No findings of significance were identified.

3PP2 Access Control

a. Inspection Scope

The inspectors observed access control activities on January 17 and 18, 2001, and equipment testing conducted on January 18, 2001. In observing the access control activities, the inspectors assessed whether officers could detect contraband prior to being introduced into the protected area. The inspectors also assessed whether the officers were conducting access control equipment testing in accordance with regulatory requirements through observation, review of procedures, and log entries. Preventative and post-maintenance procedures were reviewed and observed as performed. The following are documents reviewed to evaluate licensee program for maintaining access control:

- Safeguard Event Logs, 2000
- Browns Ferry Nuclear - NSS-00-006, Duty Assessment, dated March 23-3-, 2000.

- Security Incident Reports, January 2000 to present

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

Licensee records were reviewed to determine whether the submitted PI statistics were calculated in accordance with the guidance contained in Nuclear Energy Institute 99-02, Regulatory Assessment Performance Indicator Guideline, Revision 0.

Cornerstone: Mitigating Systems

.1 Safety System Unavailability: Emergency AC Power

a. Inspection Scope

The inspectors verified the accuracy and completeness of the licensee's third quarter Unit 2 and 3 PI data pertaining to unavailability of emergency AC power. Records reviewed included control room operator logs, licensee event reports, EDG operating data developed by the system engineer, and PI data on the NRC web site.

b. Findings

No findings of significance were identified.

.2 Safety System Unavailability: Residual Heat Removal System

a. Inspection Scope

The inspectors verified the accuracy and completeness of the licensee's second, third, and fourth quarter Unit 2 and 3 PI data pertaining to RHR safety system unavailability. Records reviewed included control room operator logs, LCO tracking log, RHR operating data, the licensee's maintenance rule database, and the PI data on the NRC web site.

b. Findings

No findings of significance were identified.

Cornerstone: Occupational and Public Radiation Safety

.3 Occupational Exposure Control Effectiveness and RETS/ODCM Radiological Effluents

a. Inspection Scope

The inspectors reviewed chemistry and the radiation protection issues in the licensee's corrective action program to determine whether any should have been reported as PI occurrences during the period April through December, 2000, and reviewed licensee PI data reported to the NRC for the fourth quarter to verify the accuracy and completeness of the Occupational Exposure Control Effectiveness and the RETS/ODCM Radiological Effluent Occurrence PIs. In addition the inspectors verified that the procedurally specified sources of information for the radiation safety PIs were collected each month and that potential PI occurrences were accurately assessed for reportability.

b. Findings

No findings of significance were identified.

Cornerstone: Physical Protection

.4 Fitness-for-Duty, Personnel Screening, and Protected Area Security Equipment PIs.

a. Inspection Scope

The inspectors reviewed licensee programs for gathering and submitting data and verified the accuracy and completeness of the Fitness-for-Duty, Personnel Screening, and Protected Area Security Equipment PIs. The review included TVA's tracking and trending reports and security event reports for the performance indicator data submitted from the first quarter 2000 to the fourth quarter of 2000.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

(Closed) Unresolved Item (URI) 259,260,296/2001-007-01, EA 01-066, RHRSW Room Sump Pump Failures. During the annual Problem Identification and Resolution inspection in January 2001, the inspectors identified this URI pertaining to possible 10 CFR 50.65, Maintenance Rule (MR) implementation and corrective action deficiencies, which appeared to be in violation of NRC regulations. Sump pump A in RHRSW pump room C had demonstrated repetitive failures over a period of approximately two years. The inspectors believed the licensee had not implemented effective and timely corrective action as to cause, nor had the licensee established goals against which the sump pump's performance could be monitored as delineated by 10 CFR 50.65(a)(1).

Subsequent NRC review of the issues determined that there was not a loss of RHRSW heat removal function. There are 8 sump pumps associated with the RHRSW system. Two redundant sump pumps are installed in each of the four RHRSW pump rooms. Although sump pump A could not be relied upon to respond in view of past repetitive failures, pump B was operational. Therefore the risk-significance of a sump pump failure was very low, and the priority for repairing the pump could be low without adverse consequences. Although the licensee considered the sump pumps to be within the scope of their MR program, failure of the pumps to meet the specific performance criteria did not require establishing performance goals under 10 CFR 50.65(a)(1), because there was no functional failure of the RHRSW system as a whole. The NRC staff concluded that there was no violation of the MR.

The NRC staff also concluded that there was no corrective action violation (10 CFR Part 50, Criterion XVI). Because of the minimal risk-significance held by the sump pumps, the priority assigned to restore pump A to a fully operational status was at the discretion of the licensee. There was room for improvement on the licensee's corrective actions in response to the repeated clearing of controller fuses; however, the licensee entered that problem into their corrective action program under PER 00-005304-000.

4OA6 Management Meetings

The inspectors presented the inspection results to Mr. Ashok Bhatnagar, Plant Manager, and other members of licensee management on March 29, 2001. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

LIST OF PERSONS CONTACTED

Licensee

T. Abney, Licensing Manager
A. Bhatnagar, Plant Manager
J. Corey, Radiation Protection and Chemistry Manager
J. Grafton, Site Quality Assurance Manager
K. Singer, Executive Vice President Acting as Site Vice President
R. Jones, Site Support Manager
G. Little, Operations Manager
D. Sanchez, Training Manager
M. Scaggs, Maintenance and Modifications Manager
R. Wiggall, Site Engineering Manager

NRC

R. Bernhard, Region II Senior Reactor Analyst
M. Lesser, Region II Chief, Maintenance Branch

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

50-260,296/2000-06-01	NCV	Inadequate Evaluation of RHR System Flow Rate Test Results (Section 1R22).

Closed

50-259,260,296/2001-07-01	URI	RHRSW Room Sump Pump Failures (Section 4OA2).

NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas): reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

Reactor Safety	Radiation Safety	Safeguards
● Initiating Events	● Occupational	● Physical Protection
● Mitigating Systems	● Public	
● Barrier Integrity		
● Emergency Preparedness		

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.

The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: http://www.nrc.gov/NRR/OVERSIGHT/index.html.

Attachment