



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

October 24, 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 05000260/2003004 and 05000296/2003004**

Dear Mr. Scalice:

On September 27, 2003, the Nuclear Regulatory Commission (NRC) completed an inspection at your Browns Ferry 2 and 3 reactor facilities. The enclosed integrated inspection report documents the inspection results, which were discussed on October 8, 2003, with Mr. Ashok Bhatnagar and other members of your staff.

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

Based on the results of this inspection, no findings of significance were identified. However, a licensee-identified violation, which was determined to be of very low safety significance, is listed in Section 4OA7 of this report. If you contest this non-cited violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN. Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Browns Ferry.

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2

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Sincerely,

***/RA/***

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

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

Enclosure: NRC Integrated Inspection Report 05000260/2003004, 05000296/2003004  
w/Attachment: Supplemental Information

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4

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-260, 50-296

License Nos: DPR-52, DPR-68

Report No: 05000260/2003004 and 05000296/2003004

Licensee: Tennessee Valley Authority (TVA)

Facility: Browns Ferry Nuclear Plant, Units 2 & 3

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

Dates: June 29, 2003 - September 27, 2003

Inspectors: B. Holbrook, Senior Resident Inspector  
E. Christnot, Resident Inspector  
R. Monk, Resident Inspector  
W. Bearden, Senior Resident Inspector, Unit 1  
(Section 1R12)  
R. Carrion, Project Engineer (Section 1R16)  
W. Sartor, Senior Emergency Preparedness Specialist  
(Section 1EP1)  
L. Mellen, Senior Emergency Preparedness Specialist  
(Section 1EP1)

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

Enclosure

## SUMMARY OF FINDINGS

IR 05000260/2003-004, 05000296/2003-004; 6/29/2003 - 9/27/2003; Browns Ferry Nuclear Plant, Units 2 and 3; routine integrated report.

The report covered a three-month period of inspection by resident inspectors, two senior emergency preparedness specialists, and a Region II Project Engineer. 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

None

B. Licensee-Identified Findings

A violation of very low safety significance, which was identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violation and corrective action tracking number are listed in Section 4OA7.

## Report Details

### Summary of Plant Status

Unit 2 operated at about 100% Rated Thermal Power (RTP) with the following exceptions: On July 2, power was reduced to 52% RTP following a trip of reactor recirculation pump B. Reactor power was increased to 100% RTP the following day. On July 5, reactor recirculation pump B tripped and power was reduced to about 52% RTP. Power was increased to 100% RTP the same day. Reactor power remained at or near 100% RTP for the remainder of the inspection period, with the exception of planned power reductions for testing.

Unit 3 was near the end of a mid-cycle outage at the beginning of the inspection period. Unit startup began on July 1 and 100% RTP was achieved July 5. The unit operated at or near 100% RTP during the remainder of the inspection period, with the exception of planned power reductions for testing.

### 1. REACTOR SAFETY

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

##### 1R01 Adverse Weather (Actual Hot Weather Conditions)

###### a. Inspection Scope

The inspectors reviewed licensee procedure 0-GOI-2000-3, Hot Weather Operations, reviewed selected Work Orders (WOs) coded as deficiencies that may affect hot weather operations, discussed potential hot weather operations with licensee personnel, and walked down plant equipment that would be used for hot weather operations to verify the status, material condition, and proper lineup of plant equipment used to support hot weather operations. The inspectors reviewed WOs to verify that deficiencies were being identified and corrected in accordance with plant procedure requirements. The walkdown occurred during the month of August when the outside temperature had been greater than 90 degrees for several days and had the potential to challenge plant operations from an ambient temperature and high river temperature standpoint. The inspectors verified that attachments to the hot weather procedure had been initiated as required by ambient temperature conditions and that systems and components required to be checked and monitored had been completed. The inspectors reviewed river temperature conditions to verify that temperature had not required cooling tower operation to maintain down-stream river temperature below procedure and regulatory requirements.

###### b. Findings

No findings of significance were identified.

#### 1R04 Equipment Alignment (Partial Walkdown)

##### a. Inspection Scope

The inspectors performed a partial walkdown of the three safety systems listed below to verify redundant or diverse train operability, as required by the plant Technical Specifications (TS). In some cases, the system was selected because it would have been considered an unacceptable combination from a Probabilistic Safety Assessment (PSA) perspective for the equipment to be removed from service while another train or system was out of service. The inspectors' verified that selected breaker, valve position, and support equipment were in the correct position for support system operation. Also, the walkdown was done to identify any discrepancies that could impact the function of the system and lead to increased risk. The inspectors reviewed 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. The inspectors' observations of equipment and component alignment for the partial walkdowns were compared to the alignment specified in: Core Spray (CS) electrical lineup checklist, CS panel lineup checklist, and drawing 2-47E814-1, CS Flow. For the RHR system alignment, licensee procedure 3-OI-74, Residual Heat Removal (RHR) System Operating Instructions, was used for reference.

- Unit 2 CS Loop 2 while Loop 1 was out of service for testing
- Unit 3 RHR alignment and equipment status while Unit 2 was testing RHRSW and Emergency Equipment Cooling Water pumps
- Units 2 and 3 250-Volt DC distribution during performance test of main battery 3

##### b. Findings

No findings of significance were identified.

#### 1R05 Fire Protection Walkdown

##### a. Inspection Scope

The inspectors reviewed licensee procedure, SPP-10.10, Control of Transient Combustibles, and SPP-10.9, Control of Fire Protection Impairments, and conducted a walkdown of the seven fire areas (FAs) listed below in order 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 verified 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. The inspectors reviewed a sampling of fire protection-related PERs to verify that the licensee was identifying and correcting fire protection problems. Pre-fire Plan drawings and documents reviewed are included in the attachment to the report.



- Fire Zone 3-2, Unit 3 reactor building elevation 519 and 565 East
- Fire Zone 3-3, Unit 3 reactor building elevation 593 and RHR heat exchanger rooms
- Fire Zone 3-4, Unit 3 reactor building elevation 621 East
- FA 6, 480V Shutdown Board 1A
- FA 7, 480 V Shutdown Board 1B
- FA 10, 480V Shutdown Board Room 2A
- FA 11, 480V Shutdown Board Room 2B

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

Resident Inspector Quarterly Review of Testing and/or Training Activities

a. Inspection Scope

The inspectors observed operations crew performance during Simulator Evaluation Guide, 177045, Control Rod Drift, ADS Relief failed open, Loss of Offsite Power, EDG Failures, RCIC Control failure, and Recirc Pump Seal failure. The use of ODM-0.4, Peer Checks and "Attention for Update" Standard, was emphasized by the licensee during this evaluation. 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; and that 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 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 Effectiveness

### .1 Routine Maintenance Effectiveness

#### a. Inspection Scope

The inspectors reviewed the two items listed below for the following: (1) appropriate work practices; (2) identifying and addressing common cause failures; (3) scoping in accordance with 10 CFR 50.65(b) of the maintenance rule (MR); (4) characterizing reliability issues for performance; (5) trending key parameters for condition monitoring; (6) charging unavailability for performance; (7) classification and reclassification in accordance with 10 CFR 50.65(a)(1) or (a)(2); and (8) appropriateness of performance criteria for Systems, Structures and Components (SSCs)/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified as (a)(1). The inspectors also compared the licensee's performance against site procedure, SPP-6.6, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting, Technical Instruction 0-TI-346, Maintenance Rule Performance Indicator Monitoring, Trending and Reporting, and SPP 3.1, Corrective Action Program.

- Control Bay Chillers A and B both tripped and were inoperable at the same time. Neither chiller could be immediately restarted to provide air handling services to the Unit 1 and 2 control rooms or to rooms in the control bay which contain electronic and electrical equipment needed to mitigate accidents. The 3B system was declared inoperable due to a motor short fault. The 3A system failed to start due to a defective control power transformer in the chiller relay system. The licensee initiated temporary cooling which, by procedure, required the opening of doors, closing fire dampers, and installing temporary ventilation fans. The control room emergency cooling system was also activated. Failure of both systems and the initiation of temporary cooling was a maintenance preventable functional failure. Additional reviews indicated that the failure of both units was not due to a common cause. WO's 03-013743-00 and 03-013745-00 were initiated to affect repairs to both control bay chillers. This was documented as part of the licensee's corrective action program in PER 03-13749-000.
- The C header of the RHRSW system had a recurring low water pressure. The problem was traced to a leak through valve 2-FCV-23-40, the 2C RHR heat exchanger cooling water outlet valve. In order to repair this valve on line, the heat exchanger would have to be removed from service and declared inoperable. The repairs were scheduled for the next Unit 2 refueling outage in 2005. The licensee decided to review and revise the Maintenance Rule performance criteria for the heat exchanger. The revision would allow for additional heat exchanger out-of-service time so that the valve could be repaired on line. The revised performance criteria, as approved by the expert panel, was increased to three times the original value. The original value was low because expected maintenance and on-line maintenance were not examined. When the heat exchanger is removed from service it does not make the low pressure

injection loop inoperable. The revised criteria were factored into the probabilistic safety analysis and a sensitivity analysis was performed.

b. Findings

No findings of significance were identified.

.2 Biennial Periodic Evaluation

a. Inspection Scope

The inspectors reviewed the most recent MR periodic assessment (April 1, 2000 through March 31, 2002) and selected Cause Determination Evaluations (CDEs) and MR self-assessment reports issued since completion of the periodic assessment to determine if the periodic assessment report met the requirements of 10 CFR 50.65(a)(3). The inspectors reviewed the licensee's evaluation of balancing reliability, unavailability, 10 CFR 50.65(a)(1) and (a)(2) activities, and use of industry operating experience. The inspectors reviewed selected MR activities covered by the assessment period for the following risk-significant systems to verify compliance with 10 CFR 50.65: High Pressure Coolant Injection System (HPCI), Reactor Core Isolation Cooling (RCIC), Residual Heat Removal (RHR), and RHR Service Water System. The inspectors also reviewed selected MR activities associated with RHR Service Water System since the licensee's assessment period ended. The inspectors also reviewed licensee documentation associated with corrective actions and reclassification of Unit 2 HPCI System and Unit 3 ECCS Inverters which had previously been classified as (a)(1). Specific procedures and documents reviewed during the inspection are listed in the attachment.

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 licensee actions taken to plan and control the emergent work activities to effectively manage and minimize risk. The inspectors verified that risk assessments were being performed as required by 10 CFR 50.65(a)(4). The inspectors reviewed: licensee procedure SPP-6.1, Work Order Process Initiation; SPP-7.1, Work Control Process; and O-TI-367, BFN Dual Unit Maintenance, to verify that procedure steps and required actions were met. Also, the inspectors evaluated the adequacy of the licensee's risk assessments and the implementation of compensatory measures.

- Units 2 and 3: Standby gas treatment train C inlet damper failed to close after the train was operated, WO 03-12560-00, PER 03-12651-00 (emergent)

- Units 2 and 3: DC ground on breaker 715, battery board 1, WO 03-13004-00 (emergent)
- Units 2 and 3: Control Bay Chillers A and B tripped and could not be restarted, WO 03-013743-00 and 03-013745-00 (emergent)
- Units 2 and 3: Emergency Fire Pump A failed to manually start, PER 03-13970-00 and WO 03-13952-00 (emergent)
- Unit 2: Low Pressure Coolant Injection MG set 2DA generator failed, PER 03-16805-00 and WO 03-16803-00 (emergent)
- Unit 2: A Emergency Diesel Generator immersion heaters not cycling properly PER 03-17067-00 and WO 03-16886-00 (emergent)

b. Findings

No findings of significance were identified.

1R14 Operator Performance During Non-Routine Evolutions and Events

a. Inspection Scope

The inspectors reviewed operator performance and actions during the following non-routine conditions to verify that performance was in accordance with licensee procedures and regulatory requirements. The inspectors reviewed operator logs, computer data, and control room chart data to verify that operator actions were appropriate for plant conditions and consistent with operator training. Inspector observations were compared to licensee procedure OPDP-1, Conduct Of Operations, SPP- 3.5, Regulatory Reporting Requirements, and 10 CFR 50.72 and 10 CFR 50.73, Event Reporting Guidelines. The non-routine events reviewed included the following:

- On July 2, the inspectors responded to the site and observed the control room personnel responding to a Unit 2 power transient, due to a B recirculating pump trip. The unit was operating at 100% RTP when the variable frequency drive (VFD) system for the B pump tripped due to a faulted card. The operator actions were appropriate for the plant conditions. The inspectors reviewed licensee Abnormal Operating Instruction, 2-AOI-68-1B, Recirc Pump Trip/Core Flow Decrease, to verify that actions were completed in accordance with procedure requirements. The licensee entered this problem into the corrective action program as PER 03-01087-000, BFN Unit 2 Variable Frequency Drive Trip.
- On August 10, the inspectors responded to the site and observed the control room personnel responding to an unplanned engineered safeguards actuation. While attempting to transfer the No. 1 Shutdown Bus from the normal source, Unit 1, to the alternate source, Unit 2, the alternate supply feeder breaker failed to close. The transfer was being performed to support a Unit 1 main transformer outage. The operators observed that, when the normal feeder breaker was opened, the alternate supply feeder breaker failed to close. The operators immediately closed the normal feeder and restored power to the Shutdown Bus 1. This caused a momentary undervoltage condition on Shutdown Boards A and B resulting in Engineered Safety Feature actuations including the A and B diesel generators.

The DGs started but did not tie onto the shutdown boards because the board voltage returned to normal prior to the DG's reaching rated speed and voltage. The inspectors reviewed plant system response to verify that the response was as expected and in accordance with plant procedures. The inspectors reviewed operator actions to verify that they were appropriate for the conditions. The event was documented in the licensee's corrective action program as PER 03-15160-000.

The inspectors compared their reviews and observations to licensee procedures SPP-12.1, Conduct Of Operations, 2-GOI-100-12A, Unit Shutdown from Power Operations to Cold Shutdown and Reduction in Power During Power Operations, to verify that procedure requirements were met.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

.1 Routine Baseline Review

a. Inspection Scope

The inspectors reviewed the six operability evaluations listed below to verify technical adequacy and ensure that the licensee had adequately assessed TS operability. The inspectors reviewed the 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 that 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 1 and Unit 2 Electrical Board Room Alternate Cooling Capability while both water chillers were inoperable (PER 03-0013749)
- Unit 3 foreign material found in drywell possible affect on containment sump (PER 03-011972-00)
- Units 2 and 3 improperly installed electrical splice kit on actuator for 0-FCO-65-22, cross tie damper for standby gas treatment system (PER-03-010856-00)
- Units 1 and 3 failed ampacity calculations for power cables to AHU 1B Supply, C.B. Water Chiller Pump 3B and Emergency Battery & Board Room Exhaust Fan 3C Supply
- Units 2 and 3 ERCW valve 0-FCV-67-53 failed acceptance criteria during the performance of surveillance instruction (PER 03-016337-00)

- Unit 2 torus snubber 2-SNUB-64-5 stroke length exceeded acceptance criteria but within acceptable margin (PER 03-010568-00)

b. Findings

No findings of significance were identified.

.2 Operability of Type HFA Relays

a. Inspection Scope

The inspectors observed and reviewed the licensee's activities involved with General Electric type HFA relays. On September 18, the licensee identified that a piece from a broken lexan relay coil spool had interfered with the operation of a relay in the D Unit 1 and 2 Emergency Diesel Generator (EDG). Although the piece caused the relay to not operate, the relay did not affect the EDG in performance of its automatic safety function. Further inspections by the licensee revealed that a relay in the A Unit 1 and 2 EDG also had a broken spool. This broken piece did not interfere with the operation of the relay. The licensee established a plan to inspect all of the approximately 1120 HFA relays installed in operating Units 2 and 3. The plan included a team of engineering, operations, and maintenance personnel. The plan also included requirements to perform an operability evaluation on each defective relay and replace as necessary. The inspectors reviewed the licensee's inspection plan, operability evaluation and observed selected relay inspections to verify the procedure and regulatory requirements were met. Inspector observations were compared to the requirements in licensee procedure SPP-3.1, Corrective Action Program, Appendix D, Guidelines For Degraded/Non-conforming Condition Evaluation and Resolution of Degraded/Non-conforming Conditions. This problem was entered into the license's corrective action program as PER 03-018067.

b. Issues and Findings

No findings of significance were identified.

1R16 Operator Work-Around (OWA) Review and Cumulative Affect Assessment

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 conducted a detailed review of the six outstanding Unit 2 and 3 priority 1 and 2 OWAs, which had been previously assessed as an independent item, to complete an assessment for the overall cumulative affect of operator ability to perform actions in response to events. The inspectors also verified that the OWAs had been reviewed in accordance with site procedures, work orders had been developed, and items had been scheduled for repair. The inspectors also reviewed recently completed work packages to verify that OWAs were corrected as scheduled. 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. Cumulative affects of the following OWAs were assessed:

- 0-023-OWA-2003-0092
- 0-025-OWA-2003-0052
- 0-065-OWA-2003-0093
- 2-069-OWA-2003-0065
- 2-073-OWA-2003-0018
- 2-064-OWA-2003-0095

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (PMT)

a. Inspection Scope

The inspectors evaluated the following six 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 on 3A & 3C Core Spray Pumps per procedure 3-SR-3.5.1.6 (CS 1), Core Spray Flow Rate Loop 1.
- Unit 3: PMT on HPSI Pump per procedure 3-SR-3.5.1.7, HPSI Main & Booster Pump Set Developed Head & Flow Rate Test at Rated Rx Pressure.
- Unit 0: PMT on A CREV Unit per procedure 0-SR-3.7.3 (PMT) Control Room Emergency Ventilation System Post Maintenance Operability Test.
- Unit 3: PMT on EECW North Header Supply Valve to RBCCW Hx, 3-MVOP-067-0050 per procedures 3-SI-3.2.10.C, Verification of Remote Position Indication and 0-SI-4.5.C.1(1), Stroke Time Test.
- Unit 2 and 3: PMT on Control Room Ventilation System (CREV) B system per procedure 0-SR-3.7.3.2 (B VFTP), Control Room Emergency Ventilation Unit B Flow Rate and Filter Testing Program.
- Unit 3: PMT on 3B RHR Pump Seal Hx per 0-TI-106, General Leak Rate Test Procedure.

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's listed below to verify 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-SR-3.5.1.6(CS 1), (Unit 2) Core Spray Flow Rate Loop 1 (IST)
- 3-SI-4.4.A.1, Standby Liquid Control Pump Functional Test
- 3-SR-3.3.8.1(3EC,3ED), V Shutdown Board Degraded Voltage Relay Calibration and Functional Test
- 3-SR-3.8.4.4 (MB-3), Main Bank 3 Battery Modified Performance Test
- EPI-0-082-DGZ003, Diesel Generator A Redundant Start Test (Units 1/2)
- 3-SR-3.5.1.6 (CS 1), (Unit 3) Core Spray Flow Rate Loop1 (IST)
- 3-SR-3.5.1.7, (Unit 3) HPSI Main & Booster Pump Set Developed Head & Flow Rate Test at Rated Rx pressure.

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 three 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 installation was consistent with the modification documents and Temporary Alteration Control Forms (TACFs).

- TACF 2-03-006-068, Isolate coolant leak through temperature element cable jacket in recirculation system variable frequency drive unit
- TACF 03-03-006-077, Revision 0, change the temperature starting and stopping setpoints on the Unit 3 drywell sump cooling system pump due to additional heat load
- TACF 03-03-006-077, Revision 1, change the Unit 3 drywell sump level starting and stopping setpoints on the drywell sump pump due to additional leakage from the reactor vessel head vent



b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP1 Exercise Evaluation

a. Inspection Scope

The inspectors reviewed the emergency exercise and scenario for the biennial, full participation 2003 emergency response exercise for Browns Ferry Nuclear Plant. The review covered whether the licensee created a scenario suitable to test the major elements of their emergency plan in accordance with 10 CFR 50, Appendix E.

Licensee activities inspected during the exercise included observations in the Control Room Simulator (CRS), Central Emergency Control Center (CECC), Technical Support Center (TSC), and Operational Support Center (OSC). The exercise was conducted on September 24, 2003. The inspectors reviewed a sample of corrective actions identified in the past and developed a list of areas to be observed in this exercise. Areas reviewed for corrective action were event classification, notification, PAR development, and assessment activities. The inspectors attended the post exercise licensee critique and the results presentation to management to evaluate their self assessment of the emergency drill.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation

a. Inspection Scope

The inspectors observed the performance of two different crews in the control room simulator, operations support center, and the technical support center during emergency training exercises on July 16 and August 6. The drills focused on degraded plant conditions that led to implementation of the Emergency Operating Procedures and to a Site Area Emergency classification. The inspectors review was to verify implementation of licensee procedures NP-REP, Radiological Emergency Plan, Browns Ferry Emergency Plan Implementing Procedures, SPP- 3.5, Regulatory Reporting Requirements, and OPDP-1, Conduct of Operations. The inspectors assessed operator performance, formality of communications, event classifications, and offsite emergency notifications to verify that they were in accordance with the requirements of the above-referenced procedures. In addition, procedure usage, alarm response, control board manipulations, and supervisory oversight were evaluated to verify that the procedure requirements were met. The inspectors also reviewed drill documents to verify that drill evaluations focused on improvement items identified during previous drills. The inspectors attended the post-exercise critiques and reviewed the licensee's post-drill report to verify that the

licensee-identified issues were comparable to issues identified by the inspectors. The inspectors reviewed the drill objectives to verify that licensee actions met the requirements of the objectives.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator (PI) Verification

Cornerstone: Mitigating Systems, Barrier Integrity

Reactor Coolant System Identified Leak Rate (RCSL)  
Safety System Functional Failures (SSFF)

a. Inspection Scope

The inspectors reviewed the licensee's procedures and methods for compiling and reporting PIs, including Procedure SPP-3.4, Performance Indicators for NRC Reactor Oversight Process. The inspectors reviewed raw data for the second quarter 2002 through the second quarter 2003 for Unit 2 and 3 SSFF, and for the third quarter 2002 through second quarter 2003 for Unit 2 and 3 RCSL. 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 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 the PI was calculated correctly. 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.

**4OA2 Identification and Resolution of Problems**

.1 Annual Sample Review

a. Inspection Scope

The inspectors selected two PERs for detailed review (PERs 03-003477-000 and PER 03-013102-000). The PERs were associated with recurring status control events, component mispositions, on Units 2 and 3 and the use of lubricants on ASCO environmentally qualified (EQ) solenoid valves. The reports were reviewed to verify that the full extent of the issues was identified, an appropriate evaluation performed, and appropriate corrective actions were specified and prioritized. The PERs were evaluated

against the requirements of the licensee's Corrective Action Program (CAP) as delineated in the Standard Programs and Processes procedure SPP-3.1, Corrective Action Program, and 10 CFR 50, Appendix B, Quality Assurance Criteria.

b. Findings and Observations

There were no findings of significance identified with either reviewed sample.

First example: PER 03-003477-000 stated that the status control events had occurred numerous times since March 1, 2002, with a total of thirty-six (36) PERs issued documenting the events. This indicated an average of 2.4 events per month, with a 12.6 day average between events. Included in the status control events were: mispositioning of switches, breakers, valves, or other plant equipment from the correct position for the existing plant conditions; jumpers inappropriately left in place or fuses not correctly installed; any equipment out of position with no reason found or pre-set throttle valves not in the correct position; reconfiguration of plant components without the use of an approved procedure or other means to document configuration; misperformance of a procedure that placed the configuration of the plant in an undesired state; and the correct performance of an approved procedure that, due to a human error induced deficiency, resulted in the configuration of the plant being placed in a undesired state.

The licensee determined the primary cause for the status control events was inadequate work practices, with the failure to use error detection practices and self-checking being the primary contributors. Unclear procedures and policies were also contributors. Among the corrective actions identified were: perform a trend and common cause analysis of status control events and add corrective actions based on the analysis; provide status control event packages to shift managers to be discussed with their crews; operations manager to discuss status control events with shift managers to reinforce expectations on oversight and guidance; operations manager and operations superintendent to discuss human performance and status control issues at training meetings; implement changes to procedures which contributed to status control issues; and operations management personnel to perform field observations of activities which may affect status control to ensure proper use of procedures and error prevention tools. The inspectors observed portions of these corrective actions throughout the report period.

Second example: The use of lubricants on ASCO EQ solenoid valves as documented in PER 03-013102-000 indicated that factory-installed Chevron SRI grease was being used. The requirement of Qualification Maintenance Data Sheet, QMDS, number SOL-003, the solenoid valve qualification document, stated that Dow Corning 550 was the only qualified lubricant. Maintenance procedure, Generic Maintenance Instructions for Pneumatic Actuators, MCI-0-000-PNU001, Section 7.3.2, stated in part that for EQ solenoid valves, Dow Corning 550 lubricant was to be used. Three Unit 1 design changes under review, DCNs 51163, 51189, and 51202, were involved with this issue. It was during a licensee review of DCN 51202 that the use of a non-qualified lubricant was identified. The vendor (Worchester Controls) drawing KN39-0008 and vendor manual both indicated that the lubricant supplied by the vendor for the DCNs was Chevron SRI grease. This would allow a petroleum based product to be in contact with an EQ device. A total of 14 Units 2 and 3 air-operated valves were involved with this item. Some of the valves were corrected and others are scheduled for the next unit 3 refueling outage. Among the

corrective actions were: revise QMDS SOL-003 to make Dow Corning 550 lubricant applicable to all valves, including the 14 Units 2 and 3 air operated valves and make the lubricant an essential requirement; review work orders and DCNs for the actuators associated with the applicable valves to ensure that the correct type of lubricant was used; issue work orders to replace the affected solenoid valves; revise the procurement specifications for actuators associated with the applicable valves to require that the actuators are procured with the correct type of lubricant; verify that in-process procurement requests specify the correct lubricant; and verify that actuators in power store's inventory contain the correct lubricant. The inspectors observed portions of the corrective action such as: the lubrication requirement for the applicable valves in the QMDS; the essential requirement that only Dow Corning 550 be used; and changes to the procurement process.

The inspectors considered that the licensee had adequately evaluated these two examples and identified and implemented appropriate corrective actions.

#### 40A3 Event Follow-up

(Closed) Licensee Event Report (LER) 50-296/2003-001-00, Mode Change Not Allowed by Technical Specifications During Vessel Re-assembly.

This LER documented a condition where completion of reactor head bolt tensioning on Unit 3 resulted in a reactor Mode change from Mode 5 to Mode 2. TS Limiting Condition for Operation (LCO) 3.0.4 prohibits ascending Mode changes unless all TS equipment required for the Mode is operable. This finding, which impacts the Barrier Integrity Cornerstone, is of very low safety significance because this status control event duration was about 5 hours and 6 minutes, the reactor was shutdown, all control rods were inserted, the reactor temperature monitoring procedures had been initiated, and no actions had been taken to initiate a reactor startup. The inspectors determined that licensee actions taken or planned were reasonable. This licensee-identified issue constituted a violation of very low significance which is addressed in Section 40A7. The problem was identified in the licensee's CAP as PER 03-011998-000.

#### 40A6 Management Meetings

##### Exit Meeting Summary

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

#### 40A7 Licensee-Identified Violation

The following finding of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an NCV.

- Unit 3 TS LCO 3.0.4 prohibits ascending mode changes unless all TS equipment required for the mode is operable. Contrary to the above, on June 30, 2003, during actions to re-assemble the reactor vessel following an outage, it was discovered that the reactor vessel head was fully tensioned with the Reactor Mode Switch in the refuel position. This resulted in an unintended mode change from mode 5 to mode 2 while all required equipment for mode 2 was not operable. This was identified in the licensee's CAP as PER 03-011998-000. This finding, which impacts the Barrier Integrity Cornerstone, is of very low safety significance because this status control event duration was about 5 hours and 6 minutes, the reactor was shutdown, all control rods were inserted, the reactor temperature monitoring procedures had been initiated, and no actions had been taken to initiate a reactor startup.

**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  
T. Feltman, Emergency Preparedness Supervisor  
C. Ottenfeld, Radiation Protection and Chemistry Manager  
R. Jones, Unit 1 Restart 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, Nuclear Plant Manager

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

**Closed**

|                    |     |                                                                                                      |
|--------------------|-----|------------------------------------------------------------------------------------------------------|
| 50-296/2003-001-00 | LER | Mode Change Not Allowed by Technical Specifications During Vessel Re-assembly (Sections 4OA3 & 4OA7) |
|--------------------|-----|------------------------------------------------------------------------------------------------------|

## LIST OF DOCUMENTS REVIEWED

### Section 1R05

- Fire Hazards Analysis, Volume 1 and 2
- Fire Protection Impairment Permit 03-00197, Unit 2 and Unit 3 Reactor Building Appendix R Separation Issue.
- Fire Pre-Plans: RX3-565, RX3-519SE, RX3-621, RX3-639, RX1-621, RX2-621, and RX3-593
- Smoke Detector Locations: Procedure 0-SI-4.11.A.1(3)b

### Section 1R12

#### Procedures

- 0-TI-346, Rev 16, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting
- SPP-6.6, Rev 5, Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting

#### Cause Determination Reports (CDEs)

- CDE 2001-11-01, A3 EECW Pump tripped
- CDE 2001-12-02, D1 RHRSW pump unavailability exceeded
- CDE 2002-04-03, A3 EECW Pump failure to start during functional testing

#### Problem Evaluation Reports (PERs)

- PER 01-012733-000, A3 EECW Pump tripped
- PER 02-003494-000, A3 EECW Pump failure to start during functional testing
- PER 03-005203-000, RHR unavailability did not meet goals

#### Other Documents

- MR Third Periodic Assessment Report 10 CFR 50.65(a)(3), dated 7/5/02
- Self-Assessment, BFN-ENG-00-013, Maintenance Rule Program dated 3/21/00
- Self-Assessment, BFN-ENG-02-007, Maintenance Rule Program dated 10/23/02

### Section 4OA1

#### Procedures

- SPP-3.4, Performance Indicator for NRC Reactor Oversight Process, Rev. 0
- Desktop Guide for Identification and Reporting of NEI 99-02, Rev. 2 Performance Indicators for Occupational Exposure Control Effectiveness
- CI-138, Reporting NEI Indicators, Rev. 1