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

January 26, 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 05000260/2003005 and 05000296/2003005

Dear Mr. Scalice:

On December 27, 2003, the US Nuclear Regulatory Commission (NRC) completed an inspection at your operating Browns Ferry Unit 2 and 3 reactor facilities. The enclosed integrated quarterly inspection report documents the inspection results, which were discussed on January 16, 2004 with Mr. Ashok Bhatnager and other members of your staff. Results from our inspection of your Unit 1 Recovery Project are documented in a separate Unit 1 integrated inspection report.

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 a self-revealing finding of very low safety significance (Green) which was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because the finding was entered into your corrective action program, the NRC is treating the finding as a non-cited violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. If you contest any non-cited violation in the enclosed report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Browns Ferry Nuclear Plant.

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

Enclosure: NRC Integrated Inspection Report 05000260/2003005 and 05000296/2003005
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

cc w/encl:
Karl W. Singer
Senior Vice President
Nuclear Operations
Tennessee Valley Authority
Electronic Mail Distribution

James E. Maddox, Vice President
Engineering and Technical Services
Tennessee Valley Authority
Electronic Mail Distribution

Ashok S. Bhatnagar
Site Vice President
Browns Ferry Nuclear Plant
Tennessee Valley Authority
Electronic Mail Distribution

General Counsel
Tennessee Valley Authority
Electronic Mail Distribution

Michael J. Fecht, Acting General Manager
Nuclear Assurance
Tennessee Valley Authority
Electronic Mail Distribution

Michael D. Skaggs, Plant Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
Electronic Mail Distribution

Mark J. Burzynski, Manager
Nuclear Licensing
Tennessee Valley Authority
Electronic Mail Distribution

Timothy E. Abney, Manager
Licensing and Industry Affairs
Browns Ferry Nuclear Plant
Tennessee Valley Authority
Electronic Mail Distribution

State Health Officer
Alabama Dept. of Public Health
RSA Tower - Administration
Suite 1552
P. O. Box 303017
Montgomery, AL 36130-3017

Chairman
Limestone County Commission
310 West Washington Street
Athens, AL 35611

Distribution w/encl: (See page 4)

Distribution w/encl:
K. Jabbour, NRR
L. Slack, RII EICS
RIDSRIDSNRRDIPMLIPB
PUBLIC

OFFICE	DRP/RII	DRP/RII	DRP/RII	DRS/RII	DRS/RII	DRS/RII	
SIGNATURE	BLH1	EFC	RLM2	via email (GTH1)	via email (EXL2)	via email (DCP)	
NAME	BHolbrook	EChristnot	RMonk	GHopper	ELea	DPayne	
DATE	01/23/2004	01/23/2004	01/23/2004	01/23/2004	01/26/2004	01/23/2004	
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
PUBLIC DOCUMENT	YES NO						

C:\ORPCheckout\FileNET\ML040270002.wpd

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos:	50-260, 50-296
License Nos:	DPR-52, DPR-68
Report No:	50-260/03-05, 50-296/03-05
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:	September 28, 2003 - December 27, 2003
Inspectors:	B. Holbrook, Senior Resident Inspector E. Christnot, Resident Inspector R. Monk, Resident Inspector G. Hopper, Senior Operations Engineer (Section 1R11.2) E. Lea, Senior Operations Engineer (Section 1R11.2) D. Payne, Senior Reactor Inspector, (Section 4OA5)
Approved by:	Stephen J. Cahill, Chief Reactor Project Branch 6 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000260/2003-005, 05000296/2003-005; 9/28/2003 - 12/27/2003; Browns Ferry Nuclear Plant, Units 2 and 3; Maintenance effectiveness.

The report covered approximately a three-month period of routine inspection by resident inspectors and senior operations engineers and resolution of a previously unresolved item by a regional engineering inspector. One Green non-cited violation (NCV) was identified. The significance of issues is indicated by their color (Green, White, Yellow, Red) using the Significance Determination Process in Inspection Manual Chapter 0609, Significance Determination Process (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 3, dated July 2000.

A. Inspector Identified and Self-Revealing Findings

Cornerstone: Initiating Events, Mitigating Systems

Green. Maintenance on Control Rod Drive pump 3A was conducted using an inadequate maintenance procedure. Work practices were inconsistent with the vendor manual. Pump seal clearances were improperly set and during the post maintenance test the pump seal rubbed sufficiently to cause sparking and damage of the new seal.

The inspectors identified a non-cited violation (NCV) (Self-Revealing) of 10 CFR Part 50, Appendix B, Section V, Instructions, Procedures, and Drawings. The finding is greater than minor in that it affects the mitigating systems cornerstone objective and degrades the attribute of equipment availability and reliability. The finding is of very low safety significance based on the operation of the standby pump and all other mitigation systems were available during the activity. (Section 1R12)

B. Licensee Identified Findings

None

Report Details

Summary of Plant Status

On October 28, 2003 Unit 2 was shutdown for a midcycle outage to repair a steam leak in the condenser, repair an electro hydraulic fluid leak, and correct component leakage in the drywell. Unit startup began on November 7, 2003. 100% Rated Thermal Power (RTP) was achieved on November 10, 2003, and remained there through the end of the inspection period.

On October 25, 2003 Unit 3 reduced power to about 65% RTP to perform power suppression testing to identify the location of leaking fuel, perform surveillance testing, and complete scheduled maintenance. Power was returned to 100% RTP on October 28. Power was reduced to about 70% on November 15, 2003 to repair a cracked weld on the feedwater header long cycle drain line to the condenser. Temporary repairs were completed and power was increased to 100% on November 16, 2003. The Unit remained at 100% RTP through the end of the inspection period.

1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (Weather Preparation and Actual Cold Weather Conditions)

a. Inspection Scope

The inspectors reviewed licensee procedure 0-GOI-200-1, Freeze Protection Inspections, and reviewed licensee actions to implement the procedure in preparations for cold weather conditions. The inspectors verified that selected valves and components listed in the attachments of the procedure were in the position specified by the procedure. The inspectors reviewed the list of open Problem Evaluation Reports (PERs) to verify that the licensee was identifying and correcting potential problems relating to cold weather operations. The inspectors reviewed immediate and planned corrective actions to verify they were appropriate. In addition, the inspectors reviewed procedure EPI-0-000-FRZ001, Freeze Protection Program for RHRSW Pump Rooms, Diesel Generator Building, and the Cooling Tower Pumping Station, to assess maintenance actions and preparations for cold weather conditions that could affect unit operation.

On November 25, 2003 while outside temperature was approximately 25 degrees F, the inspectors completed a walkdown inspection of risk significant systems and components located in outside areas and buildings that were susceptible to cold weather conditions. The inspectors observed portable heaters, building openings, and heat tracing light indications to verify proper operation.

The inspectors reviewed recent PERs and discussed cold weather conditions with operations personnel to assess plant conditions and personnel sensitivity to actual cold weather conditions. The inspectors conducted a walkdown tour of the main control rooms to assess system performance and alarm conditions of systems susceptible to cold weather conditions.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (Partial and Complete Walkdown)

.1 Partial System Lineup

a. Inspection Scope

The inspectors performed a partial walkdown of three safety systems listed below to verify redundant or diverse train operability, as required by the plant Technical Specifications (TS) while the other train of the system was out of service. 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’ walkdown was to verify that selected breaker, valve position, and support equipments were in the correct position for support system operation. The walkdown was also done to identify any discrepancies that impacted the function of the system could lead to increased risk.

The inspectors reviewed 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 system procedures included in the attachment of the report.

- Unit 2 Residual Heat Removal Service Water (RHRSW) system Loop D while Loop B was out of service for piping replacement
- Unit 2 Control Rod Drive system while Standby Liquid Control was in test configuration and alignment
- Unit 3 3EA Low Pressure Coolant Injection (LPCI) Motor Generator (MG) set while 3DN LPCI MG set out for maintenance.

b. Findings

No findings of significance were identified.

.2 Complete System Walkdown

a. Inspection Scope

The inspectors reviewed licensee procedures 3-OI-74, Residual Heat Removal, Attachment 1, Residual Heat Removal System (RHR) System Valve Lineup Checklist, Attachment 2, RHR System Panel Lineup, and Attachment 3, RHR System Electrical Lineup, and conducted a complete system walkdown of the Unit 3 RHR Loop I. The inspectors observed indications in the control room, on local panels and control stations, and observed accessible equipment in the plant to verify material condition, and proper alignment for standby operation. The inspectors compared switch and valve positions observed in the field to the applicable procedure attachment requirements to verify proper alignment. The inspectors also verified selected component positions against plant drawing 3-47E811-1, RHR System Flow, and the system procedures to verify correct alignment. The inspectors reviewed selected PERs and the PER database to verify the licensee was identifying and correcting system deficiencies. The inspectors also reviewed the system health report, operator workaround list, and the maintenance rule reports to assess the overall system condition.

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 six fire areas listed below 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 those 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, were 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 Area 25, Cable Tunnel
- Fire Area 25, Intake Pumping Structure
- Fire Area 16, Unit 2 Control Building Elevation 617

- Fire Area 18, Unit 2 Control Building Elevation 606
- Fire Area 16, Unit 3 Control Building Elevation 606
- Fire Area 16, Unit 1 Control Building Elevation 593

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

.1 Resident Inspector Quarterly Review of Testing and/or Training Activities

a. Inspection Scope

The inspectors observed portions of an operator annual examination on November 5, 2003. The inspectors observed three different job performance measures (JPMs) performed on the plant control room simulator. 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 that the conduct of training, the formality of communication, procedure usage, alarm response, and control board manipulations were in accordance with the above-referenced procedures. The inspectors compared actions contained in the JPMs to operations procedures to verify they matched. The inspectors reviewed the JPMs to verify they identified operator actions that were critical to safe operation. The inspectors also assessed instructor interface and control of the examination process. The specific JPMs observed included the following:

- JPM 500, Verification of Offsite Power Availability to 4.16 KV Shutdown Boards
- JPM 50, Primary Containment Venting from Pressure Suppression Chamber Through FCV-84-19
- JPM 39, Crosstie CAD to Drywell Control Air

b. Findings

No findings of significance were identified.

.2 Licensed Operator Requalification (Biennial Review)

a. Inspection Scope

During the week of November 17-21, 2003, the inspectors reviewed documentation, interviewed licensee personnel, and observed the administration of simulator operating tests and Job Performance Measures (JPMs) associated with the licensee's operator requalification program. Each of the activities performed by the inspectors was done to assess the effectiveness of the licensee in implementing requalification requirements identified in 10 CFR 55, "Operators' Licenses." Evaluations were also performed to determine if the licensee effectively implemented operator requalification guidelines established in NUREG-1021, “Operator Licensing Examination Standards for Power Reactors,” and Inspection Procedure 71111.11, “Licensed Operator Requalification Program.” The inspectors also reviewed and evaluated the licensee’s simulation facility for adequacy for use in operator licensing examinations. The inspectors observed three crews during the performance of the operating tests. Documentation reviewed included written examinations, JPMs, simulator scenarios, licensee procedures, on-shift records, licensed operator qualification records, watchstanding and medical records, simulator modification request records and performance test records, the feedback process, and remediation plans. The records were inspected against the criteria listed inspection Procedure 71111.11. Documents reviewed during the inspection are listed in the Attachment.

Following the completion of the annual operating examination testing cycle which ended on December 4, 2003, the inspectors reviewed the overall pass/fail results of the individual JPM operating tests, and the simulator operating tests administered by the licensee during the operator licensing requalification cycle. These results were compared to the thresholds established in NRC Manual Chapter 609 Appendix I, Operator Requalification Human Performance Significance Determination Process.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the two samples listed below for items such as: (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; (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 SSCs/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified as (a)(1).

- Unit 2 and 3 containment isolation valves experienced several failures. The failures were documented as part of the licensee’s corrective action program in the following PERs, PER 03-006747-000, PER 03-017441-000, PER 03-002719-000, and PER 03-021813-000.

- Unit 3 Control Rod Drive (CRD) Pump 3A Maintenance

b. Findings

Introduction: A self-revealing non-cited violation (NCV) (Green) of 10 CFR app. B was identified for inadequate procedure guidance during maintenance activities on Control Rod Drive (CRD) pump 3A.

Discussion: On October 14, 2003, CRD Pump 3A was removed from service for a 40 hour inboard seal replacement outage. Maintenance on CRD pump 3A was conducted using procedure MCI-0-085-PMP001, Control Rod Drive Hydraulic Pump - Worthington 2 WT-810 Disassembly, Inspection, Rework and Reassembly. Following maintenance, the licensee conducted a post maintenance test (PMT) on the pump by performing section 8.1 of procedure, 3-OI-85, Control Rod Drive System. During the PMT, the pump seal rubbed sufficiently to cause sparking and the pump was immediately secured. Subsequent investigation revealed that the drive collar was up against the gland plate. The pump was out of service an additional 131 hours for seal maintenance rework. Later, upon return to service, oil leaked from the inboard bearing causing Operations to classify the pump as ‘emergency use only’ for an additional four days. The oil leak was caused by misadjustment of the Trico oil bubbler. The bubbler was later adjusted and the pump returned to service. During the maintenance and rework activity the redundant CRD pump, 3B, was operable and in service. In addition, all other high pressure sources of water makeup were available.

The inspectors reviewed maintenance work orders, procedure MCI-0-085-PMP001, and observed field work and the post maintenance test. The inspectors observed work practices that were inconsistent with the vendor manual, such as specifically checking seal clearances, ensuring the seal was wet and thoroughly vented prior to pump startup. The inspectors also found that the procedure did not provide any guidance for setting the proper seal clearance, for initial run-in of the seal, or for adjusting the Trico oil bubbler.

Analysis: The inspectors referred to MC 0612 and determined that the finding was more than minor in that it is associated with the Mitigating Systems and Initiating Events cornerstones and affected the respective objectives of equipment performance and availability. For the Mitigating Systems aspect, the CRD system is credited as a high pressure source of inventory makeup under certain operational conditions. Additional unavailability impacts this makeup source. For the Initiating Events aspect, the unavailability of both CRD pumps leads to a condition where the Unit 3 Technical Specifications for operability of CRD accumulators requires an immediate unit scram.

The inspectors referred to MC 0609, Significance Determination Process, and determined that the finding was of very low safety significance (Green) because the conditional core damage frequency for this scenario duration was less than1E-6, and the standby pump was available and in service during the activity. Other high pressure sources of water makeup were also available. Additionally, operations was aware of the misadjusted oil bubbler and CRD pump 3A could have been operated in an emergency situation.

Enforcement: 10 CFR 50, Appendix B, Criterion V, Instructions Procedures and Drawings, Requires, in part, that, activities affecting quality shall be prescribed by documented instructions, procedures, and drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with the instructions. Contrary to this, on October 16, 2003, quality procedure MCI-0-085-PMP001 was fully implemented and resulted in damage to the seal of quality related CRD pump 3A that required additional seal replacement. The procedure did not contain guidance necessary to correctly install a new seal or directions on how to correctly adjust the oil bubbler. Because this violation is of very low safety significance and has been entered in the licensee's corrective action program under PER 03-0020163-000, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000296/2003005-01, Inadequate Maintenance Procedure for Control Rod Drive Pump 3A.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

For the seven risk and emergent work assessments listed below, the inspectors reviewed licensee actions taken to plan and control the 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 0-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. In addition, the inspectors conducted a review of scheduled work activities for work week 2352 with emphasis on risk significant activities for Division I Core Spray and Fast Start Operability tests for 3A and 3B Diesel generators. These work activities were identified at an increased risk level (yellow) and was acceptable per the risk assessment.

- 250 V DC main bank battery all intercell readings failed to meet procedure acceptance criteria, PER 03-022727 (emergent)
- Units 2 and 3: Thru wall leak on RHRSW B header piping inside pipe tunnel WO 03-19297-00, B level PER 03-19298-00 (emergent)
- Units 3: During trouble shooting a leak was discovered in the diaphragm of valve 3-FCV-84-49, drywell or suppression chamber exhaust to SBGT, WO 03-09335-00 (emergent)
- 3A EHC Pump Pressure Indicator (3-PI-47-62) isolate and replacement, PER 03-23296 (scheduled)
- Work week 2352, covering planned maintenance activities for December 22 through December 28, 2003 (scheduled)

- Units 2 & 3: 3B RHRSW pump motor failed electrical testing during performance of WO 02-013695-00, motor replaced (emergent)
- Units 2: HPCI pump experienced an unexpected suction source transfer from the condensate storage tank to the suppression pool during testing WO 03-024812-00 and PER 03-024777-00 (emergent)

b. Findings

No findings of significance were identified

1R14 Operator Performance During Non-Routine Evolutions and Events

a. Inspection Scope

On October 24 and 25, 2003, the inspectors observed operator performance during activities to reduce Unit 3 reactor power to approximately 65% RTP to conduct power suppression testing to identify possible fuel leaks. The inspectors observed the pre-job brief and compared observed performance to the requirements of procedure ODM 3-3, Pre-Evolution, Mid-, and End-of-Shift Briefings. The inspectors also reviewed procedures OSIL-108, Reactivity Management Expectations, to verify that procedure requirements were met for the power reduction. In addition, the inspectors compared operator performance to the requirements of procedure 3-GOI-100-12A, Unit Shutdown From Power Operation to Cold Shutdown and Reductions in Power During Power Operations.

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 of the evaluation 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 compensatory measures to verify that the 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 the licensee's evaluation met procedure requirements. The inspectors also reviewed a sampling of PERs to verify the licensee was identifying and correcting any deficiencies associated with operability evaluations.

- Unit 2 flow control valves 2-FCV-77-15 and 16 due to AK18 relay operation (PER 03-018092-00)
- Units 2 and 3 control bay habitability zone inleakage due to unqualified duct work (PER 03-017922-00)
- Units 2 and 3 common station service transformers A and B load tap changer control power transformers inadequate for their loads (PER 03-018143-00)
- Unit 2 and 3 operability of various HFA relays observed as part of the licensee's ongoing inspection of approximately 1720 relays (B level PER 03-18287-00)
- Unit 2 operability of 2B RHRSW heat exchanger service water piping, ASME code class 3 Section XI, for very low wall thickness due to rust and pitting (PER 03-19298-00)

b. Findings

No findings of significance were identified.

1R16 Operator Work-Around (OWA) Review

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 selected OWA that required operators to verify flow of the control room environmental control system within five hours of initiation due to a possible low flow condition. The OWA was identified at the highest level priority (1) to expedite corrections. The inspectors also verified that the OWA had been reviewed in accordance with site procedures and that work orders had been developed and scheduled for repair. The inspectors also reviewed PER 03-017922 associated with the OWA to verify that corrective actions had been established to correct the deficiency. 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.

- OWA 0-031-OWA-2003-0111, verify flow of the control room environmental control system

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 2: PMT for MSIV 2-FCV-1-15 following limit switch repairs, Procedure 2-SR-3.3.1.1.8(5)
- Unit 2: PMT for 4KV Shutdown Board under voltage lockout relay (0-RLY-211-000A/03C) following electrical maintenance
- Unit 3: PMT on 3A Control Rod Drive Pump inboard seal replacement per 3-OI-85, Control Rod Drive System
- Unit 3: PMT on 3DN LPCI MG-set per MPI-0-074-BRG001, Inspection, Lubrication, and Replacement of LPCI MG-Set Couplings and Bearings
- Unit 3: PMT on RHR heat exchanger 3C following maintenance and cleaning

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities

.1 Unit 2 mid-cycle outage

a. Inspection Scope

Risk

Prior to the mid-cycle outage scheduled for October 28, 2003 - November 7, 2003, to repair a steam leak in an extraction piping bellows in the condenser, correct leaking components in the drywell, and repair an Electro Hydraulic leak, the inspectors reviewed the Unit 2 mid-cycle Outage Risk Assessment Report, to verify 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. The inspectors specifically reviewed the contingency plans for two Level Orange risk conditions for decay heat removal during maintenance associated with Residual Heat Removal Service Water system to verify that specific equipment protective actions were identified. The inspectors' review was compared to the requirements in licensee procedure SPP-7.2, Outage Management. During identified high risk significant conditions due to equipment availability and/or system configurations, inspectors reviewed if contingency measures were identified and incorporated into the overall outage and response plan. The inspectors walked down systems in the plant, observed control room panel lineups and discussed posted risk conditions with operations and outage personnel to assess licensee personnel knowledge of the risk condition and mitigation strategies.

The inspectors reviewed the licensee's root cause of the steam leak in the main steam extraction piping, attended meetings with a bellows vendor expert, and reviewed the licensee's actions with respect to a manufacturing defect that led to the bellows failure. The inspectors review assessed the adequacy of corrective actions and maintenance activities prior to unit restart.

The inspectors attended two Plant Operations Review Committee (PORC) unit restart meetings to assess licensee actions to review and discuss activities completed during the outage and unit readiness for restart.

Unit Shutdown

The inspectors observed selected activities and monitored licensee controls over outage activities listed below to verify that procedural and regulatory requirements were met. The inspectors compared their observations to licensee procedure SPP-12.1, Conduct of Operations, and 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. Part of the activities observed included the following:

- Unit power reduction with control rods and recirculation system flow
- Manual scram of unit and recovery actions
- Core thermal limit verification
- Reactivity monitoring and control
- Startup, shutdown, and realignment of components and systems
- Realignment and transfer of AC power sources
- TS instrument and system performance verification

Decay Heat Removal

The inspectors reviewed licensee procedures 2-OI-74, Residual Heat Removal System (RHR), and conducted a main control room panel walkdown to verify correct system alignment. The inspectors reviewed operational logs to verify that procedure and TS requirements to monitor and record reactor coolant temperatures were met. In addition, the inspectors reviewed controls implemented to ensure that outage work was not impacting the ability of operators to operate RHR shutdown cooling.

Reactivity Control

The inspectors observed licensee performance during shutdown, outage, and startup activities to verify that reactivity control was conducted in accordance with procedure and TS requirements. Inspector observations were compared to procedure SPP-10.4, Reactivity Management, to verify that procedure and TS requirements were met. Reactivity manipulations observed included the following:

- Power reduction with control rods and recirculation flow
- Withdrawal of control rods during unit startup

Inspectors also observed the following items to assess licensee performance in the respective area:

Inventory Control

- Reactor water inventories and controls including flow paths, system configurations, and alternate means for inventory addition
- Operator monitoring and control of reactor temperature and level

Electrical Power

- Controls over electrical power systems and components to ensure that emergency power was available as specified in the outage risk report
- Controls and monitoring of electrical power systems and components and work activities in the power transmission yard
- Operator monitoring of electrical power systems and outages to ensure that TS requirements were met

Containment Control and Closure

- Confirm secondary containment requirements
- Verify torus and drywell walkdown and closeout prior to unit restart

Preparations and Unit startup

- Unit startup checklist
- Alignment of secondary systems to support startup
- Pre-job briefing for unit startup
- Reactivity management briefing
- Control rod withdrawal for criticality

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. 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 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 inspectors also reviewed procedures OSIL-108, Reactivity Management Expectations, and ODM 3-3, Pre-Evolution, Mid-, and End-of-Shift Briefings, to verify that procedure requirements were met for the surveillance activities. The surveillances either witnessed or reviewed included:

- 3-SR-3.5.1.1(CS II), Core Spray System Venting Loop II
- 3-SR-3.6.1.3.5 (CS II), Core Spray MOV Operability Test
- 3-SR-3.5.1.6 (CS II), Core Spray Flow Rate Loop II
- 2-SR-3.9.2.2, One-Rod -Out Interlock Functional Test
- 2-SR-3.6.1.3.5 (SD), Valve Cycled During Cold Shutdown, 2-FCV-74-47, and 48
- 3-SR-3.5.3.3, RCIC System Rated Flow at Normal Operating Pressure (IST)
- 2-SI-4.5.C.1(3), RHRSW Pump and Header Operability and Flow Test (IST)

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications

a. 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 installation was consistent with the modification documents and Temporary Alteration Control Form (TACF).

- TACF 02-03-007, Revision 0, replace General Electric (GE) neutron monitoring battery charger B2-2 with a new charger from Stored Energy Systems (SENS)

- TACF 02-03-069, Revision 0, replace Unit 2 Regenerative Heat Exchanger 2A shell-side relief valve, 2-RFV-69-571 with new type of valve

b. Findings

No findings of significance were identified

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

Cornerstones: Mitigating Systems, Initiating Events

.1 Safety System Unavailability - High Pressure Injection System and Scrams With Loss of Normal Heat Sink

a. Inspection Scope

The inspectors reviewed the licensee's procedures and methods for compiling and reporting PIs, including 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 the PI's listed below for the fourth quarter 2002 through the third quarter 2003. 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, to verify that industry reporting guidelines were applied.

- Unit 2 Safety System Unavailability - High Pressure Injection
- Unit 3 Safety System Unavailability - High Pressure Injection
- Unit 2 Scrams With Loss of Normal Heat Sink
- Unit 3 Scrams With Loss of Normal Heat Sink

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

a. Inspection Scope

As required by Inspection Procedure 71152, “Identification and Resolution of Problems”, and in order to help identify equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee’s corrective action program. This review was accomplished by a combination of reviewing hard copies of each condition report, attending daily screening meetings and accessing the licensee’s computerized database.

Annual Sample Review

The inspectors selected two PERs for detailed review (PER 03-006967-000 and 00-002340-000). The first PER was associated with the licensee’s discovery of the RHRSW discharge flow control valve for RHR heat exchanger 2C stem separated from the cage; and the second PER dealing with the adequacy of human performance root cause analysis**.** The PERs 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 CAP as delineated in the Standard Programs and Processes Procedure SPP-3.1, Corrective Action Program, and 10 CFR 50, Appendix B.

b. Findings and Observations

PER 03-006967-000: There were no identified findings associated with the review of this sample. The PER was written to evaluate low RHRSW pressure in the 2C RHRSW subsystem. Hand tightening of valve FCV-23-40, RHRSW discharge flow control valve for RHR Heat exchanger 2C, indicated valve seat leakage and the PER was revised to 03-006967-001 to disassemble and repair at the first available outage. When the valve was disassembled during the mid-cycle outage in October, it was found to have it’s cage separated from the stem. The inspectors noted, that, though four PER’s were written for emergent difficulties with this valve work, none had a problem description relating specifically to stem separation. One of the emergent PERs dealt with a problem in welding activities to weld the valve stem nut to the disc and mentioned that the stem was separated however, the PER did not specifically focus on the fact that the valve was found in an unexpected condition, i.e., separated. This was an example of an instance where a specific PER was not written and the problem description of existing PERs was incomplete.

PER 00-002340-000: There were no identified findings associated with the review of this sample. This B Level PER, stated that, in many cases, the human performance root cause analysis do not get to the fundamental cause of the problem. A search of the corrective action database revealed that a previous root cause issue was identified in a 1998 PER (98-009421-000). The PER indicated that the analyses of some plant events did not determine the fundamental reason for human performance deficiencies.

The 1998 PER indicated that a sample determined that the root cause analyses for seven of ten human performance related PERs were weak or inadequate. The root cause in the PER stated that the inadequacies were caused by failures to follow through on previously identified corrective actions due to insufficient management oversight. The inspectors noted that the licensee has now assigned the responsibility for the root cause analysis (RCA) to the manager of human performance/self-assessment (HP/SA); expectations for RCAs were that they must include at least one individual who had attended the RCA training course and the HP/SA manager was to evaluate the need for refresher training based on RCA quality; develop and pilot a RCA refresher training course to bring previously trained individuals up to speed on recent changes to the human performance model, present the refresher training course to all management review committee(MRC) members, and present the course to personnel identified by site management to include personnel involved in determination of apparent causes.

The licensee performed an effectiveness review of PER 00-002340-000 and confirmed that the deficiencies in root causes for human performance did not meet their expectations. The causal analysis of events triggered by human error continued to be ineffective in identifying fundamental causes, especially those related to process and organizational contributors. The inspectors noted that the licensee recently placed a renewed emphasis on this problem. The inspectors also noted that the root causes for equipment related problems were generally thorough, detailed, and correct and did not contain similar root cause deficiencies. This was an example where the effectiveness of PER corrective actions did not meet licensee managements expectations.

4OA3 Event Follow-up

Closed: Licensee Event Report (LER) 05000260/2003-005-00: Unplanned Start of DG A and DG B from Momentary Board Undervoltage

On August 10, 2003, 4KV Shutdown Bus 1 alternate supply breaker failed to automatically close when the normal supply breaker was manually opened during electrical switching activities. Operators observed that the alternate supply breaker failed to close and immediately reclosed the normal supply breaker. As a result, the shutdown bus lost power for about five seconds. Due to the momentary loss of power to the shutdown bus, DG A and B automatically started, but did not tie to the bus due to the short duration of the power loss. Other engineered safety features automatically started and responded as expected for the loss of power. The licensee determined that the root cause of the equipment failure was that a connector internal to the breaker had come off its termination point. The licensee had previously identified that an amber light on the alternate feeder breaker panel was extinguished and had written an work order to trouble shoot and repair the problem. However, they failed to realize that the open circuit that caused the amber light to be extinguished prevented current flow through the breaker closing coil, thus preventing closure of the alternate supply breaker.

The licensee restored equipment to the standby condition, corrected the connection problem, and initiated long term corrective actions. The LER was reviewed by the inspectors and no findings of significance were identified. The licensee entered this problem into the corrective action program as Problem Evaluation Report (PER) 03-00015160-00.

4A05 Other

(Closed) Unresolved Item (URI) 05000296/2003007-01: Inadequate Unit 3 Fire Procedure Directs Local Manual Operator Action Be Performed In Location of Fire

During the triennial fire protection inspection (NRC Inspection Report 05000260, 296/2003007, dated November 17, 2003), the inspectors identified a finding having potential safety significance greater than very low significance, involving procedural guidance in the Safe Shutdown Instruction (SSI) for Fire Area 13 (Unit 3 480 V RMOV Board Room 3A) that directed an operator to enter the location of the fire to perform a local manual action associated with tripping the Unit 3 Reactor Recirculation Pumps (RRPs). Specifically, Attachment 6, Steps 1.1 and 1.2 of 2/3-SSI-13 directed an operator to go to 250 V Reactor MOV Board 3A and place the control power breaker (breaker 1B1) for 4 KV Recirculation Pump Trip (RPT) Board 3-II to off. This action may not be successful for a severe fire in this room because of the high temperatures, heavy smoke, low visibility and hazardous plant conditions that would likely be encountered by the operator while the action is performed. This URI was opened pending further NRC review of the safety significance of the finding.

The inspectors reviewed licensee calculation ND-Q0999-92116, Appendix R Manual Action Requirements, Revision 17. This calculation required the RRPs to be tripped during a severe fire in Fire Area 13 from 4 KV RPT Board 3-II. Additionally, to prevent potential RRP restart, control power to the RPT board was to be tripped. In general, RPT control power can be removed by individually opening breaker 1B1 on 250 V Reactor MOV Board 3A or by totally de-energizing this bus. Normal power to 250 V Reactor MOV Board 3A is provided from 250 V Battery Board 3 via breaker 203. 250 V Battery Board 3 is located in different fire area separate from Fire Area 13.

Recognizing that 250 V Reactor MOV Board 3A would be in the location of the fire, Appendix B, Section Fire Zone/Area 13, of the calculation identified that RPT control power should be removed by opening breaker 203 in Battery Board Room 3 (to totally de-energize 250 V Reactor MOV Board 3A.) This requirement was captured in Attachment 1, Step 1.4.1 of procedure 2/3-SSI-13. Consequently, the operator action at issue in this URI was redundant and not needed to successfully remove RPT control power. The licensee initiated a procedure change request (PCR 20031551) to correct this procedure error.

After reviewing plant operating procedures, operator training and conducting operator interviews, the inspectors found that several other well known (skill-of-the-craft) methods were available to the operators for ensuring that the RRPs would be tripped during a

severe fire in Fire Area 13. The inspectors concluded that the erroneous procedure guidance specified in Attachment 6 of 2/3-SSI-13 would have minimal impact on the operators' ability to safely shutdown the Unit 3 reactor. Because this issue has minimal safety significance and has been documented in the licensee's corrective action program (PER 03-013882-000), this issue is considered to be minor.
URI 05000296/2003007-01 is closed.

4OA6 Management Meetings

Exit Meeting Summary

On January 16, 2004, 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 reviewed by the inspectors during the inspection period was returned to the licensee.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

T. Abney, Nuclear Site Licensing & Industry Affairs Manager
A. Bhatnagar, Site Vice President
L. Clardy, Site Nuclear Assurance Manager
C. Ottenfeld, Chemistry Manager
R. Jones, Unit 1 Restart Manager
K. Kruger, Assistant Nuclear Plant Manager
J. Lewis, Nuclear Plant Operations Manager
B. Marks, Engineering & Site Support Manager
B. Mitchell, Radiation Protection Manager
J. Ogle, Site Security
P. Olsen, Maintenance & Modifications Manager
M. Skaggs, Nuclear Plant Manager
T. Golden, Operations Site Licensing Engineer
P. Meek, Operations Site Licensing Engineer
J. Wallace, Operations Site Licensing Engineer

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

05000296/2003005-01	NCV	Inadequate Maintenance Procedure for Control Rod Drive Pump 3A (Section 1R12)
05000260/2003-05	LER	Unplanned Start of DG A and DG B from Momentary Board Undervoltage (Section 4OA3.1)
05000296/2003007-01	URI	Inadequate Unit 3 Fire Procedure Directs Local Manual Operator Action Be Performed In Location of Fire (Section 4A05)

LIST OF DOCUMENTS REVIEWED

<u>Section 1R04: Equipment Alignment</u>
0-OI-23, Attachment 1B, RHRSW system valve lineup checklist Unit 2
0-OI-23, Attachment 2B, RHRSW system panel lineup checklist Unit 2
2-OI-85, Attachment 1, CRD Hydraulic System Valve Lineup Checklist
2-OI-85, Attachment 2, CRD Hydraulic System Panel Lineup Checklist
2-OI-85, Attachment 3, CRD Hydraulic System Electrical Lineup Checklist
Drawing 3-15E500-3

<u>Section 1R05: Fire Area Tours</u>
Fire Hazards Analysis, Volume 1 and 2
Fire Pre-Plans: IS-550, IS 565, CB2-617, CB3-606, CB2-606
Smoke Detector Locations: Procedure 0-SI-4.11.A.1(3)b

<u>Section 1R11.2: Operator Requalification</u>
BFN-TRN-03-007 Self Assessment Report
Browns Ferry Simulator Transient Test Raw Data
Design Change Request Report
Simulator Problem Report
TRN 11.4 Continuing Training For Licensed Personnel
TRN-11.9 Simulator Exercise Guide Development and Revision
TRN 11.10 Annual Requalification Examination Development and Implementation
TRN -11.12 Job Performance Measures Development Administration and Evaluation Manual
TRN-11.14 TVA Operator Licensing examination Security Program
TRN-12 Simulator Regulatory requirements
OPDP-1 Conduct of Operations
Operation Logs
CAD Records
Reactivation Records
Medical Records

<u>Section 1R20.1: Refueling and Outage Activities</u>
0-OI-57A, Switchyard and 4160 Electrical System
2-SR-3.6.1.2.1, Drywell Airlock LLRT
2-SR-3.6.1.3.5(SD), Valves Cycled During Cold Shutdown
2-SI-3.2.12, Verification Of Fail-Safe Position For MSIVs
2-AOI-100-1. Reactor Scram
2-GOI-100-1A, Unit Startup from Cold Shutdown to Power Operations and Return to Full Power from Power Reductions
2-GOI-200-2, Drywell Closeout
2-OI-68, Reactor Recirculation System

<u>Section 4OA1:Performance Indicator (PI) Verification</u>

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

Section 40A5: Other

<u>Procedures</u>

2/3-SSI-13, Unit 3 480 V RMOV Board Room 3A, Rev. 5

<u>Calculations</u>

ND-Q0999-920116, Appendix R Manual Action Requirements, Rev. 17

<u>Procedure Change Requests (PCR) Initiated</u>

PCR 20031551, Delete duplicate action to open RPT Control Power breaker on 250V RMOV Board 3A, dated 11/18/03