UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos. 50-259/88-10, 50-260/88-10, and 50-296/88-10

Licensee: Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Docket Nos. 50-259, 50-260, and 50-296

License Nos. DPR-33, DPR-52, and DPR-68

Facility Name: Browns Ferry Nuclear Plant

Inspection at Browns Ferry Site near Decatur, Alabama

Inspection Conducted: April 1-30, 1988

Inspectors: A. J. Ignatonis for G. L. Paulk, Senior Resident Inspector — 6/3/88 Date Signed

Accompanied by: C. R. Brooks, Resident Inspector
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Approved by: A. J. Ignatonis, Section Chief — 6/3/88 Date Signed
Inspection Programs,
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SUMMARY

Scope: This routine inspection was in the areas of Q-list, operational safety, maintenance observation, surveillance testing observation, reportable occurrences, restart test program, personal dosimetry, and fuel reconstitution.

Results: One violation was identified for failure to have an adequate administrative procedure for controlling the preparation of licensing documents.

REPORT DETAILS

1. Licensee Employees Contacted

*J. G. Walker, Plant Manager
J. D. Martin, Assistant to the Plant Manager
*R. M. McKeon, Operations Superintendent
T. F. Ziegler, Superintendent - Maintenance
D. C. Mims, Superintendent - Technical Services
J. G. Turner, Manager - Site Quality Assurance
M. J. May, Manager - Site Licensing
*J. A. Savage, Compliance Supervisor
A. W. Sorrell, Site Radiological Control Superintendent
R. M. Tuttle, Site Security Manager
L. E. Retzer, Fire Protection Supervisor
H. J. Kuhnert, Office of Nuclear Power, Site Representative
T. C. Valentano, Director - Restart Operations Center

Other licensee employees contacted included licensed reactor operators, auxiliary operators, craftsmen, technicians, public safety officers, quality assurance, design and engineering personnel.

*Attended exit interview

Acronyms and abbreviations used throughout this report are listed in the last paragraph.

2. Licensee Action on Previous Enforcement Matters (92702)

(CLOSED) Violation (259/260/296/84-15-02), Control Air System Operating Instructions (OI 32) valve checklist in Operating Instruction 32/32A was deficient. The licensee supplemental response of October 24, 1986, was reviewed to assure corrective actions were addressed and implemented.

Although walkdowns were performed and "as-constructed" drawings were issued for system 32 (Control Air) Units 1, 2, and 3, it was determined that these corrective steps were insufficient. As a result of the incorrect drawings, OI 32 was incorrectly updated. These discrepancies were due, in part, to the lack of a formal procedure being issued to provide for systematic and controlled verifications of drawing corrections. Since the initial walkdowns and procedure corrections on the control air system, the BFN Nuclear Performance Plan was initiated with Volume III, Section II.2.4., addressing Procedures Upgrade and Section III.2.2. showing plans for an improved Design Baseline Program. Both the Procedures Upgrade Program and Design Baseline Program were initiated and thus resulted in corrections to the control/station air and drywell control air systems drawings and procedures. Specifically, on March 12, 1988, BFN Site Director's Standard Practice 9.1 was revised to implement and control mechanical system walkdowns, as well as conform with the BFN

configuration management program. Subsequently, the "common" (Unit 0) portion of system 32 was walked down in accordance with this procedure. Information obtained during this walkdown was then incorporated into configuration control drawings. These drawings were reviewed and approved by the walkdown group and then evaluated by the plant for procedural changes before restart. OI-32A is now correct.

Additionally, complete walkdowns for all unit's control/station air and drywell control air was scheduled to support Unit 2 restart. This ensures all unit crossties and interconnections are properly documented with procedural controls in place for all portions of the system affecting Unit 2. OI 32 was then corrected and reverified as correct by plant personnel and contains all system valves in the valve lineup checklists for Unit 2. This violation is therefore closed.

(CLOSED) Inspector Followup Item (296/85-09-03), Calibrations for Reactor Vessel Thermocouples. This item relates to a problem encountered in January 1985, regarding the Unit 3 bottom reactor vessel drain temperature indication in the control room.

Indication errors were caused by an improper valve alignment in the Reactor Water Cleanup System (RWCU). The inspector expressed concerns about the calibration or verification of proper thermocouple readings during plant operations.

Due to its nature, a thermocouple cannot be calibrated. There is no adjustment which could be made during a calibration. A calibration is performed once per cycle on the temperature recorders which use the thermocouples as inputs. The procedures used to calibrate the temperature recorders are Standard Calibration Instructions 501.1 and 501.2. These calibrations make the recorder function properly.

Surveillance Instructions 4.6.A.1, 4.6.A.2, 4.6.A.5, and 4.6.A.7 require temperature readings from reactor vessel thermocouples using temperature recorders TR-56-4, TR-68-37, and TR-68-2. TR-68-2 and TR-68-37 indicate upscale if the thermocouple fails. TR-56-4 will be replaced on all units with a new recorder which will indicate thermocouple failure by an upscale reading. This will be accomplished by ECN P0623. Installation is complete on Unit 2 and Units 1 and 3 will be complete prior to startup.

With procedures that keep the recorders calibrated and built in thermocouple failure indication on each recorder the licensee considers that adequate assurance of thermocouple accuracy is provided and that the plant will be operated within reactor vessel thermal limits during plant heatups, cooldowns, and recirculation pump starts. This item is considered closed.

(CLOSED) Violation (260/87-37-01), Failure to Prevent Inadvertent Operation by Tagging Components. The inspector identified a failure by the licensee to maintain an operational restriction on the electrical operation of RHR pump suction Valve 2-74-24. The valve had been tagged

under a maintenance hold order for an extended period of time prior to the event. Although the limit switches required readjustment prior to returning the valve to service, maintenance personnel released the hold order to allow system testing with the understanding that the valve was to be manually operated and not suitable for electrical operation until the limit switch readjustment was performed. This operational restriction was subsequently lost in the many turnovers that occurred over the course of a month and electrical power was eventually restored to the valve, resulting in the valve being operated against its close seat without limit switch protection until the associated breaker tripped on overload. The valve was later determined to have not been damaged.

The inspector reviewed the licensee's response to the violation dated January 15, 1988, and documentation to support completion of the proposed corrective actions.

The inspector determined that Site Director Standard Practice (SDSP)-14.9, Equipment Clearance Procedure had been revised to include an allowable method for temporary lifting of a hold order on a particular piece of equipment. The temporary lift is controlled and documented by use of form SDSP-217, and may not exceed one eight hour shift.

Additionally, the inspector reviewed BFN Unit 2 Superintendent memorandum dated November 30, 1987 (R41 871130 945) to all operations personnel. This memo consisted of operations critique 87-059 and covered the events leading up to the event and the conclusions, lessons learned and corrective actions resulting from the event.

The inspector feels that the corrective actions as implemented should be adequate to prevent recurrence. This item is closed.

(CLOSED) Violation (259/80-47-03 and 296/80-41-03), Work Plan had no Final QA Review. The inspectors had identified a failure to document the performance of a quality assurance review for completion associated with the installation and testing of certain high density spent fuel storage racks into the Units 1 and 3 spent fuel pools. The modification work was associated with work plan numbers 6371 and 7703.

The inspector reviewed the response to the violation dated April 6, 1981, in which the licensee committed to complete the required quality assurance reviews and to conduct necessary training for modifications personnel. The inspector reviewed completed work plan numbers 6371 and 7703 and verified that the documents contained the appropriate reviews by the responsible engineer section and QA section supervisor supervisors. Additionally, the inspector determined that Browns Ferry Site Director Standard Practice (SDSP)-8.3, Plant Modifications and SDSP-17.2, Post Modification Test Program were revised to clarify requirements for test review and closeout. Discussions with supervisory personnel that were associated with the modifications group during the subject period revealed that the required training called for in the response was accomplished not through formal training classes with attendance records, but through

individual emphasis by managers. Subsequent to completion of the training the modification program has evolved through the RPIP effort and newer formal training requirements now exist. The inspector feels that the corrective actions taken due to the original violation and the existence of newer upgraded Post Modification Training requirements form an adequate basis for closure of this item. This item is closed.

(CLOSED) Violation (259,260,296/85-53-02), Main Steam Line Radiation Source Check Inadequate. The inspector identified that the licensee failed to perform required routine instrument calibrations on the four channels of main steam high radiation instrumentation. The licensee had been performing routine surveillances on the instrumentation channels which amounted to performing a source response check (no acceptance criteria) rather than an instrument calibration as defined in technical specifications. The inspector also noted that the licensee failed to maintain records of actual applied voltage calculations and radiation monitor output indications.

The inspector reviewed the licensee's response to the violation dated January 6, 1986, and supplemental response dated March 20, 1986. Additionally, the inspector reviewed new surveillance instruction (SI)-4.1.B-10.1, Main Steam Line Radiation Monitor Source Calibration, which contained sufficient instructions and detail to allow for performance of a channel calibrations using a known source field as required by T.S. Table 4.1.6 SI-4.1.B-10.1 includes comparison of test results to acceptance criteria, and data sheets for recording actual applied voltage calculations and radiation monitor output indications. The inspector determined from conversations with licensee employees that the surveillance instruction is PORC approved and has been walked down as part of the SI upgrade program but is not presently scheduled for actual performance. The licensee's planning and scheduling section has the SI included on the list of outage SI, required prior to Unit 2 startup. The inspector feels that the above corrective actions are adequate to prevent recurrence. This item is closed.

3. Followup of Open Inspection Items (92701)

(CLOSED) Unresolved Item (259/260/296/86-05-09), Basis for radiation monitor trip set points. No justification could be located for the licensee's selection of 92 mr/hr as the trip setpoint for the Reactor Zone and Refuel Zone Radiation Monitors. Technical Specifications limit this setpoint to 100 mr/hr maximum; however, the potential +100% inaccuracy was not considered in establishment of the actual setpoint. The licensee responded to this item in it's April 18, 1986 letter which included a justification for the instrument setpoint. Also in this letter, the licensee stated that a more rigorous program for establishing instrument setpoints was being initiated in accordance with the Instrument Society of America Standard 67.04. Since then, another open inspection item (259/260/296/86-32-04) has been established related to the program for Reactor Protection System (RPS) setpoints. The programmatic concerns

raised by the radiation monitor setpoint issue will be tracked and closed through the RPS setpoint open item. Therefore URI 86-05-09 is closed.

(CLOSED) Unresolved Item (259/260/296/87-02-07), Problems identified during surveillance testing of the Standby Gas Treatment System (SGTS). This item contained multiple issues of which the majority were addressed and closed in Inspection Report 259,260,296-88-05. With regard to the operability question on the relative humidity (RH) heaters, another surveillance test verifies proper performance of the low flow heater cutoff switch and a Design Change Notice (H 6140A) has been initiated to replace the relative humidity indicating controller. With regard to a suspicious temporary change to the flow calculations, the Plant Operations Review Committee (PORC) reviewed this issue as documented in meeting minutes 6349 and approved the change. To address this issue in total, the inspector witnessed the performance of SI 4.7.C, Secondary Containment Capability, performed on April 13, 1988, and found that the problems evident during the past performance had been acceptably addressed. This item is closed.

(CLOSED) Unresolved Item (259/84-53-01) and (CLOSED) Inspector Followup Item (260/296/85-15-08) and (OPEN) Inspector Followup Item (259/85-15-08), Limitorque Valve actuator inspection program. The history on this inspection program can be traced through, IE Circular 79-04, Inspection Reports 84-52, 85-53, 85-15, and 85-39. The concern surrounds proper installation and orientation of various Limitorque actuator components such as pinion gears, set screws, retaining rings and split rings, which if not properly installed have been shown through experience to create premature failures. The licensee initiated a 100% inspection program with independent verification of all emergency core cooling system (ECCS) valve actuators which are susceptible to this problem. On Unit 2, nine of the valves inspected needed some type of corrective action. All Unit 2 and Unit 3 valves have been inspected; however, some have not been released since motor changeout and pinion gear installation will be necessitated by the environmental qualification (EQ) program. The final check on pinion gear orientation will not occur until this maintenance is complete. Since this activity is controlled by detailed written instruction which depict proper gear orientation, these open items will be closed out for Unit 2 and Unit 3. The inspection program for Unit 1 has not yet started, therefore, the Unit 1 Inspector Followup Item 85-15-08 will remain open to track completion of the program for Unit 1.

(OPEN) Inspector Followup Item (260/86-40-05), Several Walkdown discrepancies and housekeeping problems in the Main Steam Valve Vault. The licensee presented a closure package for this item which included MRs generated by the plant to resolve the problems. The inspector toured the area on April 15, 1988, and found conditions still unacceptable. It was obvious from the material laying about that post work housekeeping inspections and routine periodic housekeeping inspections were ineffective. The following materials were noted; discarded rings of old valve packing material, loose nuts and bolts not under in-use material control, burned out light bulbs, nails, stripped wire insulation, strips

of banding material from removed pipe insulation, cotton rags, linen tags, poly bags, wads of used radiological control tape, ink pens, wire brushes, goggles, carpenters level, an empty bottle of "snoop" leak detector. A layer of dust and particulate material existed on the floor and all horizontal surfaces. In addition to the housekeeping, additional concerns were identified as follows:

a. A section of 4-inch pipe in the northwest corner of the room was being supported by a hand-operated chain hoist hanging from a ceiling lug in lieu of a hanger which was removed. This condition appeared to have been in place for years with no tags or other controls to identify the work necessary to repair the hanger.

b. The main steam tunnel blowout panels were rusted. The panel's protective coating had flaked off exposing about 90% of the bare metal. The metal exhibited so much corrosion that the wastage may need to be evaluated in light of the panel's secondary containment integrity function. CAQR 880293 was written to address blowout panel concerns.

c. The previously identified concern over missing paint of the main steam tunnel temperature element junction boxes has yet to be fixed.

d. The previously identified concern with graffiti has yet to be cleaned.

e. An abandoned wire rope sling, which was rusted to the point of being unusable, was found hanging from a structural member near TS-1-17D.

This item will remain open pending cleanup by the licensee and reinspection by the NRC prior to Unit 2 Restart.

(CLOSED) Inspector Followup Item (259/260/296/87-09-03), Residual Heat Removal Service Water (RHRSW) system maintenance instructions were inadequate to address vendor manual and operational requirements. The inspector noted that RHRSW pump maintenance over the past several years was excessive and could be potentially attributed to improper maintenance activities. A review of the governing maintenance instructions by the licensee confirmed that many deficiencies did exist. The licensee upgraded the applicable maintenance instruction to represent vendor recommendations. MCI-0-023-PMP002, (RHRSW/EECW Pump; Disassembly, Inspection, Rework and Reassembly Instruction) was updated on July 14, 1987, to incorporate the NRC concerns. Also, retaining nuts were added to the pump baseplates to prevent loosening due to vibration. This item is considered closed.

(CLOSED) Inspector Followup Item (259,260,296/84-41-01), Criteria for HPCI Walkdown Inspections. During an inspection of the High Pressure Coolant Injection (HPCI) system, the inspector identified that no criteria was specified in plant procedures for performance of walkdowns on HPCI system piping supports following an injection. As the result of this the

licensee committed to provide detailed instructions with checklist for walkdown inspections of HPCI following an injection.

The inspector reviewed the licensees response to the item and found the corrective actions adequate to address the inspector's concerns as stated in the original inspection report.

Browns Ferry Standard Practice 12.8, Unit Trip and Reactor Transient Analysis, has been revised to include a requirement for a HPCI Pedestal and pump discharge piping inspection by qualified personnel in accordance with SI-4.6.G, HPCI pump inspection. The inspection is to be performed by Mechanical Maintenance of Inservice Inspection personnel and documented by signing the scram/event report within 3 days following an inspection.

SI-4.6.G specifies the piping supports required for inspection and requires that the inspection be performed in accordance with DPM N8OE3 procedure N-VT-1, Inservice Visual Inspection which contains adequate inspection criteria. This item is closed.

4. Q-List Concerns (35003)

The inspector identified deficiencies with regards to the Q-list implementation program for Unit 2 (Unresolved Item 250/260/296/88-05-07) during the last monthly inspection. Additional meetings with licensee program managers were held during this inspection period. The licensee made the following commitments to bolster and improve the current Q-list implementation program. If properly implemented the inspector considers the additional actions adequate. The item will be left unresolved; however, to assure proper program completion and until a more thorough QA inspection in this area can be performed. The corporate organization responsible for Q-list implementation must assure the proper definition of equipment that is safety-related, important-to-safety, or limited-QA. These terms appear not to be well-defined or consistent with NRC definitions.

To fulfill the commitments in the NPP Volume III, the BFN Phase I Unit 2 Q-List is a listing of nuclear safety related components, systems, and structures. Some system components are only required for the mitigation of abnormal operating transients and special events. These components are not included in the Q-List because of the present Q-List definition. However, the following steps are being taken to alleviate the inspector concerns regarding those components.

a. A review of the Q-List Design Review File, the BFN Safe Shutdown Analysis, and the associated System Requirements Calculations shall be performed to determine the operating modes (and components) not included in the Q-List because they were required to function in the mitigation of abnormal operating transients and special events.

b. For those systems which have operating modes (and components) for the mitigation of abnormal operating transients and special events that

are determined not to be included on the Q-List because they are not safety-related, the system designations shall be compared to the BFN CSSC to determine that all systems originally specified on the CSSC are considered in this evaluation.

c. A comparative review and evaluation of components within the operating modes of steps 1 and 2 will be performed to reduce the total set due to any components that appear common to safety-related operating modes.

d. The set of components developed through step 3 will be added to the Q-List on a systematic revision basis with definition of limited QA program requirements.

e. A review of the general boundaries of the CSSC and the included operating modes of the SSA shall be performed to determine whether the Q-List for each system is enveloped by the CSSC. If not, CAQRs will be generated as appropriate.

f. Once all systems have been considered, as indicated in steps 1 through 5 above, Q-List procedures will be revised to indicate the Unit 2 Q-List will stand alone independent of the Unit 1 and 3 CSSC list.

5. Operational Safety (71707, 71710)

The inspectors were kept informed of the overall plant status and any significant safety matters related to plant operations. Daily discussions were held with plant management and various members of the plant operating staff.

The inspectors made routine visits to the control rooms when an inspector was on site. Observations included instrument readings, setpoints and recordings; status of operating systems; status and alignments of emergency standby systems; onsite and offsite emergency power sources available for automatic operation; purpose of temporary tags on equipment controls and switches; annunciator alarm status; adherence to procedures; adherence to limiting conditions for operations; nuclear instruments operable; temporary alterations in effect; daily journals and logs; stack monitor recorder traces; and control room manning. This inspection activity also included numerous informal discussions with operators and their supervisors.

General plant tours were conducted on at least a weekly basis. Portions of the turbine buil[illegible], each reactor building and outside areas were visited. Observations included valve positions and system alignment; snubber and hanger conditions; containment isolation alignments; instrument readings; housekeeping; proper power supply and breaker; alignments; radiation area controls; tag controls on equipment; work activities in progress; and radiation protection controls. Informal discussions were held with selected plant personnel in their functional areas during these tours.

6. Maintenance Observation (62703)

Plant maintenance activities of selected safety-related systems and components were observed/reviewed to ascertain that they were conducted in accordance with requirements. The following items were considered during this review: the limiting conditions for operations were met; activities were accomplished using approved procedures; functional testing and/or calibrations were performed prior to returning components or system to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; proper tagout clearance procedures were adhered to; Technical Specification adherence; and radiological controls were implemented as required.

Maintenance requests were reviewed to determine status of outstanding jobs and to assure that priority was assigned to safety-related equipment maintenance which might affect plant safety. The inspectors observed the below listed maintenance activities during this report period:

- RPS MG Set preventive maintenance

- Secondary Containment blowout panel periodic inspection

- RHRSW Dresser coupling replacements

The inspector observed Electrical Preventive Maintenance Instruction (EPI) EPI-0-099-M6-Z002, 6 Month Maintenance for RPS MG Set, performed on the 2A RPS MG Set on April 4, 1988. This is a preventive maintenance item which is a general clean, inspect and lubricate activity. The cleaning was limited to a wipe-down with lint-free cloths and a brushing of electrical components within the control panel. No vacuum cleaner was used even though the PM card listed a vacuum in the special equipment required section. After the maintenance was completed, a large quantity of dust and debris remained under the MG set mounting skid and throughout the room. Since excessive dust accumulation on the motor cooling vent screens and within the motor insulation has been determined to be the cause of motor failures by overheating, a more thorough cleaning of the area would be expected. While adding grease to the motor bearings, an excessive amount was required. One 12-ounce tube was used for 3 bearings. The cognizant engineer was contacted and agreed that a problem existed with the lack of instruction detail contained in the EPI. The problem was caused by failure to break away the hardened grease at the grease drain plug so that the new added grease could purge the old grease out through the drain hole. With the hole plugged, grease was forced out the sides of the bearing cavity and thus, the quantity of grease added was misleading. The cognizant engineer stated his intention to revise the EPI to provide more details on both cleaning and lubricating instructions.

As a result of both the inspectors concern and a licensee reportability evaluation for the year of 1987, the overall reliability of the RPS MG Sets was called into question. The failure trend was apparently on the

rise with both motor insulation failures and bearing failures being predominant. The licensee's maintenance organization performed a reliability study on April 4, 1988. Some of the failures were attributed to improper maintenance which necessitated rework and therefore were not counted against the reliability statistics. Bearing failures were attributed to end-of-life. A predictive monitoring program is being instituted to detect and repair impending bearing failures. The preventive maintenance program was revised to eliminate motor failures from overheating due to dust accumulation. The study concluded that overall, the RPS MG Set reliability has been good and activities either in progress or planned are expected to either maintain or improve on the current reliability statistics.

The inspector discussed the results of the recently completed blowout panel inspection with the cognizant engineer. This inspection is required once every 5 years per MMI-14. Problems were detected with the Main Steam tunnel blowout panels which serve a dual function. These panels are designed to "blow-out" in the event of a steam line rupture in order to prevent exceeding design differential pressures for the Reactor Building walls. In normal operation, the panels serve to maintain secondary containment integrity. The inspection found large gaps between the blowout panels and the supporting members. These gaps had been filled in with silicon RTV sealant within the past few years apparently to reduce the secondary containment inleakage. The amount of RTV used poses the potential to defeat the blowout function of the panels. No sealant should be present, only a gasket should exist between the panels and support members. Repair activities are labor intensive and must be coordinated during a time when secondary containment is not required. Resolution of this deficiency will be tracked as an Inspector Followup Item (260/88-10-01) to ensure completion prior to fuel load. CAQR 880293 was written to address these concerns.

7. Surveillance Testing Observation (61726)

The inspectors observed and/or reviewed the below listed surveillance procedures. The inspection consisted of a review of the procedures for technical adequacy, conformance to technical specifications, verification of test instrument calibration, observation on the conduct of the test, removal from service and return to service of the system, a review of test data, limiting condition for operation met, testing accomplished by qualified personnel, and that the surveillance was completed at the required frequency.

The inspector witnessed the performance of SI 4.7.C, Secondary Containment Integrity, performed on April 13, 1988. This was the first performance of the upgraded procedure and was being performed as a validation run as well as to support the secondary containment operability requirement for fuel reconstitution activities. One minor change was implemented as an immediate temporary change (ITC) during the conduct of the SI.

During Section 7.2? of the procedure, test switches are manipulated to provide Reactor Zone and Refuel zone isolations. Following this, the procedure requires that isolation dampers be checked closed. If the dampers are not closed, the procedure authorizes the performer to close the dampers and continue with the test. This sequence was apparently written to circumvent prior problems which occur if some of the associated ventilation fans are off. In this case, some of the dampers may not go closed on receipt of a test signal. This problem does not occur with the actual isolation logic. SI 4.7.C lacked any guidance to the performer so that an informed judgement could be made as to whether a problem existed and needed to be repaired if a damper was found not to close automatically upon receipt of the test signal. The system engineer agreed to add a clarifying statement in the next revision.

Another problem was noted with system configuration control. The system status file and control room panels both indicated by caution order and MR sticker that the power supply and transmitter for flow indicators FI-65-50 had been sent back to the manufacturer for repair. This indicator was used during the SI. The system engineer stated that a modification that was partially complete had installed a new transmitter and the flow indicator was functional. It was unclear how the operators would be made aware of this and how the operators would use this indication during operation of the SGTS System. OI-65 contains a section which requires operators to periodically monitor the system for normal operating parameters during operation. FI-65-50 is used by the operator to verify system flow rate is maintained at less than 12,000 cfm. The system engineer agreed to add an entry in the system status file which would clarify the status of the flow indicator.

8. Reportable Occurrences (90712, 92700)

The below listed licensee events reports (LERs) were reviewed to determine if the information provided met NRC requirements. The determination included: adequacy of event description, verification of compliance with technical specifications and regulatory requirements, corrective action taken, existence of potential generic problems, reporting requirements satisfied, and the relative safety significance of each event. The following licensee event reports are closed:

LER No.	Date	Event
84-13 Rev. 3	7/9/85	Limitorque motor pinion gear failure
87-02	3/13/87	Drywell Platform Steel
259/82-13	2/2/82	Setpoint Drift of Voltage Relays on 4KV Shutdown Boards

LER No. (cont'd)	Date	Event
259/84-30	9/23/84	Possible Block Wall Failure During a Tornado Due to Design Miscalculations of Loading
259/84-37	11/14/84	Reactor Protection System Wiring Error
259/85-04	2/23/85	Degradation of LPCI MG Set Generator Coil Clamps and Rectifier Rings
259/85-23	7/17/86	Switchyard Problems Lead to Reactor Scrams
259/87-28	10/8/87	Unplanned Containment Isolations Due to Inadequate Procedures
259/88-02	1/6/88	Engineered Safety Feature Actuation Due to Personnel Error During Switch Calibration
259/88-05	1/22/88	Diesel Generator and Emergency Equipment Cooling Water (EECW) Pump Actuation Due to Personnel Error
259/88-08	1/20/88	Standby Gas Treatment Relative Humidity Heaters Have Not Been Tested In Accordance With Technical Specifications Due to Inadequate Procedures
260/87-01	1/6/87	High Pressure Coolant Injection Valve Operator With Improperly Sized Worm Gear
260/87-05	7/25/87	Safety Relief Valve Setpoints Exceeded During Laboratory Testing

LER No. (cont'd)	Date	Event
260/87-09	9/11/87	Unplanned Reactor Water Cleanup Isolation Caused by Electrical Short Circuit
296/86-08	9/5/86	Shorted Generator Coil Reduces RHR Capability

LER 84-13 described various problems discovered with Limitorque valve actuators. This is the same concern tracked under Inspector Followup Item 259/85-13-08 in paragraph 4 of this report and the LER is therefore being closed.

LER 87-02 described the deficiency related to overstressing certain portions of drywell platform steel during a seismic event. The condition existed as a result of poor configuration control such that the as-built condition and as-described configuration differed substantially. The subsequent analysis of the as-built configuration revealed the over-stressed areas. This problem is being tracked in the Browns Ferry Nuclear Performance Plan under Section 3.8 and as an NRC Unresolved Item (259/260/296/86-14-03) pending resolution for each unit prior to each respective unit restart. The LER is therefore being closed to consolidate tracking items.

The setpoints of degraded voltage relays on the 4 KV shutdown boards drifted down 3 percent in 6 months after installation (LER 259/82-13). The drift was caused by initial aging and by variations in ambient temperature and supply voltage. The licensee replaced the relays with a more stable type of relay.

The interim measure for possible block wall failure during a tornado is to have selected interior doors blocked open in the event of a tornado (LER 259/84-30). These doors are identified in EPIP-18, Tornado Emergency Procedure. The long term resolution is being tracked under I.E. Bulletin 80-11, Masonry Wall Design.

The licensee Engineering and Design group discovered during a schematic review of the reactor protection system that nine wires were not run in conduit as required (LER 259/84-37). The wires were installed in conduit on all three units.

During a walkdown inspection the generator end of a low pressure coolant injection (LPCI) motor generator (MG) set was found to be overheated (LER 259/85-04). The problem was determined to be a diode failure caused by vibration of the rectifier ring. The coil clamps were also found degraded. The MG sets were upgraded to new metal diode discs and coil clamps.

Because switchyard problems lead to reactor scrams (LER 259/85-23) a periodic retraining course was developed and administered to all operations personnel. Caution signs were mounted in the capacitor switchyard to instruct operators on the proper method of switching. Walkdowns were performed on the control air system to repair any leakage.

The operators did not know that moving the radiation monitor, on the refuel floor, operating switch to Zero would cause various containment isolations (LER 259/87-28). The radiation monitoring system operating instruction and alarm response procedure were revised to provide a clearer understanding of instrument response. A critique of this event was provided to all operations personnel.

Four emergency equipment cooling water pumps were inadvertently started due to personnel error (LER 259/88-02). While returning a wire to its normal position it was allowed to momentarily contact an adjacent terminal. The craft personnel involved were cautioned to exercise extreme care when working with energized circuits. All instrument maintenance personnel were provided a critique on the event.

A potential transformer fuse compartment was opened for inspection causing the deenergization of a shutdown board and the start of a diesel generator and an EECW pump (LER 259/88-05). The personnel involved were counseled on the event. A critique of the event was provided to maintenance, modifications, operations, and engineering groups. The walkdown procedure was upgraded to include a planning review.

During a programmatic upgrade of surveillance instructions it was discovered that the surveillance instruction which tests the standby gas treatment relative humidity heaters did not full test the heaters as required by technical specifications for ANSI-N510-1975 (LER 259/88-08). The surveillance instruction was revised to fully incorporate the testing described in ANSI-N510-1975.

The high pressure coolant injection valve operator for 2FCV73-2 (LER 260/87-01) was regeared to a 60 to 1 gear ratio as required as on March 3, 1988.

The Unit 2 main steam safety relief valve setpoints were exceeded during laboratory testing (LER 260/87-05). The relief valves were refurbished, recertified, and placed in the system.

An unplanned reactor water cleanup system isolation was caused by a blown fuse when a lead from test equipment slipped out of the connection and created a short circuit which blew the fuse (LER 260/87-09). The craft personnel involved were counseled on the need for increased caution when working on energized equipment. A note was added to the maintenance procedure concerning short circuits.

A Unit 3 low pressure coolant injection (LPCI) motor generator (MG) set tripped from a shorted generator coil (LER 296/86-08). It was determined that the MG set tripped due to a random failure of the generator stator winding. The damaged generator was removed and sent to the manufacturer for repairs.

9. Restart Test Program

The inspector attended RTP status meetings, reviewed RTP test procedures, observed RTP Tests and associated tests performances, reviewed RTP Test results and attended selected Restart Operations Center (War Room) and Joint Test Group meetings. The following are the RTP activities and associated activities monitored and status of testing during this reporting period:

a. Restart Test Status

(1) RTP-023, Residual Heat Removal Service Water (RHRSW)

The north header outage of the system was completed and the south header was taken out of service for Dresser Coupling replacement at the intake structure. Section 5.9, of the test procedure requiring verification of proper operation of the RHRSW pump room sump pumps was completed. The level switches were calibrated and the sump pumps performed adequately. However, the licensee was not able to complete Section 5.5 of the procedure to demonstrate operability of the standby coolant valve, 2-FSV-23-56. The reason was that the Parts Request (PR) 88-1435 for this valve was moved between various organizations such as Mechanical Maintenance (MM), System Engineering (SYS ENG) and Department of Nuclear Engineering (DNE). This PR made several back and forth trips until it finally ended up with DNE. DNE will issue a Design Change Notice H 0161A to replace valve 2-FSV-23-56 with new valve.

(2) RTP-030, Diesel Generator and Reactor Building Ventilation (DG & RX BLDG VENT)

Section 5.8, Diesel Generator Room "3C" Exhaust Fans, was successfully completed. Additional testing of the system depends on the closeout of various Maintenance Requests, hold order released and interfaces with other test such as RTP-075, Core Spray and Surveillances.

(3) RTP-31A, Control Building Heating Ventilation and Air Conditioning (CONT BLDG HVAC)

During this reporting period the RTP Group decided to split RTP-31 into 31A and 31B in order to perform the overall system test more effectively. 31A will contain the Control Room

Emergency Ventilation power supply modification and those items required to support the Loss of Power/Loss of Coolant Accident series of tests.

(4) RTP-031B, Control Building Heating Ventilation and Air Conditioning (CONT BLDG HVAC)

This system will have the control room habitability issue, testing of flow rates and balancing, the control room pressurization test and the duct work modifications to verify. No LOP/LOCA items are in this system RTP Test.

(5) RTP-57-2, 120 Volt Distribution System (120 V DIST)

This test was recently approved for testing by the Joint Test Group (JTG) consequently no actual testing has been accomplished.

(6) RTP-57-4, 480 Volt Distribution System (480 V DIST)

Due to the extended testing of the diesel generators (DG) the RTP Group decided to test the load shed of the individual circuits rather than test them as a whole. A total of 118 individual circuits were identified to be tested and a total of 102 were tested. Of the remaining 16, twelve (12) will be tested in conjunction with the remaining DG testing. A total of four circuits require material and cannot be tested with the DGs.

(7) RTP-57-5, 4160 Volt Distribution System (4.16 KV DIST)

The additional testing of this system is dependent on the Special Tests being performed on all eight (8) Diesel Generators (DG). As the DGs become available for Load Acceptance Tests the various sections of this test will also be performed. See RTP-082 for additional interfacing.

(8) RTP-57-7, 250 Volt DC Shutdown Batteries (250 VDC S/D BATT.). The system testing was essentially completed with one significant test exception (TE) still outstanding which involved the "B" charger filter capacitor-resistor network. The TE is documented on CAQR BFP 880163. The 250 VDC S/D Batt. system restart test procedure was compiled, initially reviewed by the RTP Group and forwarded to DNE for review. A total of 14 TEs were identified and 3 CAQRs were written as a result of the testing. The CAQR's that were dispositioned involve the ripple voltage test, Test Acceptance Criteria 6.2 and Steps 5.2.26 through 5.2.32 of the RTP procedure. By correspondence, the ripple criteria was changed from .5% to 1%, thus the CAQR was no longer applicable.

(9) RTP-065, Standby Gas Treatment (SGTS)

Testing was virtually completed during this reporting period. One significant TE involving the stack effect was observed by the inspector and a CAQR was generated to address this issue.

(10) RTP-067, Emergency Equipment Cooling Water (EECW)

The north header outage and replacement of Dresser couplings was completed and the south header was taken out of service for replacement of Dresser couplings. The system was impacted by DCN 3549 issuance which addresses the thermowell issue. Testing will continue as equipment, especially chillers, become available.

(11) RTP-070, Reactor Building Closed Cooling Water (RBCCW)

JTG released this system for partial testing in order to support the LOP/LOCA Test. The testing involved Section 5.1, Operation from the Control Room, which included subsections 5.1.1 through 5.1.13, Section 5.2, operation outside the control room, which included subsections 5.2.7 through 5.2.18 and Section 5.4, which verified the start of RBCCW Pump B auto-start following a LOCA with diesel generator voltage available when RBCCW Pump A fails to start.

(12) RTP-075, Core Spray (CS)

System testing was impacted by ECN 3018 to replace the breakers for Flow Control valves 2-FCV-75-23, 25, 51 and 53. These valves are involved with the GE Loss of Coolant Accident Valve Time Study. The valves were modified; however, the electrical power breakers were not.

(13) RTP-082, Standby Diesel Generators (STDBY DG)

Special Test (ST) 8806 was attempted involving 1B DG. However, excessive vibration plus the need to replace the DG blower (supercharger) impacted the completion of this special test. The inspector was informed by the RTP group that the load acceptance test was being rewritten from an Surveillance Instruction (SI) to a ST. Upon review of the RTP procedures SDSP 12.1 and 12.2, it is not clear as to the use of ST's to meet the RTP Test requirements. This item is identified as Inspector Followup Item (IFI) 259,260,296/88-10-05, Performing Special Tests to Meet RTP Test Requirements.

b. Design Testing Observations

(1) Standby Gas Treatment System (SGTs) Smoke Generation Test

On April 12, 1988, the RTP Test Director for System 65, SGTS, attempted to generate a smoke test in order to visually observe the direction of air movement in the vent duct work. This activity was observed by a QC representative. This smoke generation was required by RTP Test Instruction 2-BFN-RTP-065, Section 5.12, Off-Gas Stack Effect, Step 5.12.8.1. Specifically, the smoke blowing test was an attempt to verify the existence of a draft caused by the SGTS trains forcing air up the stack and verify presence of negative pressure in the off-gas cubicle vent ductwork. The smoke blowing was not successful even after several attempts due to the fact that a positive pressure was present in the vent ductwork. This was verified when the smoke, rather than being sucked up into the vent duct work, blew away. The inspector accompanied the system engineer and the test director on a walkdown of the off-gas system and off-gas building ventilation ductwork because it ties into the off-gas cubicle vent ductwork inside the stack. Two fans were observed in the off-gas (System-066) building with one running and exhausting air from the building; the other fan was in standby condition. The test director and system engineer indicated that the exhaust fans in the off-gas building should have been addressed in the RTP. The inspector noted the RTP test director was not the original author of RTP-065. However, this is an example of an RTP test not adequately scoped prior to performance. Upon further evaluation it appears that when power is lost and stack effect is called upon to function, the effect would not only place a negative pressure on the off-gas cubicles located in the basement of the stack, but it also place a negative pressure inside the off-gas building as well. Further followup and review of the as-built ventilation installation in the off-gas building indicated an additional three (3) exhaust fans located in panels within the off-gas building. These exhaust fans in the building and in the panels were turned off and the smoke blowing was attempted again without success. This time it was determined that the positive pressure was being caused by air flowing back down the stack, therefore no stack effect existed. This is identified as Inspector Followup Item 259,260,296/88-10-02, Lack of Stack Effect for Anticipated Air Circulation using Smoke Medium.

(2) RTP and Operations Interface

(a) While the inspector was observing the performance of RTP-065 SGTS, Section 5.2, Secondary Containment Draw Down With Two SGTS Trains, the RTP Test Director was informed by the Assistant Shift Operations (ASO) Supervisor that the

test would have to be terminated and all components returned to normal status. Subsection 5.2.7 had already been completed which required the lifting of leads in control room panels in order to lock in the isolation of secondary containment signal and a complete restoration had to be performed on this subsection. The ASO supervisor was asked why Section 5.2 had to be terminated and the answer involved a safety question with Operations Instructions OI-65, Standby Gas Treatment System, which concerned the stack dilution fans. The position taken by the ASO supervisor appeared to be that the RTP test could not override an OI, even though in this case the RTP Test did not reference the OI-65 or require the dilution fans to be operable or operating. The Operations Superintendent was informed of this conflict. The situation was resolved and the RTP test section was completed that day.

(b) It was brought to the attention of the inspector that while RTP-030, Diesel Generator Building and Reactor Building Ventilation System (DG & RX BLDG VENT), Sections 5.2 through 5.9, DG Rooms Exhaust Fans, were being performed a request was made of the Shift Operations Supervisor (SOS) that a specific Diesel Generator monthly SI be performed in conjunction with the specific RTP Test Section. This request was apparently granted. However, later in the shift the RTP Test director noted that the SI was in progress and the SOS had not notified the Test Director of the change in plans. The RTP missed an opportunity to perform a specific test section and would have to wait another month to perform the affected test section.

In observing the RTP and operations personnel interface during RTP testing, the inspector noted that there was a lack of understanding of the Restart Test Program by the incoming Senior Reactor Operators. This is identified as an Inspector Followup Item (IFI) 259, 260,296/88-10-03, lack of understanding of the Restart Test Program by on shift senior personnel.

10. Personal Dosimetry (83724)

The inspector observed reading of TLDs during the quarterly processing on April 1, 1988. The Browns Ferry program has been judged acceptable by the National Voluntary Laboratory Accreditation Program (NVLAP) per National Bureau of Standards (NBS) criteria. During this review, the inspector spot-checked various requirements of DSIL 12, Operation of the Automatic Panasonic Model UD-710 Reader, reviewed trend charts which visualize display equipment performance history, and verified operator reading files were current for the individuals reading TLDs. Adequate management involvement was apparent throughout the program as evidenced by the onsite presence of the corporate manager.

11. Fuel Reconstitution (60710)

On March 23, 1988, the licensee submitted a proposed fuel inspection and reconstitution program. The purpose of the program was to improve fuel reliability with a goal of zero fuel failures during the next operating cycle. The process is to be controlled as a special test per 10 CFR 50.59. The licensee's safety evaluations concluded that no Unreviewed Safety Questions exists; however, operability questions with non-seismically qualified secondary containment penetrations and an unanalyzed in-leakage question with the Control Room Emergency Ventilation (CREV) system necessitated a concurrence by the NRC. On April 11, 1988, the NRC found the proposal acceptable. In preparation for the reconstitution activity, the following activities were inspected:

a. SI 4.7.C, Secondary Containment Integrity, was witnessed.

b. The upgraded maintenance instruction for the refueling platform was reviewed (MMI-34).

c. Reviewed selected CAQRs on the required systems such as the CREV bypass flow problem (CAQR No. BFP 870591) and lack of a calculation to document the safety limit and instrument setpoint for the control room isolation function (CAQR No. BFP 870876).

d. Reviewed the Temporary Alteration Control Form (TACF) files.

e. Reviewed the PORC meeting minutes and attended PORC meetings where the special test was discussed.

f. Reviewed the failure evaluation on the Refuel Floor overhead crane bolts.

g. Reviewed the detailed step-by-step fuel reconstitution instructions and interviewed contractor personnel regarding actions taken or planned to minimize the potential for repeat occurrences of individual rod drops and loss of loose parts.

h. Reviewed, on a sampling basis, outstanding Maintenance Requests (MR's) on the required systems.

i. Discussed with Radiological Controls personnel the augmented Rad Con coverage and the ALARA preplan.

j. Reviewed the accidental criticality analysis and the revised accidental criticality analysis.

k. Reviewed the calculation which supported the safety evaluation conclusion that the CREV system was not needed to protect the operator from overexposure in the unlikely event of a fuel handling accident.

l. Reviewed Surveillance Instruction for the required system which are only required to be performed once per operating cycle to ensure each had been completed within the last 18 months.

m. Made weekly and in most cases daily tours of the refuel floor.

n. Reviewed outstanding LERs and NRC open items to determine the need for expedited closeout.

o. Reviewed the licensee's System Operability Evaluation Reports which provide the necessary justification for considering the required systems operable in light of any partially completed modifications, outstanding MRs, adverse findings of the Design Baseline Verification Program, Restart Test Program, and other conditions adverse to quality. Additional emphasis was placed on any special operational constraints or compensatory measures required in order to consider the systems as operable in light of any outstanding problems. Examples of this type of activity are the temporary installation of jumpers to prevent CREV load shed in the event of offsite power loss, jumpering out auto-start of the Residual Heat Removal (RHR) pump, and tagging closed certain Emergency Equipment Cooling Water (EECW) valves.

One significant problem was detected with the licensee's program submittal of March 23, 1988. In the Control Room Emergency Ventilation System (CREV) section of Enclosure 1, the licensee stated that "a calculation has been performed to evaluate the effects of the increased unfiltered inleakage." The results of this calculation were used in the submittal to conclude that the CREV system was not needed to mitigate an accident during the fuel reconstitution activities. The inspectors review of the calculation (ND-N0079-88013) showed that the calculation was not approved and issued for use until two days after the licensee's submittal. The information in the submittal was therefore based upon a draft calculation without explicitly identifying it as such. In fact, some of the second party checks of the calculation were not even performed until March 25, 1988 (two days after the licensing submittal). This issue was discussed with Site Licensing and Corporate Licensing personnel who assured the inspector that the policy is not to use draft information in NRC submittals and that a verification program is in development that should minimize the potential for recurrence of this problem. The inspector reviewed PMP 0602.01, Management of TVA's Interface With the Nuclear Regulatory Commission, which details the responsibilities and requirements for the preparation of licensing documents. This procedure was found to lack any requirement or guidance on the use of draft information in the preparation of licensing submittals. This deficiency appears to be a violation of Technical Specifications 6.8.1.1.j. which requires that administrative procedures be established that control technical and cross-disciplinary review (Violation 260/88-10-04).

Unit 2 Fuel reconstitution activities began on April 28, 1988.

12. Exit Interview (30703)

The inspection scope and findings were summarized on May 2, 1988, with the Plant Manager and/or Superintendents and other members of his staff. New items identified:

a. Inspector Followup Item (260/88-10-01) Main Steam Tunnel Blowout Panel deficiencies. Paragraph 6.

b. Inspector Followup Item (259,260,296/88-10-02) Lack of Stack Effect for Standby Gas Treatment System. Paragraph 9.b.(1).

c. Inspector Followup Item (259,260,296/88-10-03) Restart Test Program Awareness by Senior Personnel on Shift. Paragraph 9.b.(2).

d. Violation (260/88-10-04) Failure to Establish Procedures to Adequately Control Technical and Cross Disciplinary Review as Required by T.S. 6.8.1.1.j. Paragraph 11.

e. Inspector Followup Item (259,260,296/88-10-05) Performing Special Tests to Meet RTP Test Requirements. Paragraph 9.a.(13).

The licensee acknowledged the findings and took no exceptions. The licensee identified certain material associated with the fuel reconstitution procedures (e.g., visual examination standards, drawings for special tools, etc.) as being General Electric Proprietary Information. On May 25, 1988, the NRC notified TVA that Item d. above had been upgraded from an inspector followup item to a violation.

13. Acronyms and Abbreviations

ASO -	Assistant Shift Supervisor
BFN -	Browns Ferry Nuclear
CAQR -	Condition Adverse to Quality Report
CREV -	Control Room Emergency Ventilation
CS -	Core Spray
CSSC -	Critical Structures, Systems, and Components
DG -	Diesel Generator
DNE -	Department of Nuclear Engineering
ECN -	Engineering Change Notice
EECW -	Emergency Equipment Cooling Water
EPI -	Electrical Preventive Maintenance Instruction
EQ -	Equipment Qualification
FI -	Flow Indicator
HPCI -	High Pressure Coolant Injection
HVAC -	Heating Ventilation and Air Conditioning

LER - Licensee Event Report
LOP/LOCA - Loss of Power/Loss of Coolant Accident
LPCI - Low Pressure Coolant Injection
MG - Motor Generator
MR - Maintenance Request
OI - Operating Instructions
PORC - Plant Operations Review Committee
QA - Quality Assurance
RBCCW - Reactor Building Closed Cooling Water
SGTS - Standby Gas Treatment System
RHR - Residual Heat Removal
RHRSW - Residual Heat Removal Service Water
RPS - Reactor Protection System
RTP - Restart Test Program
RWCU - Reactor Water Cleanup
SDSP - Site Director Standard Practice
SI - Surveillance Instruction
SOS - Shift Operations Supervisor
TR - Temperature Recorder
TS - Technical Specifications