



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

Report Nos.: 50-259/85-39, 50-260/85-39 and 50-296/85-39

Licensee: Tennessee Valley Authority  
 500A Chestnut Street Tower II  
 Chattanooga, Tennessee 37401

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

Facility Name: Browns Ferry 1, 2, and 3

Inspection Conducted: July 27 - August 19, 1985

Inspectors:	<u><i>A. L. Johnson for</i></u>	<u>8/30/85</u>
	G. L. Pauk, Senior Resident	Date Signed
	<u><i>A. L. Johnson for</i></u>	<u>8/30/85</u>
	C. A. Paterson, Resident	Date Signed
	<u><i>A. L. Johnson for</i></u>	<u>8/30/85</u>
	C. R. Brooks, Resident	Date Signed
	<u><i>A. L. Johnson for</i></u>	<u>8/30/85</u>
	S. D. Stadler, Inspector	Date Signed
Approved by:	<u><i>F. S. Cantrell</i></u>	<u>8/30/85</u>
	F. S. Cantrell, Section Chief	Date Signed
	Division of Reactor Projects	

SUMMARY

Scope: This routine inspection involved 150 resident inspector-hours in the areas of operational safety, maintenance observation, reportable occurrences, surveillance observation, TMI action item, licensee action on previous enforcement items, and unresolved items.

Results: One Violation - Technical Specification 6.3.A.1 for failure to have an adequate procedure to cover operation of the Standby Gas Treatment (SBGT) System charcoal bed heaters and failure to use an updated procedure which covered operation of the heaters.

One Deviation - Final Safety Analysis Report, section 5.3.3.7 for not having a low temperature alarm on the SBGT system charcoal bed heaters.

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## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

J. A. Coffey, Site Director  
R. L. Lewis, Plant Manager (Acting)  
J. E. Swindell, Superintendent - Operations/Engineering  
T. D. Cosby, Superintendent - Maintenance  
J. H. Rinne, Modifications Manager  
J. D. Carlson, Quality Engineering Supervisor  
D. C. Mims, Engineering Group Supervisor  
R. McKeon, Operations Group Supervisor  
C. G. Wages, Mechanical Maintenance Supervisor  
J. C. Crowell, Electrical Maintenance Supervisor (Acting)  
R. E. Burns, Instrument Maintenance Supervisor  
A. W. Sorrell, Health Physics Supervisor  
R. E. Jackson, Chief Public Safety  
T. L. Chinn, Senior Shift Manager  
T. F. Ziegler, Site Services Manager  
J. R. Clark, Chemical Unit Supervisor  
B. C. Morris, Plant Compliance Supervisor  
A. L. Burnette, Assistant Operations Group Supervisor  
R. R. Smallwood, Assistant Operations Group Supervisor  
S. R. Maehr, Planning/Scheduling Supervisor  
G. R. Hall, Design Services Manager  
W. C. Thomison, Engineering Section Supervisor  
A. L. Clement, Radwaste Group Controller -

Other licensee employees contacted included licensed reactor operators, auxiliary operators, craftsmen, technicians, public safety officers, Quality Assurance, Design and engineering personnel.

### 2. Exit Interview (30703)

The inspection scope and findings were summarized on August 2 and 19, 1985, with the Plant Manager and/or Assistant Plant Managers and other members of his staff.

The licensee acknowledged the findings and took no exceptions. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

### 3. Licensee Action on Previous Enforcement Matters (92702)

(Closed) Unresolved (259/260/296/85-36-03) The charcoal bed heaters are the subject of the violation and deviation in this report. This item is closed.

4. Unresolved Items\* (92701)

There are two unresolved items covered in paragraph five and eleven.

5. Operational Safety (71707, 71710)

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

The inspectors made frequent visits to the control rooms such that each was visited at least daily 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 building, 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; radiation protection controls adequate; vital area controls; personnel search and escort; and vehicle search and escort. Informal discussions were held with selected plant personnel in their functional areas during these tours. Weekly verifications of system status which included major flow path valve alignment, instrument alignment, and switch position alignments were performed on the source range monitors and SBT systems.

A complete walkdown of the accessible portions of the SBT system was conducted to verify system operability. Typical of the items checked during the walkdown were: lineup procedures match plant drawings and the as-built configuration, hangars and supports operable, housekeeping adequate, electrical panel interior conditions, calibration dates appropriate, system instrumentation on-line, valve position alignment correct, valves locked as appropriate and system indicators functioning properly.

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\*An Unresolved Item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.



All three units remained shutdown during this period. Unit One fuel off-load commenced on August 16, 1985.

a. Reactor Building Flooding

During a routine tour of the unit one reactor building torus area on July 31, 1985, the inspector observed several inches of water on the floor of the northwest corner room. Water was spraying down from the next higher elevation from the control rod drive (CRD) pumps. Access to the corner room was not restricted in any manner. One of the CRD pumps was running and was observed to have a severe packing leak. The CRD pump was being used to adjust water levels prior to removing the refueling gate. The unit operator was contacted who stated personnel were being dispatched to the area.

Later, it was learned that the flood level switch located six inches off the floor had alarmed in the control room. This is one of the same flood level switches for which a deviation was given for the switches not being fully operable nor seismically mounted. (Report 85-36). The inspector notified the plant manager of his concerns and corrective action was promptly taken.

b. SBTG Charcoal Bed Heater Problems

The inspector continues to track concerns over the apparent lack of understanding of how the Standby Gas Treatment (SBGT) System charcoal bed heaters operate and general preventive maintenance of them. As discussed in Licensee Event Report (LER) 259/85-29, it was previously not known that the SBTG charcoal bed heaters needed to be reset after the SBTG system was secured. However, this information was available on Final Safety Analysis Figure 5.3-9, note six which describes the manual reset. This is a violation of Technical Specification 6.3.A.1 in that plant procedures did not address the manual reset to insure heater operation. This violation was discussed in an exit meeting with plant management on August 19, 1985. (259, 260, 296/85-39-01).

After plant procedures were revised as discussed in LER 259/85-29, an operator was questioned if the heaters had been reset or were operating properly. This could not be determined as no log readings are taken nor is the SBTG room routinely checked on the operator rounds sheet.

Each train of heaters is thermostatically controlled at 125 degrees F. If the temperature reaches 150 degrees F., a temperature switch interrupts power to the heater and alarms in control room. The temperature switch must be locally reset in the SBTG room. Train C only has an additional safety switch set at 450 degrees F. which must be locally reset. No temperature indication is provided directly for the charcoal beds. Local and remote temperature indication is provided at the outlet of the bed eighteen inches away from the bed.

The inspector reviewed Final Safety Analysis Report (FSAR) page 5.3-21 and found that it stated the charcoal bed temperature is thermostatically controlled with high and low temperature alarms in the Main Control Room. A review of the control circuit with plant personnel found no low temperature alarm. A low alarm would have indicated the system was not operating. This is a deviation from FSAR section 5.3.3.7, Standby Gas Treatment System for failure to have a low temperature alarm for the charcoal bed temperature. This deviation was discussed in an exit meeting on August 19, 1985. (259, 260, 296/85-39-02).

In an attempt to determine the status of the charcoal bed heaters the following problems were identified:

Train C -

- (1) On August 2, 1985, four of six, 750 watt heaters were found burned out. Temperature switch TS-65-63B (450 deg.) had one set of contacts which are in line with the heater power were welded closed. The annunciator in the control room was alarming but the red run light was still indicating the heaters were energized. This led to the heater burnout.
- (2) Temperature switch TS-65-63B had previously been replaced on July 6, 1985 as indicated in LER 259/85-28. Closer evaluation of the heaters indicated the design was wrong. The heaters are located in a pipe at the bottom of the filter bank. (Train A and B heaters are distributed throughout the charcoal bed.) The sensor for TC-65-63 (125 deg.) and TS-65-63A (150 deg.) are located on the opposite side of the charcoal beds and near the top of the filter bank. The TS-65-63B sensor was located directly on the heater pipe. Apparently the heaters would come on and due to the location, the 450 deg. switch would be tripped prior to the other controller or switch sensing heat from the heaters. Prior to the contacts being welded shut the only way to have the heaters remain operable was to locally reset the heaters after the temperature reached 450 degrees F. This fact was not common knowledge at the plant. The local reset is inside a cabinet in the SBTG room and is not labeled on the outside of the cabinet. The heater controls could not be made to function correctly.

Train B -

The temperature control bulb (125 deg.) was found not securely mounted and dangling next to the charcoal bed. The response of the controller was believed to be erratic depending on the position of the bulb.

Train A -

During performance of surveillance instruction on August 4, 1985, TS 65-14 (150 deg.) was found inoperable.



The licensee delayed fuel off-load of unit one until problems with the heaters were resolved. On August 8, 1985, a licensee evaluation determined that operation of the SGBT system with the relative humidity heaters on for ten hours a month ensures no moisture buildup in the charcoal beds. This operation is discussed in NRC Regulatory Guide 1.52 and plant surveillance instruction SI 4.7.B-10 implements this.

The evaluation stated that similar charcoal bed heaters at Sequoyah and Watts Bar nuclear plants had been deenergized because of a potential for a malfunction of the heaters causing a fire in the absorber bed. This information had not been relayed to Browns Ferry. The inspector requested from plant management when the information was known at the other TVA facilities. This will remain an unresolved item for further review and evaluation. (259, 260, 296/85-39-03).

#### 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:

- a. SGBT Charcoal bed heater repair.
- b. Rework of various hangers and supports incorrectly designed under bulletins 79-02 and 79-14.
- c. Refuel activities.
- d. Cable spreading room support inspections.

There were no violations or deviations in this area.

#### 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.

- a. SI 4.7.B-10 - SBT System Train Operation With Heater On
- b. SI 4.7.B-2 - SBT Humidity Control Capacity Test
- c. SI 4.7.B-4 - SBT High Efficiency Particulate Activity Test
- d. SI 4.7.B-5 - SBT Charcoal Halogenated Hydrocarbon Testing
- e. SI 4.7.B-6 - Iodine Removal Efficiency
- f. SIL-40 - Operation Section Instruction Letter, Surveillance Instruction
- g. SI 4.7.B-1 - SBT Operability Test (see below)

During a routine tour of the control room on July 30, 1985, the inspector found a surveillance procedure being used which did not contain a recent change concerning the charcoal bed heaters. Surveillance Instruction SI 4.7.B-1, Standby Gas Treatment Operability Test, was being used which did not contain a change dated July 7, 1985, which required the charcoal bed heaters to be reset after system shutdown. The controlled copy of the instruction in the control room contained the change but copies of the instruction in a file drawer did not. Operations personnel are instructed by operations section Instruction Letter SIL-40 to compare page by page the file drawer copy to the controlled copy to ensure the latest revision is being used. However, no signature verification or otherwise is required to indicate this has been accomplished.

A review of completed SI 4.7.B-1 procedures since the change of July 7, 1985, revealed three out of ten times no change had been entered into the procedure. The dates of performance are listed below:

7-07-85; Changed  
 7-07-85; Changed  
 7-08-85; Changed  
 7-09-85; Changed  
 7-09-85; Changed  
 7-11-85; No Change  
 7-12-85; Changed  
 7-13-85; Changed  
 7-25-85; No Change  
 7-25-85; No Change

This is the second example of the violation against Technical Specification 6.3.A.1 (259, 260, 296/85-39-01). In an exit meeting on August 19, 1985, plant management was informed of the violation.



## 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. Additional in-plant reviews and discussion with plant personnel, as appropriate, were conducted for those reports indicated by an asterisk. The following licensee event reports are closed:

<u>LER NO.</u>	<u>Date</u>	<u>Event</u>
*259/85-37	7-18-85	Containment Isolation Because of a Blown Fuse
*259/85-35	7-10-85	Secondary Containment Isolation from a High Radiation Alarm.
*259/85-29	6-28-85	Procedural Deficiency - Controls Necessary to Ensure Operability of the Standby Gas Treatment System Charcoal Heaters
*259/85-28	7-06-85	Loss of Standby Gas Treatment System

The inspectors reviewed LER 259/85-28 and noted the problem with the 'C' train charcoal bed heater high temperature cutout switch (450 deg. F.) was more than a switch drift. The design problem with the 'C' train is discussed in paragraph five.

## 9. TMI Action Items

The following action item was reviewed by the inspector during this report period:

II.K.3.28, Qualification of Accumulators on Automatic Depressurization System (ADS) Valves. This item requires the licensee to address two separate concerns on short-term and long-term operability requirements for the ADS valves and accumulators. In a letter from NRR to TVA on July 24, 1985, on this item, NRC found that the modifications committed to be completed on the ADS system is satisfactory. This item will be inspected for long-term operability modifications during future inspections.

## 10. Licensee Action on Previous Enforcement Matters

The inspector reviewed a number of open items from Inspection Report 84-52 regarding failures of Limitorque valve operator failures. The licensee's corrective actions were detailed in commitments at the exit interview, a Response Letter to violation 50-259, 260, 296/84-52 dated February 13, 1985 and a Supplemental Response Letter dated June 20, 1985. The licensee has substantially upgraded the maintenance and electrical procedures applicable



to Limatorque operators to ensure proper installation of the motor pinion gears; and require inspection of these gears during preventative maintenance. In addition, a comprehensive three-day Limatorque Valve Actuator Course has been established at the site for maintenance personnel. As part of this course, Limatorque operators are utilized to provide hands-on training in maintenance, repair, and inspection. At the time of this inspection, approximately 80 percent of the maintenance personnel responsible for Limatorques had completed this training course. The licensee has also completed a 100 percent inspection of Limatorque operators on safety related valves to ensure proper pinion gear orientation and pinon gear set screw tightness.

(Closed) Violation 259, 260, 296/84-52-01: The licensee has revised procedures and increased training to help control assembly of Limatorque operators and has inspected all safety related Limatorque valve operators.

(Closed) Inspector Followup Item 259, 260, 296/84-52-02: Independent verification and sign off for correct installation of the Limatorque valve operator motor pinion gear has been added to Maintenance Procedure MMI-87.

(Closed) Inspector Followup Item 259, 260, 296/84-52-03: Inspection of the Limatorque motor side gearbox and pinion gear has been added to the preventive maintenance section of Maintenance Procedure MMI-87.

(Closed) Inspector Followup Item 259, 260, 296/84-52-04: The direct current (D.C.) Limatorque operators for primary containment isolation valves have been added to the Outage Shunt Field Inspection Program.

#### 11. General Electric Reports

The inspector reviewed a number of reports written on Browns Ferry safety related systems. These reports were generated as a result of a TVA initiative to have General Electric (GE) perform detailed engineering analysis of these systems and the applicable operating and surveillance procedures.

Included within the scope of these reviews were the following:

- a. Vendor manuals
- b. FSAR
- c. GEK's
- d. Technical Specifications
- e. Design specifications
- f. System walkdowns
- g. System Information Letters (SILs) and Product Experience Reports (PERs)

h. Operating procedures

- correct equipment operation
- agreement with design intent
- agreement with references
- changes that the Operations Department would like to make
- controlling parameters

i. Surveillance procedures

- review only procedures performed by operations
- review for operational correctness and conformance with design and technical specifications intent

j. Reactor Protection System (RPS) trip history review and analysis

Excluded from the scope of these GE systems evaluations were the following areas:

- a. Abnormal operation procedures
- b. Commitment compliance
- c. Procedure setpoint verification
- d. INPO SOERs and NRC Information Notices and Bulletins
- e. Identification of changes required to other procedures or a result of GE recommendations
- f. Compliance of recommended changes to administrative requirements
- g. Identification of training required or a result of GE recommendations

The inspector's review of these GE system and procedure reports indicated that they were well done and very comprehensive. Each report is subdivided into several sections including recommended procedure revisions, walkdown results, operator comments, SIL and PER status, FSAR change recommendations, and an overall summary of major recommendations. The procedure change recommendations were numerous for most systems, including procedural steps that would not work as written, and the addition of entire sections to surveillance procedures. Although not specifically required within the scope of the TVA-GE contact, several of the engineers also conducted very detailed walkdown of their assigned systems. A number of deficiencies were noted on these walkdowns, particularly on the offgas system. Examples of the deficiencies included broken instruments, pegged high differential indicators, missing valve handles, improper equipment installation, missing or improper labeling, personnel safety hazards, and burned out indicating lamps. The inspectors expressed a concern for the status of safety related systems which were not walked down to the extent the offgas system.





The inspector encountered substantial difficulty in determining who was coordinating the overall resolution to GE recommendations and identified deficiencies, the status of each item, how the numerous deficiencies and recommendations were being tracked and how these results were being integrated into the many on-going Browns Ferry programs including RPIP, Operational Readiness Assessment, Configuration Management, the Backwork Taskforce, etc. To help ensure that each GE identified concern or recommendation receives adequate consideration, whether incorporated or rejected, it would seem beneficial to assign a unique identifier, a responsible individual, and a due date for each item. This would allow tracking and is of particular importance where safety issues are invalid, or where the item is considered necessary for Unit 2 restart. Another area of concern was the massive procedure changes recommended by GE including 63 on the HPCI operating procedure. With this number of changes, the procedures may require testing and additional operator training prior to restart of Unit 2. The inspector was also concerned that since a large number of plant groups and individuals are apparently responsible for determining whether these GE recommendations are incorporated, therefore, the safety consideration for recommendations not utilized should be considered and reviewed by plant management.

Because these systems involved in the GE study are safety related, and there are potential procedural, technical specification, and equipment deficiencies noted, the resolution of these reports will be carried as an unresolved item 259, 269, 296/85-39-04. The licensee stated at the exit interview that a coordinator for the GE systems and procedure reports had been appointed. The licensee also committed to conduct a PORC review of all GE recommendations not adopted.

