



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

Report Nos.: 50-259/91-06, 50-260/91-06, and 50-296/91-06

Licensee: Tennessee Valley Authority  
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Docket Nos.: 50-259, 50-260, and 50-296

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

Facility Name: Browns Ferry Units 1, 2, and 3

Inspection at Browns Ferry Site near Decatur, Alabama

Inspection Conducted: February 16, 1991 - March 15, 1991

Inspector: *Paul Kellogg for* 4/9/91  
 C. A. Patterson, Senior Resident Inspector Date Signed

Accompanied by: E. Christnot, Resident Inspector  
 W. Bearden, Resident Inspector  
 K. Ivey, Resident Inspector  
 G. Humphrey, Resident Inspector  
 R. Bernhard, Project Engineer  
 M. Branch, Senior Resident Inspector  
 Watts Bar

Approved by: *Paul Kellogg* 4/9/91  
 Paul Kellogg, Section Chief Date Signed  
 Inspection Programs,  
 TVA Projects Division

SUMMARY

Scope:

This routine resident inspection included surveillance observation, maintenance observation, unit separation, operational safety verification, area walkdowns, system pre-operability checklist, essential design calculations, TMI Action Items, reportable occurrences, action on previous inspection findings, and Bulletins.

**Results:**

Unit 2 fuel loading was completed during this period, paragraph 5. The details of the refueling activities are covered in Inspection Report 91-07.

A violation was identified for failure to maintain a system drawing, paragraph 7. Fire isolation dampers were not indicated on the primary flow drawing for the 480 Volt 2A and 2B Shutdown Board Rooms. The System 31, Control Bay Heating, Ventilation, and Air Conditioning, return to service review was completed on February 19, 1991, but did not identify or correct these problems.

An unresolved item was identified concerning inadequate cooling of the Reactor Protection System motor generator set, paragraph 7. Despite several memorandums and design engineering increasing the temperature limit, the doors to the motor generator room periodically must be opened to provide ample cooling. This problem still exists although the ventilation system was declared operable for fuel load and all ventilation flow balancing was completed.



## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees:

- \*O. Zeringue, Site Director
- L. Myers, Plant Manager
- \*M. Herrell, Operations Manager
- J. Rupert, Project Engineer
- R. Johnson, Modifications Manager
- \*M. Bajestani, Technical Support Manager
- R. Jones, Operations Superintendent
- A. Sorrell, Maintenance Manager
- G. Turner, Site Quality Assurance Manager
- \*P. Carier, Site Licensing Manager
- \*P. Salas, Compliance Supervisor
- J. Corey, Site Radiological Control Manager
- R. Tuttle, Site Security Manager

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

#### NRC Personnel

- \*C. Patterson, Senior Resident Inspector
- \*E. Christnot, Resident Inspector
- \*W. Bearden, Resident Inspector
- \*K. Ivey, Resident Inspector
- G. Humphrey, Resident Inspector
- M. Branch, Senior Resident Inspector, Watts Bar
- R. Bernhard, Project Engineer

\*Attended exit interview

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

### 2. Surveillance Observation (61726)

The inspectors observed and reviewed the performance of required SIs. The inspections included reviews of the SIs for technical adequacy and conformance to TS, verification of test instrument calibration, observations of the conduct of testing, confirmation of proper removal from service and return to service of systems, and reviews of test data. The inspectors also verified that LCOs were met, testing was accomplished by qualified personnel, and the SIs were completed within the required



frequency. Inspectors observed portions of several performances of 2-SI-4.10.B, Demonstration of Source Range Monitor System Operability During Core Alteration, during Unit 2 fuel loading operations. The performance observed included FLCs and permanently installed SRMs. No deficiencies were identified.

No violations or deviations were identified in the Surveillance Observation area.

### 3. Maintenance Observation (62703)

Plant maintenance activities were observed and reviewed for selected safety-related systems and components to ascertain that they were conducted in accordance with requirements. The following items were considered during these reviews: LCOs maintained, use of approved procedures, functional testing and/or calibrations were performed prior to returning components or systems to service, QC records maintained, activities accomplished by qualified personnel, use of properly certified parts and materials, proper use of clearance procedures, and implementation of radiological controls as required.

Work documentation (MR, WR, and WO) were reviewed to determine the 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 following maintenance activities during this reporting period:

- a. HPCI Pedestal Realignment
- b. Main turbine bearing replacement

No violations or deviations were identified in the Maintenance Observation area.

### 4. Unit Separation

The inspectors continued to review the licensee's activities in the area of Unit 2 separation from the non-operating units. The inspectors observed and reviewed the licensee's color coded drawings, the proposed installation of barriers, and the installation of orange colored tape in Unit 1 Raw Cooling Water System which is needed to support Unit 2 operations. The inspector also reviewed the work scope proposed for Bechtel. This scope was divided into two general areas:

- Bechtel will prepare a calculation listing Unit 1 and Unit 3 components and associated requirements, as needed to support Unit 2 safe shutdown.
- Bechtel will review the color-coded interface drawings to be prepared by TVA and verify that the drawings agree with the calculation.



The inspector also reviewed the detailed scope description. As of this reporting period Bechtel had received 711 drawings, completed 239 and returned 209 drawings back to BFN for comment resolution. Approximately 900 to 1000 drawings are involved with this effort. From these reviews and previous reviews the inspector has determined that this is an extensive effort, requiring considerable resources and is being performed in a controlled and documented manner.

5. Operational Safety Verification (71707)

The NRC inspectors followed 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. Inspection observations included instrument readings, setpoints and recordings, status of operating systems, status and alignments of emergency standby systems, verification of onsite and offsite power supplies, emergency power sources available for automatic operation, the purpose of temporary tags on equipment controls and switches, annunciator alarm status; adherence to procedures, adherence to LCOs, nuclear instruments operability, 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 supervisors.

General plant tours were conducted. Portions of the turbine buildings, each reactor building, and general plant areas were visited. Observations included valve position and system alignment, snubber and hanger conditions, containment isolation alignments, instrument readings, housekeeping, power supply and breaker alignments, radiation and contaminated area controls, tag controls on equipment, work activities in progress, and radiological protection controls. Informal discussions were held with selected plant personnel in their functional areas during these tours.

a. Refueling Activities

Unit 2 fuel load began on February 21, 1991 and was completed March 6, 1991. The inspectors reviewed and observed the control room operators on a continuous basis during the recent fuel loading activities. The details of the refueling activities are in IR 91-07. On March 11, 1991, a portion of the core loading video tape was reviewed to verify the core was loaded per the final core loading pattern. No deficiencies were noted.

b. Breaker Alignment

The inspectors reviewed the breaker alignment on the 480V Shutdown Boards and the 4160V A, B, C, and D Shutdown Boards. No deficiencies were identified.

c. Hold Orders

The inspectors reviewed the status of three tagouts, referred to as clearances, as follows: HO-2-91-135, 218, and 294. These clearances involved RHR valves 2-FCV-74-47 and 30 and the LPCI motor generator set 2DN. No problems were identified.

d. Unsupported Small Bore Pipe on RHR System

During the review of loose, missing, and damaged hardware as discussed in the closure of VIO 260/89-16-02, paragraph 11.g, the inspectors identified a questionable condition associated with the operability of the 2D RHR pump. Specifically, the inspectors observed long lengths of unsupported small bore instrument lines on the 2D RHR Pump suction and discharge pressure instruments. This condition was similar to a condition identified on the CSS pump and identified as URI 260/89-16-06. The inspector requested that the licensee verify that the observed condition was acceptable. The licensee produced calculation CD-Q-2074-893635, "Pipe Analysis, Seismic Analysis RHR System", RIMS B22'89-0724-109.

The inspector's review of this calculation identified that the dimensions used in the analysis did not match the installed configuration. Specifically, the analysis bounded the four problems in the area and analyzed the worst case condition which the licensee described as a vertical span of 12.5 feet. The actual configuration involved a vertical span of approximately 15 feet. The licensee documented this on CAQR BFP 910077 and demonstrated the acceptability of the actual configuration through reanalysis.

During his walkdown, the inspector also identified that an adjacent support to the one used to bound the above calculation was missing. The support was identified as 56-02 on the sketch in the calculation. The licensee also documented this condition on CAQR BFP 910077. The licensee indicated that their initial review determined that the support was documented as installed in 1988 and the installation was accepted by QC. The missing support will be reinstalled to closeout the CAQR.

e. Unit 2 Torus Inspection

On March 12, 1991, the inspectors accompanied the Plant Manager and others on a final closeout inspection of the torus. Using a strong portable light the bottom of the torus could be seen. No foreign material was seen in the torus. A light film of dust was visible on the bottom. The licensee stated this dust was being analyzed for any long term effects in the torus and an evaluation was being obtained from GE concerning this material.



f. Verification of Reactor Mode Switch Type

Various events have been identified by the NRC office of AEOD concerning the use of type SB-1 Reactor Mode Switch. A review of the BFN reactor mode switch revealed that the Type SB-1 was replaced by Type SB-9 during the time-frame of 1975. Based on this changeout, this issue is no longer applicable to BFN.

No violations or deviations were identified in the operational safety verification area.

6. Area Walkdowns

The inspector reviewed and observed the licensee's area walkdown effort. This activity was controlled and documented by procedure PMI 6.29, Material Conditions Inspections. Section 5 of the procedure outlines the responsibilities of various plant organizational representatives including system engineering, fire protection, maintenance, nuclear engineering, security, and operations. Attachments to the procedure indicate the items to be documented.

The inspector observed the walkdowns performed for Zones 27 and 28. These two zones were the 1C level of the control bay. Adequate organizational representation was present. The walkdowns documented deficiencies, which were placed in the applicable categories. The walkdowns also documented as acceptable/unacceptable/not applicable various equipment attributes such as damper linkage defects, system leaks, and possible physical damage.

The inspector concluded from the reviews and the observations that the licensee was performing the area walkdowns in a controlled manner and documenting the results.

7. System Pre-Operability Checklist (71707)

The inspectors continued to monitor the licensee's efforts to repair and modify plant equipment and systems to an acceptable status for the restart of Unit 2. During this inspection period, the following systems were reviewed by the inspectors after the licensee had determined that each had been completed per the SPOC process.

a. Reactor Vessel Vents and Drains (System 10)

This system consists of the reactor head vent line, the reactor bottom head drain line, the safety-relief valve tailpipes, and the tailpipe vacuum breakers and associated piping and valves.

The inspector reviewed the SPOC package after it had been finalized by the licensee. A total of 4 deferrals remain open at the time the SPOC package was completed. The first 3 of the 4 deferrals involved hydrostatic testing that could not be completed until reassembly of



the reactor vessel and was deferred until startup. The fourth deferral, which identified pipe support shear pins that did not meet the required material specification as specified by Nuclear Engineering, had been evaluated to be acceptable for the next operating cycle. All other items which remain open were evaluated by Nuclear Engineering as acceptable for Unit 2 operation.

The inspector found the licensee's activities acceptable in restoring the Reactor Vessel Vents and Drains Systems to support Unit 2 restart.

b. Condenser Circulating Water (System 27)

The SPOC for this system was completed on January 27, 1991. Three deferrals were taken at the time of the system SPOC. The SPOC was an update of the 1989 SPOC for the system. The three deferrals were the same deferrals that were taken in 1989 and which were deferred until Unit 2 restart. The first deferral was because vendor supplied test equipment necessary for calibration of vibration instruments on the CCW pumps had not arrived. The second deferral was that the condenser water box level alarm would not clear with only two CCW pumps inservice during shutdown conditions. Two pumps do not provide sufficient head to maintain the water boxes completely full when all six water boxes are in service and their outlet valves throttled open to establish the specified water box differential pressure. The third item was deferral of a two page list of maintenance items associated with the Unit 1 CCW system. The Unit 1 system is included in Unit 2 SPOC boundary for two reasons: 1) to provide water for cooling tower wetdown after Unit 2 restart at which time Unit 2 CCW cannot be routed to the cooling towers; 2) to provide an alternate discharge path for radwaste release if the Unit 2 CCW system is shutdown. The inspector concluded there was a logical basis for the deferrals.

c. Control Bay Heating and Ventilation System (System 31)

The inspector reviewed the completed SPOC package for this system which was completed on February 19, 1991. Four deferrals were taken against this system. The first deferral was tied to Unit 3 startup pending completion of an ECN to increase the HVAC capacity for a new process computer. Some fire dampers were installed by this modification which were applicable to Unit 2 but the ECN remained open pending completion of the remaining work. The second deferral was issued to track the implementation of TS Revision 265 ten days prior to the first control rod pull for Cycle Six operation. This TS change allows operation during Cycle Six with the CREVS technically inoperable but maintained as operable. The third, and fourth deferrals were tied to Unit 2 startup and DCNs for which all System 31 work was complete. The DCN's will close when all work is complete for all systems and the deferral closed. This inspector concluded there was a logical basis for each deferral.

Since this system had been declared operable and continuing problems remained with the system, the inspector performed an independent walkdown of the Unit 2 control bay ventilation panel system on March 6, 1991. This was done using plant drawing 2-47E2865-4, Mechanical Ventilation and Air Conditioning Air Flow Diagram. The problems identified are discussed below.

1) Room Cooling Problems

The inspector had observed during routine tours of the control bay building that temperature readings were being taken once a shift in Electric Boards Rooms 2A and 2B, which contain 4160 volt Shutdown Boards C and D, and the Unit 2 RPS MG Set Rooms. During several operations shift turnover meetings it was stated that the readings were taken per OI-31 as compensatory measures for high temperatures. The system had been returned to service on February 19, 1991, and the system was operable for fuel load. The inspector was aware of previous problems with the RPS MG set but none in the Electric Board Rooms. This was discussed with the system engineer and operations management. The readings in the electrical board room were stopped and no explanation was given as to why the temperature was being monitored.

The system engineer for the RPS MG stated that a memorandum would be issued to control the 1C elevation passageway temperature to 80 degrees or less. The RPS MG sets room have an exhaust duct only and air is drawn into the room through vents in the room doors. The doors have been previously left open due to the air temperature exceeding the upper limit of 95 degrees. The upper limit was increased by design engineering to 104 degrees. This temperature limit was also being exceeded. On March 5, 1991, the inspector observed that the doors were still being left open and the problem has not been solved. This is identified as URI 260/91-06-01 RPS MG Set Cooling Problem.

2) Drawing Discrepancies

During this inspection of System 31 several discrepancies were noted. First, the electric board room names were different from the Units 1-3 drawing and names on the door entering room. The names on the doors and Unit 1-3 drawing were for the 2A and 2B electric board rooms. The names on the Unit 2 drawing were electrical board rooms C and D. These rooms contain the 4160 Volt Shutdown Boards C and D, but have historically been called 2A and 2B electric board rooms. Likewise, the 480 Volts Shutdown Board Rooms 2A and 2B were only designated as 2A and 2B Electric Board Rooms on the Unit 2 drawing. Other SPOC walkdowns have not identified similar labeling problems.

The ventilation duct penetrations into the 480 volt shutdown board rooms did not show fire dampers. Fire dampers 2-31-2643 and 2-31-2644 were found in the penetrations labeled with a new



black on white identification label. Two other dampers were also not indicated on the drawing.

10 CFR 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings requires that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions. The failure to maintain a system drawing is a violation of this criterion. The violation is identified as VIO 260/91-06-02, Failure to Maintain a System Drawing.

3) System Status File

The system status file for System 31 indicated 2A Shutdown Board Rooms supply fan handswitches were in the LOCAL and FAST position. This was completed on December 7, 1990. The actual handswitch positions were LOCAL and OFF.

Additionally, the SPOC for this system was completed on February 19, 1991. A signature in SDSP 12.7, System Pre-Operability Checklist, under system configuration indicated that the system status file was up to date. PMI 12.5, System Status Control, provides the instructions for maintaining the system status file. The inspector discussed this with the Operations Manager and the fan breaker was indicated correctly, in the OFF position. A copy of the hold-order which repositioned the breaker after the modification was reviewed. The handswitch position was updated in the status file.

4) Housekeeping

Housekeeping was found to be poor behind the Ellis and Watts AHU located above the electrical board room in the reactor building. Items identified were a long piece of loose conduit, several conduit fittings, miscellaneous screws and bolts, pieces of insulation rolls, two steel plates, and other loose material.

Several concerns were noted in 480 V Shutdown Board Room 2A. A piece of ventilation duct about one foot long was stuffed into the upper corner of the room. An identification label for "480 V Unit Logic Relay Panel Unit 2, 25-44A-12" was on the floor. An open junction box was found above the shutdown board. A conduit behind the shutdown board labeled 2PL5587 did not contain a ground wire across the flexible conduit, although an identical size conduit next to it, labeled 2PL5562, did have a ground wire.

The inspector discussed all of these items with the licensee's management on March 6 and 7, 1991.



d. Containment Air Dilution (System 84)

The inspector observed the final walkdown of this system on February 25, 1991. The walkdown was conducted in accordance with OSIL-64. A good pre-briefing and system status review was conducted by the system engineer prior to the walkdown. One stenciling problem was identified during the walkdown. One line was stenciled as CAD nitrogen, but this line was connected to the drywell differential pressure air compressor. Air or nitrogen would be in the line depending on if the drywell was inerted. The system engineer planned to review an existing generic maintenance request concerning stenciling of piping system to see if this would be applicable or generate a new MR to correct the problem. No other deficiencies were noted which were not previously identified on the preliminary walkdown.

One violation was identified in this paragraph.

8. Essential Design Calculations (37700)

The inspectors reviewed various completed essential calculations selected CCRIS printout. The calculations were reviewed for a partial check of mathematical equations and to determine the adequacy of the licensee's methodology and approach. The inspectors also verified that inputs and assumptions were current and valid, and that they reflected the controlling conditions with reasonable results considering the inputs, methods, and objectives. The calculations reviewed were as follows:

CD-Q0075-894658, Seismic Analysis of Velan Gate Valves. This calculation serves as an analysis of the yoke stresses under seismic and torus hydrodynamic loads. Since the calculated yoke stresses are below the allowable stress of 21,000 psi (0.6 X yoke yield strength) the associated valves were considered qualified for use.

GENMEG9-001, Technical Basis for Use of Teflon Tape. Teflon sealant tape can degrade in high temperature or high radiation environments to form free fluoride ions leading to failure of stainless steel tubing due to localized corrosion. Prior limitations on usage had existed in TVA Specification G-29, Process Specifications for Welding, Heat Treatment, Nondestructive Examination, and Field Fabrication Operations. This calculation was developed as the technical basis for future restrictions to be placed on teflon tape usage.

No violations or deviations were identified in the area of Essential Design Calculations.

## 9. TMI Action Items TI 2500/65

The inspector reviewed the following TMI items:

- a. (OPEN) 259, 260, 296/II.F.1.2.A, Accident Monitoring, Noble Gas Monitor

(OPEN) 259, 260, 296/II.F.1.2.B, Accident Monitoring, Iodine/Particulate Sampling.

These two items were reviewed and documented in IRs 90-29 and 91-01. All field modification work was completed. The licensee was in the process of completing the applicable operating procedures, the surveillance instruction and the maintenance procedures. The last outstanding activity for these two items will be the successful completion of the SI which is scheduled for April.

- b. (OPEN) 260/II.K.3.18.C, ADS Actuation Modification.

This item was reviewed and documented in IR 90-29. All field modification work was completed. The design change ECN P7116, remained to be post modification tested using PMTP-BF-01.014. This PMTP was a functional test utilizing two SIs, 2-SI-4.2.B ATU(B) and 2-SI-4.2.B ATU(D) and is scheduled for performance in April.

- c. (OPEN) 260/II.K.3.28, Qualification of ADS Accumulators.

This item was reviewed and documented in IR 90-29. All field modification work was completed. This item was awaiting a change approval to TS 284. This change is expected prior to April 1, 1991 and is holding up closure of modification DCN W10399.

## 10. Reportable Occurrences (92700)

The LERs listed below were reviewed to determine if the information provided met NRC requirements. The determinations included the verification of compliance with TS and regulatory requirements, and addressed the adequacy of the event description, the corrective actions taken, the existence of potential generic problems, compliance with reporting requirements, and the relative safety significance of each event. Additional in-plant reviews and discussions with plant personnel, as appropriate, were conducted.

- a. (CLOSED - Unit 2 ONLY) LER 259/85-32, Reevaluation of Design Criteria for FSAR Section 8.2.

This LER was based on TVA's calculations that the possibility exists for the 250 VDC main battery voltage to drop below the FSAR value of 210 VDC to 207 VDC during a transient following postulated accidents. This transient could cause an inadvertent trip of the Staticon

inverters which power the wide range torus level monitors and the Topaz inverters which power the HPCI controller circuitry. The HPCI governor would also see the voltage dip. The inspector reviewed the licensee's closure package for this item. DCN W15748 removed power from the existing HPCI and feedwater inverters and added these loads to the ECCS ATU inverters for improved reliability and maintenance. ECN P3184 installed new 48 VDC power supplies to feed the EGM control box for the HPCI turbine to enhance reliability of the system. This replaced the power supply from 250 VDC that used stepping resistors to lower the voltage to 48 VDC. The new power supply arrangement was tested to verify adequate voltage at the EGM control box. The Staticon inverters were replaced on ECN 7006 by Nuthern inverters. The undervoltage setpoint for these inverters was set at 190 VDC. Additional 250 VDC electrical calculations (ED-Q2000-8700043) were performed to verify adequate voltage both minimum and maximum for all safety related loads and buses.

- b. (CLOSED) LER 260/88-10, Personnel Error in Procedure Preparation Causes Engineered Safety Feature Actuation.

An unplanned actuation of the engineered safety features occurred on September 15, 1988, during the performance of a modification.

The event was caused by an error in a workplan which required a wire to be lifted without first jumpering the contacts. The workplan error was attributed to poor preparation and review prior to implementation.

The licensee took corrective actions by implementing procedure Site Directors Standard Practice 7.9, Integrated Schedule and Work Control, which requires work packages be reviewed for impact on plant equipment.

- c. (OPEN), LER 259/88-37, Inadequate Design Control Produces Discrepancies in HVAC Duct Work.

The licensee performed a walkdown and evaluation of the systems affected. Repairs or modifications, as necessary, to meet the required criteria for operability have been completed. The NRC Staff has reviewed the licensee's actions and determined them acceptable for Unit 2 restart as documented in Vol. 3, Supp. 2 of NUREG-1232.

- d. (CLOSED) LER 260/89-22, Technical Specification Violation Due to Loss of Two Trains of Standby Gas Treatment.

Trains A and B of SGBT system were declared inoperable when the circuit breakers for the relative humidity control heaters were found in the tripped position. The inspector reviewed the licensee's closure package for this item. The licensee determined that the design application of these breakers did not address the high



temperatures encountered at the circuit breaker location. Contributing to the event was that the room exhaust fans were not operating at the time. DCN H-8431A was completed to relocate the circuit breakers in the 480 Volt Diesel Auxiliary Board to a different compartment, in the same board, away from heat producing auxiliary components. Operating Instruction O-OI-30F was revised to add notes and precautions to ensure the exhaust fans remain in operation. Train C of SBTG was not affected by this problem due to a different physical location of the breaker. The inspector reviewed the DCN and OI and concluded these actions should resolve the breaker tripping problem.

- e. (CLOSED) LER 259/90-17, Firewatches Were Performed Late Due to Personnel Error and Thereby Exceeding Technical Specification Requirements.

The licensee has implemented corrective actions by retraining firewatches to ensure that they understand their immediate responsibilities in communications with security personnel during computer failures. In addition, Procedure FPP-2, Fire Protection Attachments, has been revised to require the firewatch make various immediate notifications when the firewatch tour encounters unusual or unexpected situations that prevent the routine activities.

- f. (CLOSED) LER 259/90-21, Hourly Firewatch Could Not Enter Vital Area, Placing the Plant in Violation of Technical Specifications.

The licensee determined that a procedural deficiency existed in that no reference was made to handle unusual circumstances (i.e. requirements for inspecting locked rooms and rooms confined for ALARA conditions). As a result, Procedure FPP-2, Fire Protection Attachments was revised to require the firewatch to notify the Shift Operating Supervisor, then the Security Shift Supervisor, and the Fire Watch Supervisor when unusual/unexpected situations are encountered that prevent routine inspections.

11. Action on Previous Inspection Findings (92701, 92702)

- a. (CLOSED) IFI 259, 260, 296/86-32-04, Scram Instrument Setpoints.

The inspector reviewed the NRR's Safety Evaluation supporting T.S. Amendment No. 183. That SER documented the staff's review of the licensee's setpoint calculations. During that review the staff determined that TVA had adequately addressed instrument and loop errors and that the errors had been extrapolated to 18 months. The SER further stated that the licensee's methodology was in accordance with Regulatory Guide 1.105

The inspector's concern was associated with instruments 2-LT-3-56A, B, C, and D; 2-LT-3-58A, B, C, and D; 2-LS-3-56A, B, C, and D; 2-LIS-3-58A, B, C, and D; and 2-LS-3-58A, B, C, and D, which provide the RPS Scram and MSIV Isolation functions for low reactor water level.

Later the licensee issued new scaling and setpoint documents for these functions. Amendment No. 183 to the Unit 2 Technical Specifications has been issued by the NRC and incorporated by the licensee. The new limiting safety system settings include sufficient margin from the normal operating reactor water level to satisfy the inspector's concern as identified in the original inspection report.

- b. (CLOSED) IFI 259,260,296/87-09-04, Resolution of RHRSW Pump Vibrations Caused By Resonance.

This item was to find a permanent solution to vibration of the RHRSW pumps. The inspector reviewed the licensee's closure package. DCN H4330 was implemented to put a rubber pad under the pump baseplate. This was done on the A2 RHRSW pump as a trial basis. This pump will be monitored for one cycle, taking vibration readings quarterly to assure the modification is effective. The present Section XI requirements require only one reading at the baseplate but the licensee is taking reading at the baseplate, bottom of the motor, and top of the motor. In 1992, the requirements under Section XI will be for all three readings. Additionally, the practice of loosening baseplates bolts has stopped and the bolts now have locking devices installed. Since the licensee is working toward long term resolution of this problem and the vibration is monitored by Section XI, the original concern is adequately addressed.

- c. (CLOSED) IFI 50-260/89-16-05, Location of the Source of Water In CSS Pump Thermocouple.

During a NRC inspection of the CSS, the team identified that water had intruded into the lower motor bearing thermocouple housings on 2 of the 4 pumps. The interior housing had signs of rust and corrosion. The team requested that TVA determine the source of the water as well as correcting the identified deficiencies.

The licensee issued MR 1001232 and 1001224 to investigate the source of water and repair the thermocouples. Additionally, the licensee inspected and repaired the vendor junction boxes which were above the thermocouple and believed to be the source of the water. The licensee's investigation determined that the most probable source of the water was decontamination operations and that the JB cover gaskets were not properly sealed. The licensee initiated corrective action to reseal the JB covers and to replace the cracked terminal boards.



The inspector reviewed the licensee closure package for the CSS and inspected the similar installation on the 2B and 2D RHR pumps. The licensee removed the thermocouple covers on both pumps as well as on of the JB covers on the 2D RHR pump. There was no indication of water and the covers were reinstalled.

- d. (CLOSED) IFI 260/89-16-10, Revision of Calculation MEBMD-Q2075-870504 and MD-Q2075-890071 to Ensure Closure Signal for Mini-Flow Isolation Valves is Received Within Required Time.

The mini flow valves closure time was verified to be within 15 seconds of receiving the signal. Therefore, the closure signal was needed no later than 60 seconds from LOCA time "0" to meet the 75 second requirement.

The licensee closure package indicated that calculation MD-Q2075-870504 discussed above was voided since other calculation and design documents provide the same information. Calculation MD-Q2075-890071 was revised September 12, 1990 to ensure that the mini flow signal was received within the required 60 seconds. The calculation provided the necessary analytical justification for ensuring the required times were acceptable. However, there was no required testing to verify the system time response.

- e. (CLOSED) URI 50-260/89-16-07, Need to Perform ASME Section XI Inspections On Valve Operator Supports.

During inspection 89-16 the team questioned the adequacy of procedure ISI SI-4.6.G regarding the failure to include valve operator supports in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI program. The ISI group advised the team that valve operators were not included in the ISI program because they were not pressure boundary component supports. Contrary to this, the licensee's Engineering Department advised the team that valve operator supports are designed either to maintain pipe pressure boundary integrity (pipe stress) or to assure valve operation (seismic qualification). The team noted that the RHR system contained valve operator supports that were not in the ISI program. On December 15, 1989, the ISI group proposed a corrective action plan to review all drawings, identify all required supports as to ASME Code Section XI requirements prior to restart.

During the November 1990 reinspection of this issue as documented in IR 50-260/90-33, the inspector identified that the licensee had changed their proposed corrective action. Specifically, the licensee's QA ISI group reevaluated the requirements of Section XI of the ASME Boiler and Pressure Vessel Code, 1974 summer of 1975 Addendum edition, which is the current code of record for BFN



Unit 2. The reevaluation indicated that the licensee no longer believed that the code required inspection of supports which connected to valve operators. The licensee's did indicate in the issue closure package that they were planning to implement the 1986 revision of the code during the next 10 years interval and that the newer code specifically requires inspection of intervening elements.

The inspector's review of the 1974 edition of Section XI determined that sections IWB for Class 1 and IWC for Class 2, requires in Tables IWB-2500 and IWC-2520 that the support components be inspected. The tables specifically require that the area to be inspected include the support components that extend from the piping, valve, and pump attachment to and including the attachment to the supporting structure. The licensee had interpreted that this requirement did not apply to valve operator supports even if the operator is supporting the valve and piping system. The inspector has discussed the licensee's interpretation with NRR and Regional NRC staff and the NRC did not concur with the licensee's position. The requirements to inspect supports are to ensure pressure boundary integrity and to eliminate supports that serve this purpose does not comply with code requirements.

The inspector met with licensee site senior management on November 8, 1990 to discuss the licensee's position. The licensee agreed that the supports logically should be inspected. However, the licensee pointed out that their program that was submitted to the NRC in July 1977 and resubmitted for concurrence in November 1981 was never intended to inspect the type of supports in question. Nevertheless, the licensee proposed to include the supports in their program and perform the baseline inspection prior to plant restart.

The licensee ISI group requested engineering to identify any supports that met the above criteria but were not currently in the ISI program. The licensee engineer groups identified seven component supports that met the criteria but were not in the program. The supports identified were R56 for RCIC valve 2-FCV-71-18 and three supports for each of the 21A and 21B recirculation pumps. The licensee issued DCN Q15198A to add the identified supports to the ISI program by drawing revision. The one RCIC supports was inspected by the ISI group on November 16, 1990 and the six Recirculating Pumps supports were inspected on December 10, 1990. All supports were found acceptable by the ISI inspectors. The inspector reviewed the licensee inspection package for the above supports and found them acceptable.

The inspector asked the licensee why RHR valve operator supports were not identified by engineering, since the NRC original issue was that RHR valve operator supports were not included in the ISI program. On February 21, 1991, the licensee described the ISI boundary for the RHR system as depicted on drawing 2-47E811-1-ISI. The valve operator



supports 2-FCV-74-58 & 2-FCV-74-72 were outside the ISI boundary. The licensee had exempted this piping under Article IWC-1220(b) of ASME Section XI. The inspector reviewed the RHR support drawing and compared it against the ISI boundary drawing and did not find RHR valve supports that were within the boundary that are not being inspected.

f. (CLOSED) VIO 89-16-01, Failure to Take Effective Corrective Action

This violation was in three parts. The first part involved mechanical calculations performed by a contractor that contained errors. A TVA generated CAQR written August 4, 1989, identified the problem, but actions taken to resolve the problem had not been effective as demonstrated by the errors found during the December 1989 NRC inspection in 1989. In the April 9, 1990 response to the violation, TVA had determined the problem to be limited to mechanical calculations from one contractor. They committed to have the contractor perform additional checks of the essential calculations, evaluate the impact of errors found, and correct the deficiencies if found to be significant.

Based upon interviews with licensee personnel, the inspector determined that the contractors evaluations of the affected calculations are complete. Those calculations that required revision have been revised. Some of the calculations have been reviewed, and were found to contain errors, but not of enough magnitude to impact the current plant operability. The CCRIS and RIMs systems have been annotated to indicate those calculations that contain errors, and the calculations require a release from the lead mechanical engineer prior to their use as the basis for further engineering work. Prior to completion of each system SPAE, all issues concerning the systems design assumptions and calculation input appropriateness are complete. This part of the violation is closed.

The second part of the violation concerned TVAs inability to retrieve weld records from lifetime storage in a timely manner. This problem had been identified by TVA in a CAQR. TVA's reply to the NOV stated a systematic approach for timely retrieval of records has been developed through interviews with individuals who are knowledgeable of the construction era filing methods. The retrieval method has been documented for future use. DCRM-I-317.1, Appendix M contains the methodology for retrieval of these records. The individuals who work in lifetime records have been trained in its use. TVA validated its effectiveness by retrieving CMTRs for ten welds on RHR from the same period as the weld records that could not be found during inspection 89-16. It took less than 2 hours to retrieve these records. All records requested by the NRC team in 89-16 have been

located. In addition, other small bore weld records were examined to verify adequate records exist and are retrievable. The licensee indicated that these records can be retrieved in less than one day after the request. Based upon the inspectors review of the closure package and interviews with licensee personnel, this part of the violation is closed.

The third part of the violation indicated that system walkdowns performed by TVA prior to Inspection 89-16 failed to identify the conditions adverse to quality found in the NRC's walkdown of the system. TVA indicated in their response to the violation that additional training would be provided to system engineers to increase their sensitivity to the type of deficiencies identified by the NRC but not documented in previous TVA walkdowns. In addition, area walkdowns were to be performed to identify problems on an area basis through the use of a Modifications Engineer, a Civil/Structural Engineer, an Operations representative, and a System Engineering representative. Area walkdowns are in progress and will be complete by restart. The resident inspectors are accompanying licensee personnel on selected area walkdowns and system walkdowns to monitor walkdown effectiveness. The inspector reviewed PMI 6.29, Material Condition Inspections, Rev 0, dated December 23, 1990. The PMI contains checklists with guidance in enough detail to address the concerns of the violation. Walkdown training has been completed by the system engineers. This part of the violation is closed.

- g. (CLOSED) VIO 260/89-16-02, Failure to Follow Procedure/Drawing During Hardware Installation With Eight Examples.

In the licensee's response dated April 9, 1990, TVA admitted that the violations occurred as stated in the inspection report. The response indicated that the cause of the failure to properly install plant hardware, during construction, could not be determined. However, the licensee proposed a Zone walkdown program that should identify any additional hardware problems similar to those identified by the NRC team. The program was procedurally controlled by PMI 6.29, "Material Condition Inspection".

The inspector discussed the results of a recent Zone walkdown with the licensee and the onsite NRC staff. The licensee has established a schedule for conducting the area walkdowns and those that have been completed to date, have identified hardware deficiencies that required correction. The inspector reviewed several of the area walkdown punchlists provided in the closure package. Additionally, the site inspectors who have participated in the area walkdown feel that to date it has resulted in the correction of many otherwise unknown deficiencies.

On February 21, 1991, the inspector toured the accessible areas of the RHR pump corner room and looked for examples of loose, missing or damaged hardware as well as observing bolting and alignment problems.

Except for what appears to be a missing support on the 2D RHR pump discharge pressure instrument tubing, the inspector did not identify any hardware deficiencies. The missing instrument line support was discussed in paragraph 5.d., of this report.

- h. (CLOSED) VIO 259, 260, 296/89-17-01, Failure to Comply With The Requirements of 10 CFR 50.59.

In response to this violation, the licensee committed to provide safety evaluations for the three DCN/ECNs identified in the violation, and to review the change packages closed between January 1988 and April 1989 in support of the next FSAR annual update. In IR 259,260,296/90-33, the inspectors presented the results of their review of the closure package. The inspectors questioned the basis for the review beginning in January 1988. The licensee later confirmed that the inadequate screening review form was used beginning in January 1988. The inspector also questioned the adequacy of the SWEC review to identified all DCN/ECNs, with inadequate 10 CFR 50.59 evaluation because their procedure for review of DCN/ECNs, required that first they would be screened for FSAR impact. If no impact was found, the packages were not further reviewed. This process could have allowed a modification that was not described in the FSAR to be implemented without a proper safety evaluation.

The licensee agreed to identify those DCN/ECNs reviewed by SWEC which had a screening review only and were implemented during the period when questionable screening reviews were performed. They would then assess the adequacy of the screening reviews for a sample of the DCN/ECNs involved. The licensee identified 189 DCN/ECNs with screening reviews only, 129 of which were electrical and 60 of which were mechanical. The licensee randomly selected 20 DCN/ECNs (14 electrical and 6 mechanical) for review. The review of these DCN/ECNs did not identify any cases which involved a change in the technical specifications or an unreviewed safety question and therefore a safety evaluation was not required. The inspectors reviewed the screening forms that were the basis for the licensee's conclusion stated above. The inspectors questioned the basis for the conclusion that no USQ existed, i.e., did TVA perform a safety evaluation to support that conclusion. The inspectors determined through discussion with the licensee that none of the packages reviewed required safety evaluations, and, if they were processed under the current procedure (SDSP-27.1, "Safety Assessment Evaluation of Changes, Tests, and Experiments 10 CFR 50.59)", would not have required a safety evaluation. The inspector reviewed a sample of safety assessments/evaluations prepared between January 1990 and February 1991. During this review several questions came up but the

licensee was able to resolve them to the inspectors satisfaction. No deficiencies in implementation of the 10 CFR 50.59 program were identified.

i. (CLOSED) VIO 259, 260, 296/90-27-03, Bypassing QC Holdpoints

The inspector reviewed the licensee's responses to the violation dated November 21, 1990 and December 28, 1990, along with other documentation provided by the licensee. The licensee determined that the cause of the bypassed QC holdpoints was a series of personnel errors resulting from lack of attention to detail by craft personnel during the implementation of workplans.

The inspector determined that each of the identified examples of bypassing QC holdpoints along with the associated corrective actions were documented through the CAQR Program. Additionally licensee management issued a memorandum to all modifications personnel which emphasized the significance of this problem and outlined an expanded disciplinary action policy for personnel bypassing QC holdpoints. Although two additional examples in this area were identified between August 1990 and November 1990 the licensee has had no similar problems since the date of the licensee's final response.

Based on the results of the above review, the licensee's determination that the problem was programmatic with no impact on hardware, and the lack of recurrence of the problem the inspector determined that the licensee had adequately addressed the violation.

12. Bulletins

(OPEN) NRC Bulletin 90-01, Loss of Fill-Oil in Transmitters Manufactured by Rosemount

The licensee responded to the bulletin by letter on July 18, 1990. The response stated that BFN had performed an investigation to identify the subject RTs installed in safety systems, and to identify any RTs that were identified by Rosemount as having had a high failure fraction due to loss of fill-oil (suspect lots). Additionally, BFN developed an enhanced surveillance program for Unit 2 that provides a high level of confidence that RTs which experience loss of fill-oil are detected early. The method to be used in Units 1 and 3 (i.e., monitoring or replacement) will be decided as part of the licensing actions needed to support restart of those units. The NRC will be formally notified of the proposed method of resolution and status of this issue before the restart of each unit.

The inspector reviewed the bulletin, the licensee's response, and the surveillance program to be conducted to ensure suspect RTs are identified early. In addition, the inspector reviewed the monitoring methods in detail with the cognizant system engineer. The inspectors findings were as follows:

- a. The licensee identified 100 RTs at BFN that met the criteria of the bulletin. Of these, 74 were installed in Unit 2. The licensee is in the process of returning the identified RTs to Rosemount for refurbishment. To date, 19 RTs have been replaced in Unit 2 and several more have been refurbished but not yet installed.
- b. BFN performed an investigation and determined there were no RTs installed in the plant from the manufacturing lots that have been identified by Rosemount as having a high failure fraction due to loss of fill-oil. The review did identify four suspect RTs that were found in the power stores inventory. Three of these were spares and the fourth was procured for a specific system but never installed. The three spare RTs have been removed from the site. TVA is planning to return the fourth suspect RT to Rosemount for refurbishment.
- c. The licensee performed a review of plant calibration records and determined that no subject RTs installed at BFN had exhibited symptoms indicative of a loss of fill-oil.
- d. BFN developed an enhanced surveillance program to monitor subject RTs for symptoms of a loss of fill-oil. The monitoring program looks for unusual or sustained RT drift in one direction which is an early indication of a transmitter with a potential oil-loss problem. Because BFN has been pursuing obtaining refurbished RTs from Rosemount, a combination of pre- and post-July 11, 1989 RTs will be installed in Unit 2 by restart. Special procedure 2-SII-XT-00-165, Rosemount Transmitter Special Monitoring Program, was developed to detail the method for monitoring and recording the transmitter outputs, and trending each RT. The trending requirements prescribed in the SII were based on the recommendations contained in RTB No. 4.
- e. The RT monitoring program will be implemented by Unit 2 restart. Now the systems which utilize the subject RTs are not pressurized or in service. Until these systems are pressurized and the RTs are generating a signal, RT monitoring will provide no meaningful data.
- f. BFN conducted training for appropriate personnel on the symptoms of loss of fill-oil and sluggish RT response to either increasing or decreasing test pressures. This information was also included in periodic retraining lesson plans.
- g. Subject RTs which do not meet TS acceptance criteria or which have failed causing noncompliance with TS will be reported to the NRC using the LER process, as applicable.

The inspector concluded that the licensee was actively pursuing the actions identified in their response for Unit 2. The NRC HQ staff is still in the process of reviewing all licensee responses to this bulletin. Acceptance of the TVA response and final closure of the bulletin will be addressed following completion of the staff reviews. This bulletin is resolved for Unit 2 restart only.

## 13. Exit Interview (30703)

The inspection scope and findings were summarized on March 15, 1991 with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings listed below. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors during this inspection. Dissenting comments were not received from the licensee during the exit meeting.

<u>Item Number</u>	<u>Description and Reference</u>
260/91-06-01	URI, RPS MG Set Cooling Problem, paragraph 7.
260/91-06-02	VIO, Failure to Maintain System Drawing, paragraph 7.

Licensee management was informed that 5 LERs, 4 IFI, 1 URIs, 4 VIOs were closed. One bulletin was resolved for Unit 2 restart.

## 14. Acronyms and Initialisms

ADS	Automatic Depressurization System
AEOD	Office of Analysis and Evaluation of Operational Data
AHU	Air Handling Unit
ASME	American Society of Mechanical Engineers
ATU	Analog Trip Units
ATWS	Anticipated Transient Without Scram
BFNP	Browns Ferry Nuclear Plant
CAD	Containment Air Dilution
CAQR	Condition Adverse to Quality Report
CCRIS	Calculation Cross Reference Information System
CCW	Condenser Circulating Water
CFR	Code of Federal Regulations
CREVS	Control Room Emergency Ventilation System
CS	Core Spray
DCN	Design Change Notice
ECCS	Emergency Core Cooling System
ECN	Engineering Change Notice
EGM	Electric Governor Motor
FCV	Flow Control Valve
FLC	Fuel Load Chamber
FPP	Fire Protection Procedure
FSAR	Final Safety Analysis Report
GE	General Electric
GPM	Gallons Per Minute
HO	Hold Order
HPCI	High Pressure Coolant Injection
HVAC	Heating, Ventilation, & Air Conditioning
IFI	Inspector Followup Item
IM	Instrument Mechanic

IR	Inspection Report
ISI	Inservice Inspection
JB	Junction Box
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
LPCI	Low Pressure Coolant Injection
MG	Motor Generator
MR	Maintenance Request
MSIV	Main Steam Isolation Valve
NE	Nuclear Engineering
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
OI	Operating Instruction
OSIL	Operations Section Instruction Letter
PMI	Plant Manager Instruction
PMT	Post Modification Test
PORC	Plant Operations Review Committee
PRD	Problem Reporting Document
QA	Quality Assurance
QC	Quality Control
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RPS	Reactor Protection System
RT	Rosemount Transmitter
RTB	Rosemount Technical Bulletin
RTP	Restart Test Program
SBGT	Standby Gas Treatment
SDSP	Site Directors Standard Practice
SER	Safety Evaluation Report
SI	Surveillance Observation
SPAE	System Plant Acceptance Evaluation
SPOC	System Pre-Operability Checklist
SRM	Source Range Monitor
SWEC	Stone Webster Engineering Corporation
TD	Test Discrepancy
TE	Test Exception
TMI	Three Mile Island
TS	Technical Specification
TVA	Tennessee Valley Authority
URI	Unresolved Item
USQ	Unreviewed Safety Question
VIO	Violation
V	Volt
WO	Work Order
WP	Work Plan
WR	Work Request

