UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report Nos.: 50-259/78-21, 50-260/78-23 and 50-296/78-20

Docket Nos.: 50-259, 20-260 and 50-296

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

Licensee: Tennessee Valley Authority
830 Power Building
Chattanooga, Tennessee 37401

Facility Name: Browns Ferry Units 1, 2 and 3

Inspection at: Browns Ferry Site, Athens, Alabama

Inspection conducted: August 28 - September 1, 1978

Inspectors: R. F. Sullivan
J. E. Ouzts

Accompanying Personnel: H. C. Dance

Reviewed by: H C Dance 10/26/78
H. C. Dance Date
Chief, Reactor Projects Section No. 1
Reactor Operations and Nuclear Support Branch

Inspection Summary

Inspection on August 28-September 1, 1978 (Report Nos. 50-259/78-21), 50-260/78-23 and 50-296/78-19)
Areas Inspected: Routine, unannounced inspection of reportable occurrences, follow-up on I.E. Bulletins and Circulars, follow-up on Unit 3 blowdowns, Unit 3 and Unit 1 refueling activities, plant tour, surveillance and procurement. The inspection involved 77 inspection hours on-site by three NRC inspectors.
Results: Of the seven areas inspected, no apparent items of noncompliance or deviations were identified.

DETAILS I

Prepared by: H C Dance /for 10/26/78
R. F. Sullivan, Reactor Inspector Date
Reactor Projects Section No. 1
Reactor Operations and Nuclear
Support Branch

Dates of Inspection: August 28 - September 1, 1978

Reviewed by: H C Dance 10/26/78
H. C. Dance, Chief Date
Reactor Projects Section No. 1
Reactor Operations and Nuclear
Support Branch

1. Persons Contacted

*J. D. Dewease, Plant Superintendent
*H. L. Abercrombie, Assistant Plant Superintendent
*J. L. Harness, QA Supervisor
J. B. Studdard, Operations Supervisor
R. Hunkapillar, Assistant Operations Supervisor
*R. G. Metke, Results Section Supervisor
J. R. Pittman, Instrument Engineer
G. T. Jones, Outage Director
J. E. Swindell, Assistant Outage Director
J. H. Miller, Outage Planning Coordinator
J. E. Harrell, Outage Refuel Floor Coordinator
T. E. Mayfield, Shift Engineer
*R. Cole, QA Site Representative, Office of Power
R. R. Smallwood, Shift Engineer

*Denotes those present at the Exit Interview.

2. Licensee Action on Previous Inspection Findings

Not inspected.

3. Unresolved Items

No new unresolved items were identified during this inspection.

4. Exit Interview

The inspectors met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on September 1, 1978, where they discussed their findings in the areas inspected. The licensee was informed that there were no items of noncompliance or deviations noted.

5. I E Circular and Bulletin Follow-Up

The inspector reviewed licensee action on the following circulars and bulletin.

IEC 78-08, Environmental Qualifications of Safety-Related Electrical Equipment

IEC 78-09, Arcing of General Electric Company Nema Size 2 Contactors

IEC 78-11, Recirculation M-G Set Overspeed Stops

IEC 78-12, HPCI Turbine Control Valve Lift Rod Bending

IEC 78-13, Operability of Service Water Pumps

IEC 78-14, HPCI Turbine Reversing Chamber Hold Down Bolting

IEC 78-15, Tilting Disk Check Valves Fail To Close With Gravity in Vertical Position

IEB 78-08, Radiation Levels From Fuel Element Transfer Tubes

Discussions were held with licensee personnel and internal files were examined. Licensee action had been scheduled, implemented or completed on Circulars 78-09, 78-12, 78-13, 78-14, 78-15 and on Bulletin 78-08 which the inspector considered closed. The inspector indicated his intent to do further follow-up on completed action on Circulars 78-08, 78-11, 78-13 and 78-14.

6. Reportable Occurrence Review

The inspector reviewed with QA section personnel the preparation of Licensee Event Reports (LER) by the plant staff. The administrative procedure for processing LER's, BF 15.2, was revised June 9, 1978, which placed additional responsibilities on the QA section in gathering information and developing the final draft. The section supervisors were relieved of responsibility for preparing the draft reports but

they still participate in furnishing information. The inspector concluded that the established procedure provides the framework for meeting LER reporting requirements and minimizing errors. The inspector had reviewed only a few reports since the revised system was in effect so could not attest to any change in quality of reporting. He encouraged the staff to be certain there is sufficient detail to permit meaningful evaluation and to address corrective action thoroughly.

The inspector had identified several reports which were submitted without the attachment enclosed. The licensee attributed this matter to an administrative oversight which he indicated will be corrected. The inspector stated that he would review the subject LER's on his next inspection.

7. Plant Tour

A tour of the plant was made by the inspector. Included were the control rooms, refueling floor and portions of each reactor building. Observations were made of system status, housekeeping and various work activities in progress.

On the refueling floor, the inspector observed that three new fuel storage racks of the high-density design had been placed in the Unit 3 storage pool. The new racks have the capability for storage of 559 fuel bundles. The pool also contained some of the original racks with a storage capacity of 808 fuel bundles.

The new racks had been modified to provide for venting of trapped air and gasses to avoid swelling. Small holes had been drilled in the top of the stainless steel sections which encased the Boral. The inspector observed the first refilling of the pool with the new racks installed. As the racks became covered with water, many air bubbles were seen coming from the racks. Small bubbles were still coming from the racks on the third day but at a much reduced rate. TVA had scheduled Boral verification tests using a neutron source and also dimensional checks of the racks for swelling or interference fit. NRC had not yet given authorization to place fuel in the new racks.

Other activities on the refueling floor which the inspector observed were the underwater removal of fuel bundle channels from irradiated fuel stored in the Unit 1 pool and the placement of these used channels on new fuel bundles. Also, the inspection and channelling of new fuel was observed. The inspector examined inspection data sheets and the approved procedure being used. All questions developed by the inspector were satisfactorily answered.

8. Recent Unit 3 Blowdowns

Although the written reports of the two recent blowdowns had not yet been submitted to NRC, the inspectors did review selected operating records including pressure recording charts of the blowdowns and discussed the events with plant personnel.

The blowdowns occurred on August 17 and 22, 1978, and were caused by faulty operation of main stream relief valves. The valves are to be refurbished during the first refueling outage which is scheduled to begin September 8, 1978. Plant personnel indicated that experience had shown that relief valve performance worsens near the end of the first operating cycle due to valve seat leakage from the extended service without refurbishing. Refurbishing on subsequent refueling outages is usually done on a more frequent basis.

On August 17, one of four relief valves failed to reseat following a scram and main stream isolation. These four relief valves had lifted, as designed, in order to control system pressure. The faulty valve reseated after pressure decreased to 300 psi and opened again prematurely when pressure built back to 840 psi to cause a second pressure reduction to 200 psi. On the August 22 blowdown, one relief valve lifted prematurely at 920 psi during reactor start-up and did not reseat until pressure was reduced to 200 psi. The maximum cooldown rate indicated on the recordings was 180 degrees Fahrenheit per hour. Since the limiting condition of 100 degrees Fahrenheit per hour was exceeded, the thermal transients were evaluated and the fatigue usage factors were assigned.

The relief valve malfunctions were attributed to pilot valve leakage. Following the blowdown of August 17, the topworks (which includes the pilot and second stages) were replaced on three valves and the valves were functionally tested during reactor restart. The topworks of the faulty valve causing the August 22 blowdown was also replaced and tested during reactor restart.

Questions developed by the inspectors were satisfactorily answered.

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DETAILS II

Prepared by: J. E. Ouzts, Operations Inspector 10/2/78 Date
Nuclear Support Section No. 2
Reactor Operations and Nuclear Support Branch

Dates of Inspection: August 30-September 1, 1978

Reviewed by: W. H. Bradford Jr. 10/26/78 Date
P. J. Kellogg, Chief
Nuclear Support Section No. 2
Reactor Operations and Nuclear Support Branch

1. Persons Contacted

*J. D. Dewease, Plant Superintendent
H. L. Abercrombie, Assistant Plant Superintendent
*R. E. Burns, Instrument Engineer
*R. Cole, Office of Power Production QA Coordinator
*M. A. Haney, Mechanical Maintenance Supervisor
*J. L. Harness, QA Supervisor
J. D. Hood, Power Stores Unit Supervisor
*R. Mentke, Results Supervisor
K. Montgomery, Instrument Foreman
J. Teague, Electrical Supervisor
J. Thompson, Instrument Foreman

Six instrument technicians, one storeroom employee and one plant services employee were also contacted.

*Denotes those attending the exit interview.

2. Licensee Action on Previous Inspection Findings

Not inspected.

3. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance or deviations. Two unresolved items disclosed during the inspection are discussed in paragraph 5.

4. Exit Interview

The inspector met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on September 1, 1978. The inspector summarized the scope and findings of the inspection as discussed in paragraphs 5, 6 and 7. The licensee acknowledged these findings and agreed to review his procedures for the purpose of revising one procedure and providing a new procedure to cover another area in question.

5. Surveillance Test Procedures, Results Verification and Test Witnessing

The inspector conducted a review of test procedures and associated test results and witnessed testing for Units 1, 2 and 3 as follows:

Precedure and Results Review:

- SI4.1.A-5 - High Reactor Pressure Functional Test
- SI4.1.A-5 - Reactor Low Water Level Functional Test LIS-3-203 A-D
- SI4.2.B-7 - Reactor Low Pressure Functional Test - PS-3-74A and B; PS-68-95 and 96
- SI4.2.B-22A - Recirculation Pump Running Functional Test
- SI4.2.C-1A - APRM Upscale (flow bias) upscale (startup mode) Downscale, Inoperative Functional Test - Alarms
- SI4.2.C-2A - Rod Block Monitoring Upscale (flow bias) Downscale Inoperative Functional Test
- SI4.1A-9 - Turbine Condenser Flow Vacuum Functional Test
- SI4.1.A-11 - Main Steam Isolation Valve Closure Functional Test
- SI4.2.B-26 - Condensate Storage Tank Low Level Functional Test
- SI4.7.A-2 - Leak Rate Test Air Lock at 49.6 PSIG
- SI4.7.2, g-2 - Leak Rate - Primary Containment Testable Penetrations at $\geq$ 49.6 PSIG
- SI4.2.B-45 - Auto Sequencing Timers Diesel Power Functional Test
- SI4.2.B-20 - RHR Pump Discharge Pressure Functional Test
- SI4.2.B-32 - RCIC Steam Line Space High Temperature Functional Test
- SI4.5.A - Core Spray System
  Sec 0 1b I & II - Pump Operability
- SI4.5.C.5 - RHR Service Water Pump Operability Test
- SI4.9.A.1.b - Demonstrate That Diesel Generators Will Start and Accept Load Within Specified Time Sequence
- SI4.9.A.2.b - Auxiliary Electrical Equipment Battery Voltage Measurement
- SI4.9.A.4.b - Demonstrate the UV Relay on Each Shutdown Board Will Start Diesel Generators
- SI4.2.B-27 - Suppression Chamber High Level Functional Test
- SI4.2.F-4C - Drywell Temperature Instrument Check (TI-64-52-TR64-52)
- SI4.2.F-5C - Suppression Chamber Air Temperature Instrument Check

Test Witnessed:

- SI4.2.B-2 - Reactor Low Water Level (LIS-3-184 and 185) Unit No. 1
- SI4.2.F.2 - Reactor Pressure Calibration (Level Compensation - Unit No. 1
- SI4.2.B.3 - Reactor Low Water Level (LITS-3-52 and 62) - Unit No. 3

The inspector used one or more of the following acceptance criteria for the above items:

- Operational Quality Assurance Manual
- Technical Specifications
- ANSI N18.7 (1972) (5.1.2) (5.1.7)
- ANSI N45.2 (1971) (12)
- Inspector Judgement

The test procedures and test results were reviewed to verify:

- Test prerequisites and plant conditions were specified and reviewed and approvals had been performed.
- Technical contents of the procedures were correct and the tests were performed on schedule.
- Test instruments were listed in the procedures and the instruments used were identified by number with test results.
- Test results were recorded and compared with acceptance criteria and the return of the equipment to service and removal of test equipment was verified upon completion of the test.

The performance of testing was witnessed to verify:

- The latest revision of the approved test procedure was in use.
- Prerequisites for the test had been established and verified.
- Test stations were adequately manned.
- Test instruments in use had been calibrated.
- Test results were being recorded and verified.
- Test instruments were removed and the system returned to normal service.

Within the areas inspected no items of noncompliance or deviations were identified. In one area the inspector found the technicians using a 0-1500 psi Heise gauge to calibration test a 0-1500 psig pressure transmitter, that required the addition of a 14.4 psi static head correction, and thus making the high point in the calibration 1514.4 psig. The correct procedure that should have been used when used on instruments of this range, would have been to apply the static head of 14.4 psi, than zeroing the Heise gauge prior to starting the test. This would have prevented overranging the Heise at the upper

limit. The licensee agreed that corrective action was necessary in the form of a procedure describing the method above or by using a Heise with a wider range. The licensee agreed to investigate this finding further and take necessary corrective action. This item will remain unresolved pending the corrective action and verification by NRC at a subsequent inspection (259/78-21-01). In another area in the review of SI4.7A.2 g-2, step 5.3.7 required repressurizing electrical penetrations to 3 psig. During previous investigations by NRC into electrical penetration failures, vendors recommended pressurizing these penetrations to 15 and 30 psig, depending on the voltage rating. The licensee identified the 3 psig in the procedure as an error and reported that he was pressurizing the penetrations to the vendor recommendations. The inspector also inquired as to how often the pressure gauges on the penetrations were calibrated. The licensee was unable to identify the exact schedule, but would investigate and report to NRC. These items will remain unresolved pending this investigation and correction to SI4.7A g-2, and verification by NRC at a subsequent inspection (259/78-21-02).

6. Procurement Control Verification

The inspector conducted a review of procurement documentation and inspected storage of safety-related equipment as follows:

- RD639327 - Pearless Pump Endbell Adapter - Item 71
- RD631295 - Target Rock Relief Valve (Requisition for Testing Services
- RD639418 - Print Mechanism Kit - Leeds and Northrup
- 324436 Lands Recorder - 2 Units N1005540
- 244097 - Power Sensor EM - GE Power Supply - Catalog No. 0156C4508 C-10 60Hz
- 244097 - Power Sensor Solid State Unit Type PSA Model Number 184L373G-45 - General Electric
- 244097 - Power Sensor Test Kit for use With Power Sensors - General Electric
- 78P-83-258959 - Steel Bar 1-1/4 Inch Alloy Round Cold Finished ASTM 331, Grade 4140, Annealed to 10/12 ft. length for shafting. Certified - Ryerson Steel Company, Chattanooga, Tennessee.
- PR145442 - Contract No. 77P54-145442, Main Disc, Target Rock No. 200848 - Target Rock Corporation, Farmingdale, N. Y.
- 249537 - Pressure Switch, Target Rock Part No. 200372, Revision D, 7769, Target Rock Corporation, Farmingdale, N. Y.
- 584597 - Electrode 3/32" x 36", Welding Mild Steel Base, Certified Type E70-S, TVA Specification PF-1019SFA5.18 Item 14, Proweld Inc., Chattanooga, Tennessee

- 606211, Electrode 3/32" x 36" Welding - Mild Base, Certified, Type E 70-S-3, TVA Specification PF-1019-SFA 5.18, Proweld Inc., Chattanooga, Tennessee.

The inspector used one or more of the following acceptance criteria for the above items:

- Operational Quality Assurance Manual
- ANSI N18.7 (1972)
- ANSI N45.2.2 (1972)
- Regulatory Guide 1.38 (1977)
- Inspector Judgement.

The procurement documents and components were reviewed and inspected to verify:

- Procurement documents had proper approvals
- Quality Control inspection requirements were included in the procurement documents.
- Quality Control Records such as Certificates of Compliance, Certificates of Test and Analysis, results of vendor tests and receipt inspection records were available for equipment in storage.

- Measures were in effect for properly controlled and separation of conforming and nonconforming materials, parts and components.
- Components and materials were supplied by an approved vendor.

Within the areas inspected no items of noncompliance or deviations were identified.

7. Review of Reportable Occurrence Report BFRO-50-260/7815 of August 23, 1978

The subject of this report was the flow degradation of flow for Unit 2 Standby Liquid Control Pump 2B, as observed during the routine performance of surveillance test SI-4.4.A-1, in early August 1978. The flow observed was 36 gpm, 3 gpm below the minimum requirements of 39 gpm as required by 3.4.A-1 of the Technical Specifications. The pump was disassembled and the internal valve seating surfaces refurbished by machining, although no abnormal wear of the seating surfaces was noted. This pump is a three piston positive displacement pump, and the flow degraded about one-third normal flow, from about 53 gpm during the test in July to 36 gpm during the test in August. This indicates that one of the three pistons was not performing, due to a sticking valve or something under the valve seat, since following reassembly of the pump tests showed that the normal flow of 53 gpm was

restored. A check with other similar facilities in Region II revealed that they had not experienced a like problem, thus this was determined to be a random failure at this time with no generic significance.

As a result of the review of this problem no further questions or outstanding items remain.