U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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License Nos.:	DPR-33, DPR-52, DPR-68
Report Nos.:	50-259/99-07, 50-260/99-07, 50-296/99-07
Licensee:	Tennessee Valley Authority (TVA)
Facility:	Browns Ferry Nuclear Plant, Units 1, 2, & 3
Location:	Corner of Shaw and Browns Ferry Roads Athens, AL 35611
Dates:	October 17, 1999 - November 27, 1999
Inspectors:	W. Smith, Senior Resident Inspector J. Starefos, Resident Inspector E. DiPaolo, Resident Inspector D. Jones, Senior Radiation Specialist (Section R1) R. Telson, Resident Inspector, Sequoyah Plant (Section E2.1)
Approved by:	P. E. Fredrickson, Chief Reactor Projects Branch 6 Division of Reactor Projects

Enclosure

EXECUTIVE SUMMARY

Browns Ferry Nuclear Plant, Units 1, 2, and 3
NRC Inspection Report 50-259/99-07, 50-260/99-07, 50-296/99-07

This integrated inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a 6-week period of resident inspection. In addition, the NRC staff conducted a Year 2000 (Y2K) readiness program followup review and an inspection of programs for radioactive effluents, environmental monitoring, and radioactive shipments.

Operations

- Based on a general walkdown inspection of selected risk-significant systems, structures, and components (SSCs), the SSCs were found in a configuration appropriate to the mode of plant operation (Section O2.1).

- Based on walkdowns of freeze protection equipment performed by the inspectors during the inspection period, susceptible and risk-significant plant systems were adequately protected from cold weather. The licensee was actively pursuing cold weather preparations (Section O2.2).

Maintenance

- The licensee met regulatory requirements while performing surveillance tests observed during this inspection period (Section M1.2).

Engineering

- Based on June 14, and October 21, 1999, reviews by the NRC staff, the Browns Ferry Y2K readiness programs had been satisfactorily completed (Section E2.1).

- While establishing a clearance for Unit 1 maintenance, operators blocked an emergency equipment cooling water crosstie valve open, which was a change to the facility as described in the final safety analysis report. This action was not supported by a safety evaluation as required by 10 CFR 50.59, and was identified as a non-cited violation (Section E2.2).

Plant Support

- The licensee had maintained an effective program for the control of liquid and gaseous radioactive effluents from the plant. The radiation doses from those releases were a small percentage of regulatory limits (Section R1.1).

- The licensee complied with the sampling, analytical and reporting requirements for the radiological environmental monitoring program, the environmental sampling equipment was well-maintained, and the monitoring program was effectively implemented (Section R1.2).

- The licensee had effectively implemented a program for shipping radioactive materials in accordance with NRC and Department of Transportation regulations (Section R1.3).

Report Details

Summary of Plant Status

Unit 1 remained in a long-term lay-up condition with the reactor defueled.

Unit 2 operated at or near full power with the exception of scheduled brief reductions in power to adjust control rods and perform routine testing.

Unit 3 operated at or near full power with the exception of scheduled brief reductions in power to adjust control rods and perform routine testing. In addition, power was reduced on November 12, 1999, to 80% to make a control rod pattern adjustment and repair the main turbine electro hydraulic control system. Power was restored to 100% on November 13.

I. Operations

O2 Operational Status of Facilities and Equipment

O2.1 General Walkdown of Risk-Significant Structures, Systems, and Components (SSCs)

a. Inspection Scope (71707)

The inspectors toured the plant on a regular basis to observe the condition and status of a sampling of risk-significant SSCs.

b. Observations and Findings

During the inspection period, the inspectors conducted a general walkdown of the accessible portions of plant systems, including the Unit 2 standby liquid control system, Unit 3 reactor core isolation cooling system, Unit 3 core spray system, Loop II, Unit 3 high pressure coolant injection, and Unit 3 residual heat removal pumps 3B/3D. The condition and status of important valves, switches, and components was observed. In general, the SSCs were in good material condition. With few exceptions, housekeeping was maintained at an acceptable level in these areas. Minor problems were found by the inspectors, and the licensee had already identified some of the items and had them scheduled for correction. The inspectors found a Unit 3 reactor core isolation cooling system pump suction piping spool piece labeled, "3-STN-071-0019 Suction Strainer." A strainer was not permitted by the system diagram and had the potential of affecting operability. The inspector promptly informed the Shift Manager. Engineering subsequently verified this to have been a labeling problem only, on the basis that the previously installed strainer had an entirely different outward appearance. The incorrect label was removed. Unit 2 was checked for a similar problem and none was found.

c. Conclusions

Based on a general walkdown inspection of selected risk-significant SSCs, the inspectors concluded that the SSCs were in a configuration appropriate for the mode of plant operation.

O2.2 Freeze Protection

a. Inspection Scope (71707)

The inspectors reviewed the licensee's preparations for cold weather. The inspectors performed walkdowns of freeze protection equipment (e.g., heat tracing, pipe insulation, and space heaters) installed on risk-significant plant systems susceptible to freezing.

b. Observations and Findings

The inspectors performed walkdowns of the Unit 3 diesel generators, residual heat removal service water system pump rooms, plant stack, condensate storage tanks, fire protection head tanks, 3EB battery room, and diesel-driven fire pump to the extent practical. The condition of visible portions of freeze protection equipment was generally good. The inspectors identified only minor discrepancies on freeze protection equipment which were not already identified by the licensee. The discrepancies were appropriately addressed by the licensee. Review of the working copies of General Operating Instruction 0-GOI-200-1, Freeze Protection Inspection, Revision 35, and other preventive maintenance procedures showed that the licensee was actively pursuing cold weather preparations.

c. Conclusions

Based on walkdowns of freeze protection equipment performed by the inspectors during the inspection period, susceptible and risk-significant plant systems were adequately protected from cold weather. The licensee was actively pursuing cold weather preparations.

O8 Miscellaneous Operations Issues (92901)

O8.1 (Closed) Licensee Event Report LER 50-260/1999-008-000: High Pressure Coolant Injection (HPCI) Inoperable Due to a Failed Flow Controller. The licensee added alarm points to the Units 2 and 3 control room alarm printer which would alert operators when the HPCI flow controller output signal drops to an abnormal level. This alarm printer is frequently monitored by operators. The inspector verified that the licensee added similar alarm points for the reactor core isolation cooling flow controller which is similarly in a standby condition. The inspector concluded that the addition of the alarm points to the control room alarm printer would aid operators in detecting a failed flow controller.

O8.2 (Closed) Licensee Event Report LER 50-260/1999-010-000: Reactor Scram Due to Moisture Separator High Level. During a reactor startup, a high water level in a moisture separator caused a main turbine trip which resulted in a reactor scram. The high water level was caused by a malfunction of the high level controller for one of the six moisture separators. The licensee found that there were some operator knowledge deficiencies regarding the moisture separator level control reservoir instrumentation operation. The licensee planned additional training which will include simulator and classroom training. The inspector concluded that the licensee's actions to address the operator knowledge

deficiencies were comprehensive. The alarm response procedures for high moisture separator levels were also revised to provide additional guidance to aid the operator in diagnosing level problems. The inspector also verified that the licensee placed the reactor scram in the licensee's Maintenance Rule database.

II. Maintenance

M1 Conduct of Maintenance

M1.1 Troubleshooting of Drywell Leakage Determination Equipment

a. Inspection Scope (62707)

The inspectors reviewed the licensee's actions to resolve abnormal indications received from the Unit 3 drywell unidentified leakage determination equipment.

b. Observations and Findings

On November 26, 1999, the Unit 3 control room operators received an alarm indicating an abnormal drywell floor drain sump level. The level in the sump was 12 inches and decreasing. The licensee performed troubleshooting on the level indication system in accordance with Work Order (WO) 99-012897-000, but found no problems. The integrator (sump pump flow totalizer) had already been declared inoperable because of previous instrument drift. The licensee was utilizing the alternate method of drywell leakage determination, as allowed by the Technical Specifications (TS). This method pumped the sump every 4 hours. Pump operation continued until the low level trip secured the pump. Leakage was then calculated from the change in sump level into a 12-hour leak rate. Because the sump level was below the low level pump trip on November 26, the operators could not utilize the alternate leakage detection method. This placed the Unit in a 24-hour shutdown limiting condition for operation (LCO) in accordance with TS 3.4.5.

After troubleshooting and analyzing the problem, the licensee concluded that the pump discharge piping had possibly siphoned the water out after the last pumpout. The sump was isolated and allowed to refill from leakage in the drywell. The integrator was calibrated and the normal drywell leakage method was placed in service. The previous drift problem with the integrator was unresolved at the time; however, any additional drift would be additive to the leakage calculation, thereby yielding more conservative results. Both the normal and the alternate methods were used for the first 24 hours to verify accuracy of the normal method. The inspectors reviewed the data and found the two methods to be in reasonable agreement. The 24-hour shutdown LCO was exited within the 24 hours when the alternate method provided satisfactory leak rate data. Problem Evaluation Report (PER) 99-012901-000 was initiated to enter the possible siphoning problem into the licensee's corrective action program. The PER focused on the drywell floor drain sump level continuing to lower after the pump was shut off.

The drifting problem with the Unit 2 and Unit 3 drywell leakage integrators has been a long term problem (since August 1998), which the licensee has not successfully resolved as of the end of this inspection period. The exact causes of this drift have not been formally identified; however, there was evidence of both siphoning out of the sump, and backflow into the sump through leaking check valves (which were replaced on Unit 3). The licensee's engineers developed a plan to obtain diverse and redundant data from the drywell leakage determination equipment in order to effectively identify the causes and correct them.

c. Conclusions

Although the inspectors considered that the licensee was acting appropriately to resolve the problem, the licensee has not been successful in resolving long-standing problems affecting the accuracy of drywell leakage detection equipment.

M1.2 Surveillance Observations (61726)

The inspectors observed all or portions of the following surveillance procedures:

- 0-SR-3.8.1.7(A), Diesel Generator A 24-Hour Run, Revision 3
- 3-SR-3.3.1.1.8(5 II), MSIV Closure - RPS Trip Functional Test (Channel B1/B2)
- 1/2-ETU-SMI 1-SB1.4, Procedure for Making 18-Month Relay Functional Tests on 4-kv Shutdown Bus 1, Revision 10
- 3-SR-3.4.4.1, Manual Calculation of Unidentified, Identified and Total Leakage, Revision 0002

In general, the licensee met regulatory requirements while performing the above surveillance tests.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Year 2000 (Y2K) Readiness Program Review (2515/141)

During the week of June 14, 1999, the inspector conducted an abbreviated review of Y2K activities and documentation. This review was documented in NRC Inspection Report 50-259,260,296/99-04. Three items remained open as of the conclusion of the review.

By letter dated September 20, 1999, the licensee notified the NRC that the remaining Y2K open items had been closed for all TVA nuclear sites. On October 21, 1999, the inspector reviewed the licensee's Y2K certification documentation and reviewed the three closed items in accordance with applicable portions of Temporary Instruction (TI)

2515/141, "Review of Year 2000 (Y2K) Readiness of Computer Systems at Nuclear Power Plants."

The inspector determined the certification documentation and operation of the three systems, listed below, to have adequately demonstrated Y2K compliance:

- Health Physics Information Management System (HIS-20)
- Nuclear Operations Management System (NOMS)
- Security Check-In Process Software (CHIPS)

Based on the June 14, and October 21, 1999, reviews, the inspector concluded that the Browns Ferry Y2K readiness programs had been satisfactorily completed.

E2.2 Performance of 10 CFR 50.59 Safety Evaluations

a. Inspection Scope (37551, 62707)

The inspectors reviewed licensee actions to address the blocking open of an emergency equipment cooling water (EECW) crosstie valve to the control air compressors without having performed the required safety evaluation.

b. Observations and Findings

On November 2, 1999, the licensee established a clearance to isolate and drain a Unit 1 raw cooling water (RCW) booster pump to facilitate replacement of the pump suction and discharge valves. In order to maintain cooling water flow to the control air compressors, it was necessary to open valve 0-FCV-67-0053, EECW crosstie to the control air compressors. As discussed in Section 10.10.3 of the Final Safety Analysis Report (FSAR), BFN-17, the valve is a pneumatically operated flow control valve and is designed to shut off flow to the air compressors on low EECW header pressure in order to guarantee adequate flow to the essential components. Difficulty in opening the crosstie valve from the Unit 1 back up control panel required the operators to open the valve from Unit 2. Based on the operators' concerns over whether the valve would stay open and provide required cooling to the air compressors, the operators blocked the valve open, as a precaution. Work on the RCW booster pump suction and discharge valves subsequently proceeded.

On November 3, the operators decided that the block was not needed, because one of the control air compressors would not be affected if the valve closed. The block was removed after being installed for about 18 hours. At this time, Operations questioned whether a safety assessment covering the installation of the block on the crosstie valve had been performed. The engineering response was that the valve should not have been blocked, because there was no safety assessment covering this condition. The operators initiated PER 99-012134-000 to enter the problem into the corrective action program. For reportability purposes, the operators requested a technical operability evaluation (TOE) to determine whether the EECW system was operable when the crosstie valve was blocked open.

On November 3, TOE 0-99-067-2134, Revision 00, was issued to address the past operability concern of EECW with valve 0-FCV-067-0053 blocked open. The inspectors reviewed the TOE for clarity, content and validity. The TOE referenced Calculation MD-Q0067-930028, Revision 3, EECW System Pressure Drop EZ FLOW. This calculation supported a determination that the EECW system was operable under design basis conditions and with the crosstie valve blocked open. However, the TOE stated that the referenced calculation indicated that a pressure of 66 psig was needed at the valve to ensure that the EECW system could perform its safety function and, that with four pumps running, the pressure was measured at 113 psig during the period the crosstie valve was blocked open. The inspectors expressed concern that the 113 psig value did not address system functionality in terms of design basis conditions, i.e., no more than three pumps would be running (single failure of one pump). The licensee pointed out that this TOE would not be suitable to support future blocking of the crosstie valve, but, rather, the TOE evaluated the past condition, and the 113 psig value provided confidence that the system would have performed its safety function with plenty of margin. The inspectors accepted the TOE as valid but containing extraneous information that could mislead the operators into making an inappropriate operability determination.

Blocking valve 0-FCV-067-0053 open, while considering the EECW system to be operable, constituted a change to the facility as described in FSAR Section 10.10.3. 10 CFR 50.59 requires, in part, that such changes shall be supported by a written safety evaluation which provides the bases for the determination that the changes did not involve an unreviewed safety question. Contrary to this regulatory requirement, on November 2, 1999, the above valve was blocked open without a supporting safety evaluation. There have been other, recent similar occurrences where a change was made to the facility without the appropriate safety evaluation. Therefore, this occurrence was not considered minor. For example, NRC Inspection Report 50-259,260,296/99-01 described a change to Unit 1 and Unit 2 main turbine stop valve load limit switches without a safety evaluation. NRC Inspection Report 50-259,260,296/99-02 described the licensee's failure to perform a safety evaluation in support of high pressure coolant injection system configuration changes for work/testing. Both of these issues resulted in non-cited violations. The licensee acknowledged that the recent problems associated with 10 CFR 50.59 requirements warranted additional review. PER 99-013192-000 was initiated to address this issue.

This Severity Level IV violation is being treated as a non-cited violation (NCV), consistent with VII.B.1 of the NRC Enforcement Policy. This violation is identified as NCV 50-259/99-07-01, Blocking an EECW Valve Open Without a Safety Evaluation.

c. Conclusions

While establishing a clearance for Unit 1 maintenance, operators blocked an EECW crosstie valve open, which was a change to the facility as described in the FSAR. This action was not supported by a safety evaluation as required by 10 CFR 50.59.

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Radioactive Effluent Control Program

a. Inspection Scope (84750)

The inspectors reviewed the overall results of the radioactive effluent control program as documented in the Annual Radioactive Effluent Release Report for 1998 and licensee records for radioactive effluents released to date during 1999. Performance of the effluent control program was evaluated relative to the design objectives in 10 CFR 50, Appendix I for radiation doses from plant effluents.

b. Observations and Findings

The 1998 Annual Radioactive Effluent Release Report indicated that there were no planned liquid effluent releases that year and that the doses to the public from gaseous effluents were less than one percent of the annual regulatory limits. One abnormal/unplanned liquid release of approximately 14 micro-curies occurred as a result of a failed packing on a reactor water cleanup system sample pump. The resulting dose from that release was much less than one percent of regulatory limits. During 1999 liquid releases were temporarily resumed due to contamination of the liquid radwaste processing system by a spill of hydraulic fluid from the electro-hydraulic control (EHC) system. The doses from those liquid releases and from the gaseous effluents released year to date during 1999 were much less than one percent of regulatory limits. The inspectors determined that such low doses represented good performance by the Effluent Control Program.

The inspectors also observed collection of samples of the Unit 2 and Unit 3 post treatment off gas on October 22, 1999. By direct observation, the inspectors determined that the samples were collected in accordance with applicable sampling procedures.

The inspectors also discussed condensate storage tank (CST) surveillance requirements with the licensee. Through a review of sampling procedures and analytical results, the inspectors determined that the licensee had established and implemented a surveillance program for monitoring and limiting the activity concentration in the CSTs. TS 5.5.8.b and Technical Requirements Manual (TRM) 3.7.1 prescribed the surveillance requirements for ensuring that the specified limit for the quantity of radioactivity contained in outside liquid radwaste storage tanks was not exceeded. The limit for the quantity of radioactivity in those tanks was established such that, in the event of an uncontrolled release of the tank's contents, the resulting concentrations at the nearest potable water supply and the nearest surface water supply would be less than liquid effluent concentration limits specified in 10 CFR 20, Appendix B. The licensee had made the interpretation that the CSTs were not radwaste storage tanks and therefore the surveillances required by TS 5.5.8.b and TRM 3.7.1 were not applicable to the CSTs. Given that interpretation, there were no TS or TRM required surveillances for the CSTs.

The licensee indicated that the TRM would be revised to clarify the surveillance requirements for the CSTs.

c. Conclusions

The licensee had maintained an effective program for the control of liquid and gaseous radioactive effluents from the plant. The radiation doses from those releases were a small percentage of regulatory limits.

R1.2 Radiological Environmental Monitoring Program

a. Inspection Scope (84750)

The inspectors reviewed the overall results of the radiological environmental monitoring program as documented in the Annual Radiological Environmental Operating Report for 1998. Those results were compared to the program requirements delineated in the Offsite Dose Calculation Manual (ODCM).

b. Observations and Findings

The inspectors noted that, in accordance with the ODCM, the report included a description of the program, a summary and discussion of the results for each exposure pathway, analysis of trends during the operational years as compared to the preoperational years, and an assessment of the impact on the environment based on program results. The report also included a tabulation of the summarized analytical results for the samples collected during 1998. From a review of those data, the inspectors determined for selected exposure pathways that the sampling and analysis frequencies specified in the ODCM had been met. As indicated in the report, very low concentrations of man-made isotopes were occasionally detected in a few of the samples but were of no dose consequence. It was further concluded that any activity which may be present in the environment as a result of plant operations did not represent a significant contribution to the exposure of the public.

The inspectors reviewed analytical results for three types of environmental samples (air, milk, and drinking water) collected during 1999 and verified that samples for those pathways were being collected and analyzed at the frequencies specified in the ODCM.

The inspectors also visited four air sampling stations and five radiation monitoring stations. The inspectors noted that the air sampling equipment was operable and in good working order, thermoluminescent dosimeters (TLDs) were in place at the radiation monitoring stations, and the sampling stations were located as indicated in the ODCM.

c. Conclusions

The licensee complied with the sampling, analytical and reporting requirements for the radiological environmental monitoring program, the environmental sampling equipment was well-maintained, and the monitoring program was effectively implemented.

R1.3 Transportation of Radioactive Materials

a. Inspection Scope (86750)

The inspectors evaluated selected elements of the licensee's radioactive materials transportation program for consistency with the requirements delineated in 49 CFR Parts 170 - 179, 10 CFR Part 20, and 10 CFR Part 71.

b. Observations and Findings

The inspectors reviewed the licensee's procedures for shipping radioactive materials and determined that they adequately addressed the following: assigning the form, quantity type, and proper shipping name of the material to be shipped; classifying waste destined for burial; selecting the type of package required; labeling and marking the package; placarding the vehicle; assuring that the radiation and contamination limits are met; and preparing shipping papers.

The inspectors reviewed the shipping papers for five recent shipments and verified that the recorded hazardous material description information and emergency response information were accurate and in accordance with the requirements of 49 CFR 172 Subparts C and G. The records of the radiological surveys of the shipping packages and transport vehicles indicated that the radiation and contamination levels were well within the limits specified in 49 CFR 173, 441, and 443. The licensee's records also indicated that shipping package marking and labeling and vehicle placarding were in accordance with the requirements of 49 CFR 172 Subparts D, E, and F. The inspectors also determined the licensee had maintained records of shipments of licensed material as required.

The inspectors also verified that the licensee possessed a current "Quality Assurance Program Approval for Radioactive Material Packages" (NRC Form 311).

The licensee also informed the inspectors that a 10 CFR 50.59 evaluation had been performed for long-term onsite storage of low-level radioactive wastes under the provisions of their existing operating licenses. Implementation was expected by mid-November 1999.

c. Conclusions

The licensee had effectively implemented a program for shipping radioactive materials in accordance with NRC and Department of Transportation regulations.

V. Management Meetings

X1 Exit Meeting Summary

The resident inspectors presented inspection findings and results to licensee management on December 3, 1999. The licensee acknowledged the findings presented. The licensee did not identify any of the materials reviewed during this inspection as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

T. Abney, Licensing Manager
A. Bhatnagar, Site Support Manager
R. Coleman, Radiological Control Manager
J. Corey, Radiation Protection and Chemistry Manager
J. Grafton, Site Quality Assurance Manager
J. Herron, Interim Site Vice President
R. Jones, Plant Manager
R. LeCroy, Site Security Manager
R. Rogers, Maintenance Superintendent
G. Little, Operations Manager
R. Moll, System Engineering Manager
W. Nurnberger, Chemistry Superintendent
D. Olive, Operations Superintendent
B. Pierce, Superintendent, Radwaste and Environmental
D. Sanchez, Training Manager
J. Schlessel, Maintenance Manager
J. Shaw, Design Engineering Manager
R. Wiggall, Site Engineering Manager

INSPECTION PROCEDURES USED

IP 37551	Engineering
IP 61726	Surveillance Observations
IP 62707	Maintenance Observations
IP 71707	Plant Operations
IP 71750	Plant Support Activities
IP 84750	Radioactive Waste Treatment, and Effluent and Environmental Monitoring
IP 86750	Solid Radioactive Waste Management and Transportation of Radioactive Material
IP 92901	Follow-up - Plant Operations
IP 92904	Follow-up - Plant Support
TI 2515/141	Review of Year 2000 (Y2K) Readiness of Computer Systems at Nuclear Power Plants

ITEMS OPENED AND CLOSED

Closed

50-260/1999-008-000	LER	HPCI Inoperable Due to a Failed Flow Controller (Section O8.1).
50-260/1999-010-000	LER	Reactor Scram Due to Moisture Separator High Level (Section O8.2).

Opened and Closed

50-259/99-07-01	NCV	Blocking an EECW Valve Open Without a Safety Evaluation (Section E2.2).