



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

MAY 02 1984

Report Nos.: 50-259/84-12, 50-260/84-12, and 50-296/84-12

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

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

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

Facility Name: Browns Ferry 1, 2, and 3

Inspection at Browns Ferry site near Decatur, Alabama

Inspector: *R. E. Weddington* 4/19/84  
 R. E. Weddington Date Signed

Approved by: *G. R. Jenkins* 4/19/84  
 G. R. Jenkins, Section Chief  
 Emergency Preparedness and Radiological Protection Branch  
 Division of Radiation Safety and Safeguards

SUMMARY

Inspection on March 26-30, 1984

Areas Inspected

This routine, unannounced inspection involved 39 inspector-hours on site in the areas of Exposure Control, ALARA, Compliance Program, Open Items and Transportation.

Results

Of the five areas inspected, no violations or deviations were identified in three areas; three apparent violations were found in two areas.

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## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*D. C. Mims, Plant Engineering
- \*T. L. Chinn, Compliance Staff Supervisor
- \*J. N. Hutton, Reactor Engineering Branch, Division of Nuclear Power
- \*S. G. Bugg, Radiation Health Supervisor
- \*A. W. Sorrell, Plant Health Physics Supervisor
- \*W. C. Thomison, Plant Engineering Supervisor
- \*H. M. Crowson, Plant Health Physics Staff
- \*E. M. Cargill, Jr., Plant Health Physics Staff
- \*J. M. Corey, Plant Health Physics Staff
- \*A. L. Clement, Plant Radwaste Supervisor
- \*J. E. Swindell, Assistant Power Plant Superintendent
- \*G. T. Jones, Plant Superintendent
- \*M. D. Kelley, Radwaste Operations, Division of Nuclear Power

Other licensee employees contacted included eight technicians, two operators, four security force members, and two office personnel.

#### NRC Resident Inspector

- \*C. A. Patterson, Resident Inspector

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on March 30, 1984, with those persons indicated in paragraph 1 above.

### 3. Licensee Action on Previous Enforcement Matters

(Closed) UNR 50-259/260/296/83-30-02, Investigate how a radioactive material storage area outside the building became unposted. The licensee was not able to determine how the subject postings were removed. The licensee now requires a health physics escort for radioactive material movements outside the building. More durable signs are now being used for outside storage areas. The inspector noted no posting problems during his tours. This item is considered closed.

(Closed) UNR 50-259/260/296/83-12-03, Continuous health physics technician coverage in high radiation areas. When a radiation work permit specifies continuous health physics coverage, the health physics supervisor and/or technician is given the flexibility to establish how frequently the technician is to visit the work site based on the nature of the work and the radiological conditions. The Region has determined that this policy is not

inconsistent with Technical Specification (TS) requirements. The licensee provides each person that enters a high radiation area an alarming digit dosimeter. This item is considered closed.

(Closed) UNR 50-259/260/296/84-03-05, Review shipping manifests for two overweight radioactive material shipments that had to return to the site in 1983. The inspector reviewed the records of the two shipments in question. No violations of requirements were noted. This item is considered closed.

(Closed) UNR 50-259/260/296/81-27-01, Evaluate posting of discrete radiation areas within the reactor building. The inspector toured the reactor, turbine and radwaste building and noted that access to specific areas requiring posting as radiation areas were posted as such. This item is considered closed.

(Closed) VIO 50-259/260/296/82-44-01, Unauthorized disposal of waste oil. The licensee procedures and operating instructions now requires that waste oil samples be obtained and measure less than the detection capability of the radiochemistry analysis equipment prior to being released. If activity is detected, the oil is solidified and disposed of as radioactive waste. This item is considered closed.

(Closed) VIO 50-259/260/296/82-44-02, Inadequate sample and evaluation of waste oil. The licensee no longer samples oil and water mixtures. The water is removed prior to sampling. When radioactivity is discovered, the material is solidified and disposed of radioactive waste. This item is considered closed.

(Closed) VIO 50-259/260/296/83-38-02, Failure to post a drum reading 65 millirem/hour as radioactive material. The licensee has distributed a copy of the inspection report to their health physics technicians and discussed the issue in a recent seminar. The health physics staff has sent memoranda to plant operations and supervisory personnel outlining the requirements to control movements of radioactive material. No problems of this nature were noted during the inspection. This item is considered closed.

(Closed) VIO 50-259/260/296/83-38-03, Three examples of procedure violations. Browns Ferry radiological control instructions (RCI)-5 has been updated in include the July, 1983 changes to 49 CFR. The other two examples involved failure to perform a proper frisk and chewing gum and candy in the plant regulated area. Administrative actions in accordance with plant procedures were taken against the individuals involved. These problems have been discussed with plant personnel in recent training sessions. This item is considered closed.

(Closed) VIO 50-259/260/296/83-03-06, Wearing contaminated gloves outside a contamination control area. The plant laborer group was given instruction in proper radiological work practices. Current health physics problems are incorporated into routine training. This item is considered closed.

(Closed) VIO 50-259/260/296/83-12-02, Failure to post a high radiation area and personnel inside a high radiation area without a dose rate instrument. Radiological incident reports were issued by the licensee and the involved personnel received additional training. The licensee has obtained sufficient alarming digital dosimeters to issue to each person entering a high radiation area so that they can better comply with the instrument requirements. This item is considered closed.

(Closed) VIO 50-259/260/296/83-12-04, Three examples of procedure violations. The licensee issued radiological incident reports and gave additional instruction to involved personnel on observation of radiological barriers. This item is considered closed.

(Closed) VIO 50-259/260/296/82-26-02, Shipment of an acidic solution which caused a breach in a package of radioactive material. The licensee implemented procedural controls and verifications during the packaging and processing of radioactive materials packages to ensure that prohibited materials are not introduced in the waste. This item is considered closed.

(Closed) VIO 50-259/260/296/83-30-01, Entry into a contamination zone without a radiation work permit and inability to read pocket dosimeters in high radiation areas. The licensee changed their radiation control procedure (RCP)-1 to better define the proper method to reach across control barriers in order to operate valves. The field services group has removed all protective clothing coveralls without outside pockets from service since these garments do not provide a readily accessible location for the worker to place his pocket dosimeter. This item is considered closed.

(Closed) VIO 50-259/260/296/83-25-01, Failure to post an outside radioactive materials storage area. Licensee procedures now require that radioactive materials movements outside buildings require a health physics escort. No problems of this nature were noted during the inspection. This item is considered closed.

(Closed) VIO 50-259/260/296/83-25-03, Failure to perform an adequate whole body frisk. The plant superintendent issued a memorandum to plant personnel concerning frisking requirements. The licensee has improved the maintenance and availability of friskers to minimize delays waiting to frisk. The inspector noted that frisking practices were improved. This item is considered closed.

(Closed) VIO 50-259/260/296/83-25-04, Failure to post a contamination control zone. A copy of the inspection findings were forwarded to health physics technicians and they have been instructed to be observant for this type of problem during their facility tours. The inspector noted no similar problem. This item is considered closed.

(Closed) VIO 50-259/260/296/83-03-02, Failure to properly evaluate TLD and pocket dosimeter discrepancies. The licensee now has a formal monthly review established for TLD and dosimeter discrepancies. The computer generated discrepancy list is supplemented by a manual review of the monthly

data base to identify discrepancies that do not meet the general evaluation criteria yet appear suspect. This item is considered closed.

(Closed) VIO 50-259/260/296/83-03-03, Failure to provide personnel in high radiation areas with dose rate meters. The licensee has obtained sufficient quantities of digital alarming dosimeters to provide an instrument to each person who enters a high radiation area. The inspector noted no similar problems. This item is considered closed.

(Closed) VIO 50-259/260/296/82-14-01, Failure to post a high radiation area on the demineralizer shield plug. The licensee took a number of corrective actions to make their health physics technicians more aware of the radiological hazards of removing these shield plugs. The plugs have also been posted as requiring health physics coverage when they are removed. This item is considered closed.

#### 4. Unresolved Items

Unresolved items were not identified during this inspection.

#### 5. Open Items (Inspector Follow-up Items)

(Closed) IFI 50-259/260/296/84-03-06, Revise TLD and pocket dosimeter discrepancy evaluation criteria. The licensee has revised their computer generated discrepancy criteria to state that (1) the value of either the TLD or the dosimeter should be greater than 300 millirem, (2) the difference between TLD and dosimeter readings should be greater than fifty percent (50%), and (3) the difference between TLD and dosimeter values should be greater than 200 millirem. Health physics personnel now conduct the discrepancy investigation. This item is considered closed.

(Closed) IFI 50-259/260/296/82-21-01, Updating radiation work permits with current radiological data. Radiation works permits are now updated every seven days if radiological conditions are not subject to change, every three days during outages or whenever significant changes are noted in the radiological conditions. The inspector noted no problems in this area. This item is considered closed.

(Closed) IFI 50-259/260/296/82-21-04, Incorporate proper frisking techniques into employee training. The licensee now includes a demonstration and practical abilities evaluation of proper frisking techniques as a part of their initial employee training. The inspector observed a portion of one of these classes and interviewed the training instructors. The instructor knowledge was good and the subject was being adequately covered in the class. This item is considered closed.

(Closed) IFI 50-259/260/296/82-21-05, Evaluate compliance with 10 CFR 19 requirements for posting of notices of violation. The licensee has four designated bulletin boards to display current notices of violation. Personnel have been designated to be responsible for ensuring the boards are

maintained. No problems were noted in this area. This item is considered closed.

(Closed) IFI 50-259/260/296/82-29-02, Investigation of radiation incident reports. The licensee has implemented their standard practices procedure 19.11, which specifies investigation procedures, disciplinary actions for various categories of violations and follow-up requirements for the identified problem. The licensee is also developing a computer based trending system for these reports. This item is considered closed.

(Closed) IEN 50-259/260/296/83-C6-01, IE Notice 82-49, Gaseous effluent monitor differential pressure. An in-line differential pressure gauge has been installed on the main stack sample line. Licensee experience has been that the pressure differential between the main stack and the sample line has been approximately eight percent (8%). Measurements of effluent concentrations are adjusted accordingly. Other gaseous effluent sample lines are tested using portable pressure gauges. The licensee is evaluating installing permanent gauges in all such lines. This item is considered closed.

(Closed) IFI 50-259/260/296/83-03-04, Evaluate adequacy of contamination surveys and postings. During the course of the inspection, the inspector reviewed selected contamination survey records and observed the postings of various areas. No problems were noted. This item is considered closed.

(Closed) IFI 50-259/260/296/83-12-01, Place liquid effluent flow rate meter on a routine maintenance schedule. The licensee now calibrates the flow rate meters every six months. Similar instrumentation on other effluent systems have also been evaluated and incorporated into the maintenance program where appropriate. These changes have been incorporated into plant procedure BF SIMI-77. This item is considered closed.

(Closed) IFI 50-259/260/296/83-03-07, Evaluate shock to pocket dosimeters at gatehouse dropbox. The licensee has evaluated the problem and concluded that the short drop does not result in enough shock to cause the dosimeter to go off scale. The box has been covered with lexan and has a narrow slot to preclude personnel from tossing the dosimeters into the box. Dosimeters are checked by security and rezeroed by health physics if they are off scale prior to being reissued. This item is considered closed.

(Closed) IFI 50-259/260/296/83-12-05, Improve housekeeping in reactor and turbine buildings. The licensee has implemented a program to improve housekeeping in the facility. The licensee is also conducting training sessions for their supervisory personnel on this subject. The inspector noted improvement in this area. This item is considered closed.

(Closed) IFI 50-259/260/296/83-38-04, Implement a radioactive material shipment tracking system per the requirements of 10 CFR 20.311. The licensee has implemented such a tracking system by use of a ledger and suspense file maintained in the shipping trailer. The inspector noted that the system was being maintained. This item is considered closed.

## 6. Exposure Control

The inspector reviewed the licensee's procedures for issue of personnel dosimeters and the operation of the plant dosimetry section. The licensee uses two types of TLD devices, the Harshaw and the Panasonic. The Harshaw is used for routine monitoring and the Panasonic is used for high exposure jobs and multibadging. The licensee has the capability to process Panasonic badges on site, but sends the Harshaw badges to the TVA dosimetry office at Muscle Shoals, Alabama, for processing on a monthly basis. The inspector observed the manner in which TLD processing results are obtained and entered into the dose tracking computer system. The personnel in the dosimetry office have an orderly system to ensure all of the information is properly recorded and have various quality control checks in effect. The inspector observed that the dosimetry technicians were diligently and accurately performing their duties and noted no problems in this area.

The inspector inquired into the status of multiple badging. The licensee stated that their use of such badging and the evaluation of their badging criteria was continuing. A concern had previously been expressed that the criteria of exposure gradients having to be greater than fifty percent (50%) may be too high, particularly for personnel approaching exposure control limits. The licensee acknowledged the concern and stated that the NRC would be provided a final report when they had concluded their multiple badging evaluation.

The inspector was informed of an event which occurred the week prior to the inspection in which a worker had made numerous drywell entries wearing a TLD badge that he had previously reported as being lost in January, 1984. The worker was observed wearing the incorrect issue period badge by a dosimetry section technician. The licensee performed an investigation and took disciplinary action against the individual. The inspector reviewed the licensee's report and noted no problems with the dose assigned to the worker. The inspector questioned why the worker was not identified to be wearing the incorrect badge when the health physics technicians at the drywell control point permitted him access on several occasions. The licensee stated that the distinguishing characteristics of the various issue period badges are not common knowledge among the health physics technicians. The inspector stated a concern that the health physics technicians at the control points are unable to identify a worker wearing an out-of-date badge. The licensee acknowledged the concern and stated that they would evaluate the question.

The inspector observed that visitor TLD badges issued by public safety (security) personnel at the site gatehouse have the individual's name and social security number written on the back of the badge whereas permanently issued TLD badges have the information typed on the front. The inspector expressed a concern that a visitor might be inclined to wear the TLD with the name side facing outward which would result in the beta radiation window on the badge facing the wrong direction. The inspector interviewed four security force members at the gatehouse and three of them stated that they instruct visitors to wear the badge with the name side facing to the front.

No procedure or written instruction was available at the gatehouse to clarify how the badge is to be worn. The licensee immediately took action to ensure the security force personnel understood the correct manner in which to wear the TLD badge and alerted their plant and outage health physics sections to send technicians into the plant to check that visitors were wearing the TLD properly. The licensee stated that they would inform the other security shifts and would formulate written instructions. The inspector then performed a spot check of visitor TLD badges in the issue rack at the gatehouse and noted that approximately ten to twenty percent had excess tape over the beta window as a result of the manner in which the name sticker is affixed to the badge. The inspector stated a concern that indiscriminately placing tape across the beta window would alter its sensitivity to beta radiation. The licensee acknowledged the concern and stated they would take appropriate corrective actions. The inspector then visited the Unit 3 drywell and torus control points to determine if health physics technicians check that a worker has his TLD orientated with the beta window in the proper direction inside of his protective clothing pocket. The technicians and supervisor interviewed stated that they do not even check that a worker has his dosimetry before allowing entry in the high radiation area. The inspector expressed a concern that the health physics technicians do not check that the worker has dosimeter and that it is being properly worn. The licensee acknowledged the concern and stated that they would evaluate this matter.

The inspector then inquired how reports of lost TLD badges are handled. This licensee stated that lost badges are reported to the dosimetry office and a report is initiated. The worker is routinely assigned the exposure from his pocket dosimeter unless his cumulative exposure or work history is such that a more detailed investigation is considered warranted. The inspector and licensee discussed means to make workers more aware of the importance of not losing TLD badges and means to identify personnel who may falsely report a lost badge or lose an unacceptable number of badges. The licensee stated that they would evaluate this area and would consider a trending system combined with notification of the worker's supervisor when a TLD badge is lost. They also stated that they would evaluate restricting the individual from controlled areas until the appropriate health physics field office conducted a search for the lost TLD. The inspector stated that he had identified several concerns related to dosimetry and that these would be designated as an Inspector Follow-Up Item for the next routine inspection. In summary, the licensee should evaluate (1) Instructions given to public safety for the issue and wear of visitor TLD's, (2) placement of tape over badge beta windows, (3) checks for dosimetry at control points, (4) unique identification of TLD badge issue series, and (5) lost TLD badge investigation, and trending (IFI 50-259/260/296/84-12-04).

The inspector then reviewed the reports sent to terminated employees of their whole body exposures. The inspector noted that subcontractor employees are sent monthly reports of their exposure and are not sent a summary report of their exposure when they terminate. The licensee stated that they do not know when a contractor is terminating and that the employee can combine the monthly letters to determine his cumulative exposure. The



inspector determined that terminated contractors are required to complete an out-processing form which also requires a whole body count. The last monthly letter that the employee receives states that he has received a termination whole body count and gives the results. The inspector observed that it appears that the licensee is aware that the person is terminating. The inspector contacted the NRC Headquarters office which receives the licensee reports and inquired as to the effect of their receiving copies of the monthly letter instead of a summary report upon termination. They stated that each monthly letter is processed as if it was a termination report since they cannot hold these reports to see if the worker appears on a subsequent monthly report. This practice then distorts the tracking of transient workers since a particular worker is considered terminated more frequently than actual. The inspector stated a concern that not giving a summary report could cause the worker to confuse or misrepresent his last monthly letter to a subsequent employer. The licensee acknowledged the concern and stated that they implemented the use of monthly reports to ensure that all of the exposure was reported. The inspector stated that failure to give a terminated employee a report of his exposure incurred during the period of his work assignment at the site was an apparent violation of 10 CFR 20.409 and failure to report to the NRC was an apparent violation of 10 CFR 20.408 (VIO 50-259/260/296/84-12-03).

The inspector then asked to see a copy of the exposure report sent to an individual who had received 3059 millirem in the third quarter of 1983. The licensee produced a copy of the report of the overexposure sent to the NRC per the requirements of 10 CFR 20.405. They also gave the inspector the worker's monthly exposure letters and a letter sent to the individual in response to his request for additional information on his overexposure. This letter contained the same report as was forwarded to the NRC, was dated three days later than the NRC report and contained the statement: "This report is being furnished to you for your information and is in addition to reports required by Federal regulations." The inspector stated that 10 CFR 20.409 requires that whenever a licensee reports exposures to the NRC, they must also report in writing to the individual at a time no later than the time of submission to the NRC. The report to the individual is required to contain the standard statements of 10 CFR 19.13a. The licensee stated that no other report was sent to the individual, however, the letter that was sent contained all of the necessary factual information. The inspector informed the licensee that they were in apparent violation of 10 CFR 20.409 since the letter in question was sent in response to the individual's request, stated that it was in addition to reports required by regulation, and did not meet the standards of the required letter in that it was sent after the report to the NRC and did not contain the required statements (VIO 50-259/260/296/84-12-03).

#### 7. ALARA

The inspector reviewed the ALARA actions in place for the current Unit 3 outage. The licensee had improved in their planning and preparations for the outage. The inspector noted as particularly commendable the temporary shielding work that had been done in Unit 3. The licensee brought in an

outside contractor to develop shielding plans for the outage. The licensee stated that 300 shield blankets had been used for the Unit 1 outage and over a thousand are now in use in Unit 3. They estimate that they will use twice as much shielding in the upcoming Unit 2 outage. The licensee stated that the last shielding effort in Unit 3 was done at an expense of 2.8 man-rem exposure and will save an estimated 80-100 man-rem. A forty percent (40%) reduction in general area radiation levels has been observed. Each shielding job is evaluated for structural seismic and radiological considerations. The shielding plan includes detailed diagrams of shielding placement and how it is to be secured. A system of chains suspended from pipe whip restraints permit the shield blankets to be rapidly installed with "S" hooks. The licensee has a dedicated crew of shielding installers that is becoming very proficient. The inspector noted considerable improvement in the ALARA area.

#### 8. Compliance Program

The licensee has implemented a program to upgrade their compliance performance. Corporate personnel are on site to assist. The inspector observed portions of the compliance training being given all station personnel and thought that the classes were being well instructed and well received by the employees. The inspector noted that the licensee has made improvements in the areas of housekeeping, radioactive waste reduction, adherence to local procedures and increased health physics management involvement in the daily activities of the plant.

#### 9. Transportation of Licensed Materials

On October 25, 1983, the licensee performed a radioactive shipment consisting of dewatered resins in a shielded cask and liner to the Chem-Nuclear waste disposal site near Barnwell, South Carolina, under allocation number 1083-165-A. The resin liner was sampled on November 4, 1983 at the disposal site and found to contain 95 gallons of free-standing water which is in excess of the 0.5 percent of volume (6.75 gallons) permitted by Condition 29 of the State of South Carolina license for the Barnwell site. In the meantime, two other resin shipments had arrived at the Barnwell site from Browns Ferry. TVA requested that the two resin liners be returned to Browns Ferry without sampling and Chem-Nuclear agreed. One of the returned liners was sampled at Browns Ferry and found to contain approximately 100 gallons of free-standing water. On November 8, 1983 the licensee was informed by the State of South Carolina that a civil penalty was being assessed and that their permit to ship resins to Barnwell was being suspended until such time that they could demonstrate ability to comply with all applicable provisions of federal and state law. In two correspondences dated November 18 and December 2, 1983, TVA informed the State of South Carolina of the causes of the excess water in the resin liners and the actions they had taken to preclude recurrence. The licensee's permit to ship resins was subsequently reinstated. The licensee upgraded their procedure for dewatering resin liners, TVA Operating Instruction (OI)-77, to provide more specific instructions on valve alignment, sequencing and dewatering times. A check list was also incorporated

into the procedure. They also affixed nameplates to identify the hoses and valves in the dewatering system. The licensee implemented a process control program which includes periodic tests of resin liner water content. The inspector informed the licensee that shipping resin liners containing excess free-standing water was an apparent violation of 10 CFR 30.41(c), which requires that the licensee verify that the intended recipient is authorized to receive the type of material being shipped (VIO 50-259/260/296/84-12-01).

The inspector was shown by the licensee a report of the investigation conducted by the TVA Nuclear Safety Review Staff (NSRS) of the resin liners containing excess water. The NSRS investigation was conducted in November and December 1983 and their report was dated March 9, 1984. One of the areas examined by the NSRS was the practice of mixing bead and powdex resins in the same liner and the effect that has on the dewatering technique used. They stated that the dewatering characteristics of liners containing either of the two resin types was known, however, no evaluation had been performed on mixtures of resins. They also stated that the TVA engineering design group had indicated that the two resin systems were not intended to be combined and that the FSAR describes separated systems. The NSRS concluded that the licensee was in violation of 10 CFR 50.59 in that an unreviewed safety question determination (USQD) had not been performed for mixing the two resin types in the same liner. The licensee stated that they were still evaluating this finding. The inspector questioned how the two types of resin become mixed. The FSAR, Section 9.3.4.1 and plant drawing 47W830-6 describe the two systems. Powdex resin is accumulated and stored in phase separator tanks. After sufficient volume is stored, the resin is piped to the waste packing area. Bead resin goes to a spent resin tank and then to the waste packing area. The licensee stated that in 1973, the two systems were inter-connected in order to give them more flexibility in operation. The cross connection involved a line shown on the plant drawing as a clean out (water flush) line to the spent resin tank. Bead resin is being sent in the opposite flowpath through this water line, and another line the licensee installed directly to the phase separator, where the bead and Powdex resins mix. The licensee was not aware that this modification was not shown on the plant drawing. The inspector informed the licensee that they were in apparent violation of 10 CFR 50.59(b) in that they (1) made changes in the facility as described in the FSAR and (2) mixed bead and Powdex resins without performing an evaluation that the changes did not involve an unreviewed safety question. The second part of the violation involving mixing the two resin types is not considered licensee identified in that it does not meet the criteria of 10 CFR 2.C.IV.A.(4) in that the system continued to be operated and a USQD was not initiated until after the issue was addressed by the inspector, a period of approximately four months after the NSRS investigation (VIO 50-259/260/296/84-12-02).