



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30303

JUN 28 1984

Report Nos.: 50-259/84-19, 50-260/84-19, and 50-296/84-19

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 Conducted: May 21 - 25, 1984

Inspector: *R. E. Weddington*  
R. E. Weddington

6/13/84  
Date Signed

Approved by: *G. R. Jenkins*  
G. R. Jenkins, Section Chief  
Division of Radiation Safety and Safeguards

6/13/84  
Date Signed

SUMMARY

Scope: This routine inspection entailed 37 inspector-hours (eight inspector-hours on backshifts) on site in the areas of radioactive waste and transportation, internal exposure control, licensee audits, control of radioactive material, Health Physics organization and followup on previous enforcement matters and inspector followup items.

Results: One violation was identified - failure to properly brace a radioactive waste package during transport.

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## REPORT DETAILS

### 1. Licensee Employees Contacted

- \*J. A. Coffey, Site Director
- A. W. Sorrell, Health Physics Supervisor
- \*M. D. Kelley, TVA Radwaste Operations Engineer
- \*G. T. Jones, Plant Superintendent
- \*D. C. Mims, Plant Engineering Supervisor
- \*J. R. Clark, Plant Chemistry Supervisor
- \*H. M. Crowson, Assistant Health Physics Supervisor
- \*J. E. Swindell, Assistant Plant Superintendent
- \*J. R. Pittman, Assistant Plant Superintendent
- \*A. Clement, Radwaste Supervisor
- \*K. Whitt, Nuclear Safety Review Staff
- \*J. Corey, Plant Health Physicist
- \*T. Chinn, Plant Compliance Staff

Other licensee employees contacted included six technicians and three office personnel.

NRC Resident Inspector

\*G. L. Paulk, Senior Resident Inspector

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on May 25, 1984 with those persons indicated in paragraph 1 above. The following issues were discussed in detail: an apparent violation for failure to properly brace a radioactive waste package during transport (paragraph 4) and respiratory protection training (paragraph 5).

The licensee acknowledged the inspection findings and took no exceptions.

### 3. Licensee Action on Previous Enforcement Matters

(Closed) Violation 50-259/260/296/83-02-01. The licensee was cited for obtaining and analyzing RHR heat exchanger service water in a one liter sample bottle contrary to plant procedures which required the use of a three liter, Marinelli beaker. The licensee responded to the violation by letter dated March 16, 1983 in which they stated that Browns Ferry Technical Instruction (BF-TI)-38, section 1012 was changed to allow use of both sample containers. The inspector verified the procedural changes had been made. This item is considered closed.

(Closed) Violation 50-259/260/296/84-03-01. The licensee was cited for four instances in which they failed to establish or adhere to radiation control procedures. The licensee stated their corrective actions in a letter dated April 13, 1984.

- (a) Applicable provisions of 10 CFR Part 61 and 10 CFR 20.311 had not been incorporated into local radioactive material shipping procedures. The licensee corrective action was to make appropriate changes to their shipping procedures. The inspector reviewed Browns Ferry Standard Practice 7.9 and determined that the necessary changes had been made.
- (b) Plant radwaste procedures did not specify which preshipment activities were to be performed again when radioactive material transport vehicles were brought back onsite for load rearrangements. The licensee published a change to their Pre-Shipment Checklist, Form BF 86, to indicate which steps must be recertified. The inspector reviewed the new checklist and determined that it was adequate.
- (c) A licensee employee failed to perform a whole body frisk upon exiting a contamination zone. The licensee took disciplinary action against the employee. Plant building services section employees received instruction in frisking procedures. The dressing area for the contamination zone in question was relocated. The inspector determined that the corrective actions were adequate.
- (d) Personnel sorting contaminated trash were not complying with all of the radiation work permit protective clothing requirements. The licensee took appropriate disciplinary action and conducted training for health physics personnel. The inspector determined that the corrective action was adequate.

This item is considered closed.

(Closed) Violation 50-259/260/296/84-03-02. The licensee was cited for two instances of noncompliance with regulations governing the transportation of licensed material. The licensee stated their corrective actions in a letter dated April 13, 1984.

- (a) A radioactive material shipping manifest was improperly prepared in that it did not specify the proper shipping name, identification number or name of each radionuclide in the radioactive material. The licensee corrective action included a reorganization within the radwaste section and increased administrative control over manifest preparation and review. The inspector reviewed selected manifest prepared since this problem was noted and observed that they were properly completed.
- (b) Radioactive material not intended for disposal was transferred to the Barnwell site without a prior approval from the site operator or the State of South Carolina. The licensee discontinued this practice. The inspector determined that the personnel responsible for transportation

of licensed material are now knowledgeable in the procedures for transferring material to agreement state licensees.

This item is considered closed.

(Closed) Violation 50-259/260/296/84-03-03. The licensee was cited for failure to accurately report whole body count results to terminated employees in that they reported no activity was detected on a count if the result was less than two percent of the maximum permissible organ (MPOB). The licensee stated their corrective action in a letter dated April 13, 1984. The licensee changed the wording of their termination exposure reports to indicate that the result is below the ten percent MPOB action level of ANSI N343. The inspector verified that the termination report wording has been changed. This item is considered closed.

(Closed) Violation 50-259/260/296/84-03-04. The licensee was cited for failure to post a storage area for laundered protective clothing located outside the regulated area as containing radioactive material. The licensee stated their corrective action in a letter dated April 13, 1984. The licensee changed the regulated area boundary to include the storage area and posted the storage racks as containing radioactive material. The inspector verified that the storage area was properly posted. This item is considered closed.

4. Radioactive Waste and Transportation (84722, 86721)

The inspector reviewed procedures for procurement and use of radioactive material packaging. The licensee does not own any Type B containers or any other container for which an NRC Certificate of Compliance has been issued. The licensee uses procured metal boxes and 55 gallon drums to meet the strong tight packaging requirements for low specific activity (LSA) waste and obtains resin liners and high integrity containers (HIC's) from the Barnwell disposal site operators.

The licensee has performed 145 radioactive material shipments to date this calendar year. The volume allocation at the Barnwell, South Carolina, disposal site is used for spent radioactive resin shipments and all other wastes are sent to the Richland, Washington disposal site. The licensee stated that they are concerned about the number of radioactive waste shipments they have to make and are pursuing means to reduce the volume of waste generated. A program to reduce the number of contaminated zones is in place. The licensee is evaluating a shredding machine and a compactor that will permit compacting waste directly into the LSA metal boxes.

The inspector reviewed Browns Ferry Standard Practice 7.9, Radwaste Packaging and Radioactive Materials Shipment Control. The procedure was revised in February, 1984 to incorporate a process control program for resin liner dewatering and to implement contractor provided 10 CFR part 61 waste classification procedures. The inspector determined that the revisions met 10 CFR requirements.

The licensee recently received from their contractor a revised set of waste classification scaling factors. The scaling factors showed good agreement with licensee waste stream sample analysis. The inspector also determined that the criteria for periodic waste stream sample analysis and adjustment of scaling factors was adequate.

The licensee had a training and qualification program for radioactive waste processors and inspectors. The Radwaste Supervisor conducts the training and administers a written examination. The performance of the radwaste personnel is monitored and remedial actions are taken if warranted. Through observations and discussions the inspector determined that the radwaste personnel were knowledgeable in their duties.

The licensee was notified by the State of Washington in a letter dated April 16, 1984 that violations of Department of Transportation regulations and disposal site license conditions were noted on their April 4, 1984 shipment of boxes of low specific activity radioactive waste performed under shipment number BSMP 84-20. A waste box placed on top of another waste box had shifted during transport. Even though there was no breach of package integrity, 49 CFR 173.425(b)(6) requires that packages be braced to prevent shifting a lading under conditions normally incident to transportation. The violation of the disposal site license condition was for two boxes having waste classification marking greater than 6 inches from the Radioactive LSA marking contrary to US Ecology License WN-I019-2(27)(k).

The licensee responded to the State of Washington by letter dated May 3, 1984. They stated that in the future double-stacked boxes will be more extensively blocked and braced. The inspector expressed a concern that the indicated corrective action did not address a probable root cause of the event. The inspector had determined through observations and discussions that the carpentry crew which blocks and braces a shipment does so based on experience alone and the radwaste supervisor approves the work based on his judgement. The inspector observed that specific criteria for blocking and bracing would be beneficial to the personnel performing the work and to the supervisor who inspects and approves the work. The licensee acknowledged the concern and stated they would evaluate placing bracing criteria in their shipping procedures. The inspector informed the licensee that failure to properly brace the radioactive waste box would be considered a violation of 10 CFR 71.5(a), which requires that they comply with the requirements in 49 CFR Parts 170 through 189 when transporting licensed material (VIO 50-259/260/296/84-19-01).

The licensee also stated in their May 3, 1984 letter to the State of Washington that they disagreed with the violation concerning placement of the waste classification marking on the grounds that the six inch criteria did not apply to waste marked as Radioactive LSA.

## 5. Internal Exposure Control (83725)

The inspector reviewed personnel files of outage and plant personnel to determine if initial and termination whole body counts has been performed. The inspector identified a plant radiation worker which did not outprocess when he was terminated on March 15, 1984. The worker was one of a class of workers that are not permitted to work a full year for benefit purposes; that is they are terminated after working a maximum of 364 days and customarily re-hired a short time thereafter. Through an apparent administrative error, the worker ran past his maximum term of employment. When the error was discovered, the worker was called at home by the personnel supervisor and was told that he was being terminated. The worker requested a whole body count and was told by the personnel supervisor that he would not be permitted back on site. The worker was subsequently re-hired on March 20, 1984 and his inprocessing whole body count showed no detectable activity. The plant health physics staff was not consulted on the decision not to give the terminated worker a whole body count. The inspector stated to licensee management that it was improper for the personnel section to be making decisions regarding whole body counts without consulting health physics particularly since the worker had requested a whole body count. The licensee acknowledged this and stated that necessary action would be taken necessary to preclude a recurrence.

The inspector reviewed the licensee's procedures for respiratory protection. Respirator qualification training is combined with the general employee radiation worker training. The licensee uses MSA filter respirators, supply air respirators and self contained breathing apparatuses (SCBA's). The training on the filter respirator is comprehensive and each student is provided a mask to trial fit and leak check. The other two protective devices are demonstrated by the instructor. The radiation worker examination then contains questions on respiratory protection. A worker may also challenge the examination with health physics management approval and thereby be exempted from attending the class. The inspector noted that the worker was provided no opportunity to don or obtain any familiarity with the supply air or SCBA protective devices prior to first using them in an actual environment. A person may also incorrectly answer a significant number of the respiratory protection questions and still be considered qualified if he had an overall passing score on the radiation worker examination. The licensee stated that they would evaluate separating the respiratory protection training from the radiation worker course and would also look at giving the worker some familiarity with the devices during training.

The inspector then reviewed the procedures for respiratory issue and documentation of worker exposure to airborne radioactivity. The worker obtains a respirator from the issue area based on the radiation work permit requirements and reports to the health physics control point. Health Physics verifies that he is respirator qualified and his entry is recorded on the radiation work permit time sheet. Health physics then performs an MPC-hour calculation and any result greater than one percent MPC is recorded

on a log sheet which is forwarded at the end of the shift to the dosimetry section for updating the daily exposure printout. The inspector noted that protective devices are not uniquely identified to permit retrieval and checking the device for defects should a worker be subsequently determined to have internally deposited activity. The radiation work permit time sheet does not document what type of protective device was worn and does not specify what the airborne radioactivity was in the breathing zone of the worker. The licensee therefore has no record that appropriate protective devices are being worn and that MPC hours are being properly computed. The licensee stated that they would evaluate changes in their respiratory issue and documentation procedures.

No violations or deviations were noted.

6. Licensee Audits (83722, 83723, 83724, 83725, 83726, 83728, 84722, 86721).

The inspector reviewed the licensee radiation incident reports (RIR's) issued since the first of the year. The reports are used by the health physics staff to document radiological problems, events and procedure violations. The reports are reviewed by licensee management.

The plant quality engineering staff conducts monthly and quarterly audits in the health physics, transportation and training areas. The inspector reviewed the results of selected previous audits and determined that appropriate corrective action and management reviews were indicated.

The corporate quality assurance group conducts periodic audits on a two year cycle. The inspector reviewed the results of the last audit in the areas of radioactive material shipping and storage, health physics program, personnel qualification and training, radiation exposure control, contamination control and ALARA. The inspector also discussed changes in the transportation audit procedures with a corporate auditor and determined that 10 CFR 61 and 10 CFR 20.311 requirements have been included in the audit.

No violations or deviations were noted.

7. Control of Radioactive Material (83726)

The inspector performed independent radiation surveys in the turbine, reactor and radwaste buildings. Selected recent licensee survey records were also reviewed. Posting and labeling was consistent with the survey results and 10 CFR 20 requirements.

During the week of the inspection, licensee routine radiological surveys revealed a spread of contamination outside of the controlled area. The carpeted area outside the main entrance to the plant administrative building was found contaminated up to 20,000 disintegrations per minute (dpm). The activity was determined to be Cobalt-60, Niobium-94 and Zinc-65. The licensee determined that the source of activity was a previously unidentified contaminated area between the entrance to the Unit-2 RHR heat

exchanger room and the control rod drive headers. The contamination levels in this area were up to 30,000 dpm per 100 square centimeters. No other contaminated areas were discovered outside of controlled areas. It could not be exactly determined how the contamination was spread from the identified contaminated area in the reactor building to the uncontrolled area.

No violations or deviations were noted.

9. Open Items - Inspector Followup Items (IFI's)

(Closed) IFI 50-259/260/296/83-03-01 - Evaluate licensee capability to detect control levels of Chromium-51. The concern was that since the portable survey instruments used to release material from the plant controlled area is primarily sensitive to beta radiation, the licensee may not be able to detect chromium-51 contamination at their control level since it emits only low energy gamma radiation. The inspector determined that the ratio of Chromium-51 to beta emitting isotopes would have to be greater than 1:1 in order to cause contaminated materials to be inadvertently released due to the insensitivity of the portable survey instruments to low energy gamma radiation. The inspector reviewed radiochemistry analysis data for each of the three units taken during unit operation and observed that the ratio of Chromium-51 to beta emitters was always less than 1:1. Favorable ratios were also observed on sample analysis of the plant's major waste streams. This item is considered closed.

(Closed) IFI 50-259/260/296/84-12-04 - Evaluation of concerns regarding the administration of dosimetry. Security personnel were incorrectly instructing visitors to wear the TLD badge with the beta window facing toward the body. Security personnel were instructed on the correct manner to wear the TLD badge. Public Safety Service (PSS) Form 47 was also changed to include a signature for visitors that they understand the correct manner in which to wear the TLD. Security personnel were also observed to be placing tape over the TLD beta windows when they affixed name tapes to the badges. PSS Section Letter 2.2 was issued cautioning security personnel not to tape over the beta windows. Health physics personnel periodically check the badge storage racks to determine that the TLD beta windows are not being covered.

The concern was expressed that health physics does not verify a person has the proper dosimetry before granting access to a high radiation area. The inspector determined from observations and discussions with personnel manning control points that appropriate checks are now being performed.

The licensee revised their procedures for investigation of reports of lost TLD badges. Dosimetry Section Instruction Letter-11, paragraph VI.C now requires a search when a TLD badge is reported lost, ALARA considerations permitting. The supervisor of the person who loses the TLD is also notified. Data is also maintained for trend analysis to identify personnel who frequently lose TLD's.



The licensee has also begun using the Panasonic TLD badge for whole body monitoring in lieu of the Harshaw. The badge name tape has markings to indicate the issue period of the badge so that health physics can recognize that the correct TLD is being worn.

The inspector reviewed the implementation of the changes in licensee dosimetry procedures and determined that they were adequate. This item is considered closed.