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

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Report Nos.: 50-259/84-37, 50-260/84-37, and 50-296/84-37

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: September 10 - 14, 1984

Inspector: Ray E. Weddington 9/26/84
R. E. Weddington Date Signed

Approved by: G. R. Jenkins 9/26/84
G. R. Jenkins, Section Chief Date Signed
Division of Radiation Safety and Safeguards

SUMMARY

Scope: This routine, unannounced inspection entailed 39 inspector-hours on site in the areas of previous enforcement matters, organization and management controls, external exposure control, training, control of radioactive material and inspector follow-up items.

Results: Two violations were identified - three examples of failure to adhere to radiation control procedures and failure to conspicuously post documents and notices required by 10 CFR 19.11.

REPORT DETAILS

1. Licensee Employees Contacted

G. T. Jones, Plant Superintendent
J. E. Swindell, Assistant Plant Superintendent
A. W. Sorrell, Health Physics Supervisor
D. C. Mims, Plant Engineering Supervisor
J. R. Clark, Plant Chemistry Supervisor
W. C. Thomison, Plant Engineering
A. Clements, Radwaste Supervisor
E. M. Cargill, Assistant Health Physics Supervisor
J. M. Corey, Plant Health Physicist
H. M. Crowson, Assistant Health Physics Supervisor
M. H. Shanks, Plant Engineering
J. B. Walker, Plant Compliance
P. Ebersole, Plant Compliance
M. Johnson, Document Control
B. C. Morris, Plant Compliance
K. K. Richards, Plant Chemistry

Other licensee employees contacted included two engineers, five technicians, two craftsmen, and two office personnel.

NRC Resident Inspectors

G. L. Paulk, Senior Resident Inspector
C. A. Patterson, Resident Inspector

2. Exit Interview

The inspection scope and findings were summarized on September 14, 1984, with those persons indicated in paragraph 1 above. The following issues were discussed in detail: commitments made by the plant manager to conduct tests to demonstrate adequacy of resin liner dewatering (paragraph 4); an apparent violation for failure to adhere to radiation control procedures with three examples (paragraph 6.b) and an apparent violation for failure to conspicuously post documents and notices required by 10 CFR 19.11 (paragraph 7). The licensee acknowledged the inspection findings and took no exceptions.

3. Licensee Action on Previous Enforcement Matters

(Closed) Violation 50-259/260/296/84-12-02 - 10 CFR 50.59 review for a change in the radwaste system. The inspector reviewed and verified the corrective actions as stated in TVA's letter of August 17, 1984.

(Closed) Violation 50-259/260/296/84-19-01 - Failure to adequately brace a radioactive materials package during transport. The inspector reviewed and verified the corrective actions as stated in TVA's letter of July 30, 1984.

(Open) Violation 50-259/260/296/84-12-01 - Excess water in radioactive resin shipping liner. The inspector discussed the details of the licensee's supplemental response dated August 17, 1984, with licensee representatives. Licensee commitments were made to conduct tests to demonstrate the adequacy of their dewatering procedures (see paragraph 4).

4. Resin Liner Dewatering

The low level radioactive waste disposal facility at Barnwell, S.C., had discovered in October, 1983 that a resin liner shipped from Browns Ferry contained excess free standing water (>0.5% volume). The licensee concluded that the primary cause of the excess water was inadequate administrative controls in the dewatering procedure and unlabeled hoses and valves in the waste packaging area. The licensee took action to correct these problems. It was also learned that the licensee mixed bead and Powdex resins in the same disposal liner. The liner dewatering procedure for these resin types are not the same. A liner filled with Powdex resin can be effectively dewatered using a vacuum pump. Bead resins are commonly dewatered by gravity draining the liner over a two to three day period since a vacuum pump is not effective in drawing the excess water off the resin beads. The liners used for bead resins also differ from the Powdex liners in that they have a conical bottom as opposed to a flat bottom and have a bottom circular filter as opposed to a line filter. The licensee used Powdex liners exclusively to ship bead and Powdex resin mixtures.

Phase separators E and F were expected to contain bead resin and separators A through D Powdex. If the resin discharge was from phase separators E or F, the bead resin ratio was quantitatively determined by laboratory procedure using a sixty-mesh sieve. A quality control procedure was also implemented to quantitatively determine the bead concentration for every sixth liner. Samples of resins from other phase separators were visually examined for excessive bead concentration. Resin liners determined to contain bead resin concentrations greater than 45 percent were dewatered using a vacuum pump. The pump was kept running an additional four hours after breaking vacuum. The liner was then left standing for twelve hours and dewatered again. If a volume of water exceeding disposal site criteria was obtained, the liner was dewatered again until the volume obtained was below the limit. Resin liners containing bead concentrations less than 45 percent were dewatered using the vacuum pump. The pump was kept running an additional two to four hours after breaking vacuum.

The licensee had performed tests since the excess water was discovered at the disposal facility. Special Test 83-18 was prepared to demonstrate the effectiveness of the dewatering procedure for liners containing Powdex resins. Two tests were conducted on November 4 and 10, 1983, using two different steel disposal liners. The test consisted of filling a new liner with uncontaminated Powdex resins and water and then dewatering the liner by normal plant procedures. The liner had been modified by adding plugged drain holes in the bottom so that any excess free standing water could be drained and measured. The liner was then taken on a twelve hour road trip and left standing upon return to the site for seven days. The licensee

determined that the total free standing water in the two liners was 0.44 and 0.295 percent by volume with 0.5 percent being the limit. The inspector observed that the plant procedure for dewatering would have to be highly efficient for bead resin to preclude excess free standing water since the free water found in the Powdex filled liners was close to the limit. The licensee also no longer uses the steel liner. The high integrity (HIC) liner was being used.

The licensee performed a test on June 28, 1984, to demonstrate that their resin sampling is representative. The licensee had previously concluded that their sampling was isotopically representative by observation of uniform radiation levels on the recirculation line after approximately thirty minutes of phase separator recirculation. The test consisted of obtaining a beginning, middle, and end of discharge resin sample and quantitatively determining the bead resin concentration in each. The samples were determined to contain 34, 29, and 34 percent bead resin by volume.

The inspector reviewed how resin samples were obtained. The sample point is a 3/8 inch horizontal line that connects to a vertical run of the 4 inch recirculation line. The sample line has two valves to isolate the line and control the filling of a one liter sample bottle. The inspector observed that the sample line may be more selective for Powdex particles since the heavier bead resins may be less able to divert into the sample line.

During the inspection, the licensee conducted a special test on a resin liner being prepared for shipment. The liner was a high integrity container (HIC) containing 28.1 percent bead resin. After the routine 12 hour standing period, 8.5 gallons (0.7 percent volume) free standing water was obtained. The free standing water limit for a HIC is 1% volume. The licensee then let the liner stand for an additional twelve hours and dewatered again, obtaining 7 gallons (0.6 percent volume) free standing water. The inspector stated that this test indicated that a normally dewatered container still had a large quantity of water, relative to the limit, available to become free standing.

The licensee stated that the disposal site operators at Barnwell, S.C., had checked four Browns Ferry resin liners since November, 1983, that the State of South Carolina had checked one liner, and that no excess water had been discovered. The last disposal site test was on August 15, 1984. The liner contained 54 percent bead resin and the licensee had accumulated 5.5 gallons of water after the routine 12 hour standing period. The licensee stated that this result indicated that the vacuum pump may be more effective in drawing off excess water than the gravity draining technique used at the disposal site.

The licensee acknowledged that additional tests were appropriate to conclusively demonstrate that their dewatering procedures are effective for bead and Powdex resin mixtures. The licensee committed to conduct additional tests within two months as outlined below. These commitments were discussed during the exit interview and confirmed by the plant manager.

a. The licensee committed to conduct a test to demonstrate that their resin sampling procedure is representative of the bead resin concentration in the shipping liner. The licensee discussed obtaining samples from the normal sample point and the phase separator and/or resin liner and comparing the bead resin quantitative determinations.

b. The licensee committed to define what constitutes excessive bead concentration in samples that are not quantitatively checked. The licensee discussed providing an objective standard for laboratory personnel. They also stated they would evaluate quantitatively determining bead concentration for all samples.

c. The licensee committed to evaluate liner weighing as an indicator of resin liner dewatering since excess water increases the liner weight.

d. The licensee committed to conduct a special road test, similar to Special Test 83-18, for a liner containing a bead and Powdex resin mixture.

e. The licensee committed to conduct a test to compare the efficiency of vacuuming and gravity draining in removing excess free standing water.

5. Organizations and Management Controls (83722)

Technical Specification 6.1 describes the licensee's organization. The inspector reviewed changes made to the licensee's organization, staffing levels and lines of authority as they related to radiation protection, radioactive material control and plant chemistry, and verified that the changes had not adversely affected the licensee's ability to control radiation exposures, radioactive material, or plant chemistry.

No violations or deviations were identified.

6. External Exposure Control and Personal Dosimetry (83724)

a. 10 CFR 20.202 requires each licensee to supply appropriate personnel monitoring equipment to specific individuals and require the use of such equipment.

The inspector was informed by the resident inspectors that the radiation exposure information provided to them by the licensee was significantly lower than that reported on the NRC contractor TLD. The inspector determined that the NRC TLD contractor does not subtract any background exposure prior to reporting the results. The licensee typically subtracted approximately ten millirem per month for background correction and then only reported exposures greater than ten millirem due to statistical uncertainties in lesser values. The inspector observed that the licensee corrections could account for the differences in the two TLD systems. Licensee representatives agreed to conduct a test to determine the response of the two type TLD's to known radiation sources. The inspector provided six NRC contractor TLD's.

Two TLD's were designated as controls and were maintained with the others except for the time the others were being exposed. The remaning four TLD's were irradiated using a Shepherd model 89 radiac calibrator containing a 400 curie Cesium-137 source. Two TLD's of each type were exposed in a reproducible geometry for time periods corresponding to doses of 50 and 200 millirem. The TLD's will be processed and the results evaluated to determine if any other action is appropriate in this matter.

b. Technical Specifications 6.3.A.7 requires that radiation control procedures be prepared and adhered to.

During tours of the facility, the inspector observed in progress activities in the chemistry laboratory. The inspector observed radiation work permit SWP-01-0-06668, which specified controls for handling radioactive material in the chemistry fume hoods. The SWP required personnel to wear cloth glove liners and rubber gloves or surgical gloves. The inspector observed on several occasions personnel handling radioactive material inside the fume hoods wearing only cotton glove liners.

The chemistry laboratory and radwaste fume hoods are marked to indicate the hood window position which ensures a minimum of 100 linear feet per minute of air face velocity into the hoods. The inspector observed that four of the five hoods posted as contamination zones were unattended and had the window raised well above the maximum height indicator. On a subsequent tour of the area, the inspector observed raised windows on three unattended hoods. Licensee management acknowledged that leaving the windows raised was a poor work practice and contrary to instructions previously provided to chemistry personnel. The applicable procedure, BF-RLM-400.5.20, states that the hood windows should be lowered to the level indicated on the hood.

Through observation and discussions with chemistry personnel, the inspector determined that inadequate contamination control was being exercised in removing radioactive liquid samples from sample hoods. The sample bottle was wiped dry after obtaining a liquid sample and placed in an open bucket for transfer to the chemistry laboratory. Radiation levels were measured, but no contamination evaluation was made and health physics was not present. Licensee representatives confirmed that this is the normal procedure for samples that read less than 100 millirem per hour. The inspector noted that licensee procedure RCI 1, paragraph D.1 required that items being removed from a contamination zone or potentially contaminated items shall be contained in plastic, unless otherwise directed and surveyed by a health physics representative. Chemistry sample bottles were not exempted from these requirements by the RCI and the applicable radiation work permit did not address removing these bottles from the sample hoods.

The licensee was informed that the three examples of failure to adhere to procedures would be considered an apparent violation of Technicial Specification 6.3.A.7 (50-259/260/296/84-37-01).

c. The inspector discussed the planning and preparation for the upcoming Unit 1 recirculation piping replacement outage with licensee representatives. Specific areas discussed included increased staffing, special training, equipment and supplies, health physics involvement in outage planning, licensee control over contractor health physics technicians, dose reduction methods to be employed, and radioactive waste reduction and disposal activities.

7. Training (83723)

10 CFR 19.11 requires that Parts 19 and 20, the license, license conditions, operating procedures, and NRC Form 3 be conspicuously posted or if posting of the documents is not practicable, the licensee may post a notice which describes the document and states where it may be examined.

Licensee procedure BF 2.4 required that notices and documents required by 10 CFR 19 be posted at the east and west guard portals and in the plant and field services lunch rooms.

The inspector observed upon entering the restricted area that he had not encountered any of the 10 CFR 19 required postings. The licensee conducted an audit and determined that two of the four official postings had been removed. The licensee also determined that NRC Form 3 was displayed in ten other locations throughout the site. The inspector located the posting in the main gate house. The documents were stapled together inside of a document protector, inside of a closed display case, that was away from the main traffic flow. The inspector stated that the documents and notices were not conspicuously posted and this was an apparent violation of 10 CFR 19.11 (50-259/260/296/84-37-02).

8. Surveys, Monitoring, and Control of Radioactive Material (83726)

10 CFR 20.201(b) requires each licensee to make or cause to be made such surveys as (1) may be necessary for the licensee to comply with the regulations and (2) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

During tours of the plant, the inspector observed health physics technicians performing radiation and contamination surveys.

The inspector performed independent radiation surveys in the service and turbine buildings and in the restricted area outside the buildings, and verified that the areas were properly posted.

The licensee obtained smears and samples of gravel from the turbine building roof. No significant radioactivity above background was detectable.

No violations or deviations were identified.

9. Inspector Follow-up Items

(Closed) IFI 50-259/260/296/83-30-3 - High LLD's for whole body counter. The inspector reviewed the LLD's for the whole body counter currently in use and verified that they were consistent with regulatory requirements and ANSI N-343.