



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

DEC 18 1985

Report Nos.: 50-259/85-55, 50-260/85-55, and 50-296/85-55

Licensee: Tennessee Valley Authority
6N11 B Missionary Ridge Place
1101 Market Street
Chattanooga, TN 37402-2801

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: November 18-22, 1985

Inspector: *T. R. Collins* 12/17/85
T. R. Collins Date Signed

Accompanying Personnel: T. G. Lee
C. M. Hosey

Approved by: *C. M. Hosey* 12/17/85
C. M. Hosey, Section Chief Date Signed
Division of Radiation Safety and Safeguards

SUMMARY

Scope: This routine, unannounced inspection entailed 41 inspector-hours onsite during regular hours inspecting the radiation protection program; training and qualification of personnel; internal and external exposure control; radioactive materials control; posting and labeling; and program for maintaining exposures as low as reasonably achievable (ALARA).

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *R. L. Lewis, Plant Manager
- *J. E. Swindell, Assistant Plant Manager
- *A. W. Sorrell, Health Physics Supervisor
- *J. M. Corey, Health Physics Unit Supervisor
- *H. M. Crowson, Health Physics Unit Supervisor
- *R. H. Albright, Health Physics Unit Supervisor
- E. G. Pugh, Training Supervisor
- E. Balch, Plant Compliance
- L. Coots, Plant Compliance
- D. L. Lovette, ALARA Engineer
- S. R. Howard, ALARA Supervisor
- R. Asheraff, Training Supervisor
- J. Rawlston, Health Physics Shift Supervisor
- E. Mastich, Health Physics Shift Supervisor

Other licensee employees contacted included technicians, operators, mechanics, security force members, and office personnel.

NRC Resident Inspectors

- *G. L. Paulk, Senior Resident Inspector

- *Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on November 22, 1985, with those persons indicated in paragraph 1 above. During the exit interview, the inspector discussed the removable contamination action level for requiring respiratory protection and plant housekeeping. The inspector had noted that a previous action level for considering the use of respiratory protection (50,000 dpm/100 cm² removable contamination) had been deleted from procedures. Also, through plant tours, the inspector noted that plant housekeeping had deteriorated. The licensee acknowledged the inspector's comment. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Training and Qualifications (83723)

a. Radiation Protection and Chemistry Technician Qualification

The licensee was required by Technical Specification 6.1 to qualify radiation protection technicians in accordance with ANSI N18.1. The inspector observed the radiological controls established by technicians covering the hanger and pipe support maintenance tasks. The inspector discussed with the technicians these controls and those specified on the RWP. The inspector discussed with the technicians their training and qualification program. The inspector discussed the qualification program with one recently qualified radiation protection technician. The inspector reviewed the training records for this technician to assure all topics were completed. The inspector discussed with two radiation protection technicians-in-training, the qualification program and assignments to assure that they had not been assigned to work independently and had been qualified for assigned tasks.

The inspector reviewed the program for qualification of contract radiation protection technicians. The inspector discussed separately with three contract technicians their previous experience and training to determine if it was comprehensive or if it had been limited to selected tasks. The inspector also discussed the training and qualification program the licensee had provided, what limits had been placed on their activities, and controls that should be established for one task they were qualified to perform. The inspector reviewed the resumes, training records, and tests for these technicians. By review of Engineering and Technical Training Section Instruction Letter No. 6, Training Plan for Health Physics Staff, the inspector verified that the licensee had a formal training plan for the health physics staff.

b. Radiation Protection and Chemistry Foreman Qualifications

Technical Specification 6.1 required that radiation protection supervisory staff have four years experience in their specialty. The inspector discussed with one recently appointed foreman from the radiation protection department, his training and experience and selected duties and responsibilities of his position. The inspector reviewed the records of the individual's experience.

c. Respiratory Protection Training

The licensee was required by 10 CFR 20.103 to establish a qualification program for workers who wear respiratory protective equipment. Elements of the qualification program outlined in 10 CFR 20.103 were delineated in NUREG-0041. The inspector observed workers using respirators while they were performing maintenance in the reactor building. The inspector discussed this use with the radiation protection technician covering the job and with the workers. The inspector observed a training class in progress being conducted by a

qualified training instructor. The inspector reviewed recent changes in the respirator qualification program and discussed these changes with the Training Supervisor.

d. Basic Radiation Protection Training

The licensee was required by 10 CFR 19.12 to provide basic radiation protection training to workers. Regulatory Guides 8.27, 8.29, and 8.13 outline topics that should be included in such training. The inspector discussed the initial and refresher general employee radiation protection training (GET) with the Training Supervisor and reviewed lesson plans to determine what changes had been made in GET training and the scope of these changes. The inspector reviewed the GET training records for selected individuals to determine if records reflected adequate completion of GET initial and refresher training.

No violations or deviations were identified.

5. Control of Radioactive Materials and Contamination, Surveys, and Monitoring (83726)

The licensee was required by 10 CFR 20.201(b), and 20.401 to perform surveys to show compliance with regulatory limits and to maintain records of such surveys. Technical Specification 6:8 required the licensee to follow written procedures. Radiological control procedures further outlined survey methods and frequencies.

a. Surveys

The inspector observed, during plant tours, surveys being performed by radiation protection staff. The inspector reviewed two Radiation Work Permits (RWPs) to determine if adequate controls were specified. The inspector discussed the controls and monitoring with the radiation protection technician assigned and one worker for each task. The inspector performed independent radiation level surveys.

The inspector performed independent radiation level surveys of selected areas and compared them to licensee survey results. The inspector reviewed selected survey records for the month of November 1985 and discussed with licensee representatives methods used to disseminate survey results. The inspector noted that there were 129 previously designated contamination control areas in January 1985 and in October 1985 there were 115, a decrease of approximately 11%, however, housekeeping of contaminated areas seemed lax. The inspector pointed out that tracking contamination control areas by square footage was a better method of assessment. The licensee acknowledged the inspector's comment.



b. Frisking

During tours of the plant, the inspector observed the exit of workers and movement of material from contamination control to clean areas to determine if proper frisking was performed by workers and that proper direct and removable contamination surveys were performed on materials. The inspector reviewed records of skin contamination occurrences and resulting evaluations and corrective actions. Records and discussions with licensee representatives showed contamination had been promptly removed from the workers using routine washing techniques. Subsequent whole body counts showed less than detectable internal disposition of radioactive material.

c. Instrumentation

During plant tours, the inspector observed the use of survey instruments by plant staff and compared plant survey meter results with results of surveys made by the inspectors using NRC equipment. The inspector examined calibration stickers on radiation protection instruments in use. The inspector discussed with radiation protection technicians the methods for doing instrument source checks prior to use. The inspector reviewed the procedures and methods for calibration of the RO-2a beta survey instrument and the personnel frisker. The inspector discussed these calibrations with calibration technicians and inspected calibration facilities.

d. Release of Materials for Unrestricted Use

The inspector discussed with radiation protection technicians, the program for monitoring items to be released from contaminated areas and reviewed the procedures for such releases. The inspector observed release surveys performed by radiation protection technicians and documentation of results. During tours of plant areas, the inspector observed posting of containers to determine if containers of radioactive material were properly identified.

No violations or deviations were identified.

6. Licensee Audits and Surveillances (83723, 83724, 83725, 83726, and 83728)

The licensee was required by Technical Specification 6.2 to perform audits of radiological controls. The inspector reviewed audits of the radiation protection operations dated September 5, 1985, and March 8, 1985; the responses to these audits; and the status of selective corrective actions resulting from the audits. The inspector discussed the results of these audits with licensee representatives. Corrective action had been initiated for all items. The audits were conducted using staff with technical background in radiological controls.

No violations or deviations were identified.



7. External Occupational Dose Control and Personal Dosimetry (83724)

During plant tours, the inspector checked the security of the locks at two locked high radiation areas and observed posting of survey results and the use of controls specified on three radiation work permits (RWPs).

a. Use of Dosimeters and Controls

The licensee was required by 10 CFR 20.202, 20.201(b), 20.101, 20.102, 20.104, 20.403, 20.405, 19.13, 20.407, and 20.408 to maintain workers' doses below specified levels and keep records of and make reports of doses. The licensee was required by 10 CFR 20.203 and Technical Specification 6.3.D to post and control access to plant areas. During observation of work in the plant, the inspector observed the wearing of TLDs and pocket dosimeters by workers. The inspector discussed the assignment and use of dosimeters with plant modifications personnel and radiation protection technicians. During plant tours, the inspector observed the posting of areas and made independent measurements of dose to assure proper posting. The inspector reviewed recent changes to plant procedures regarding the use of TLDs and dosimeters.

b. Dosimetry Results

The inspector reviewed the TLD results for 1985. For three individuals, the inspector examined each individual's dosimetry file to determine if NRC Form 4s had been completed.

c. Management Review of Dosimetry Results..

The inspector discussed the dosimetry results with the Health Physics Supervisor and a dosimetry foreman to determine their understanding of radiological controls for their staff. The inspector reviewed records of administrative dose control extensions for the month of November 1985, and discussed the extensions with selected supervisors and staff.

No violations or deviations were identified.

8. Internal Exposure Control and Assessment

The licensee was required by 10 CFR 20.103, 20.201(b), 20.401, 20.403, and 20.405 to control uptakes of radioactive material, assess such uptakes, and keep records of and make reports of such uptakes.

a. Control Measures

During plant tours, the inspector observed the use of temporary ventilation systems, containment enclosures, and respirators. The inspector discussed the use of this equipment with workers and radiation protection technicians. The inspector reviewed recent

changes to respiratory protection procedures. The inspector examined records for the pre-job analysis performed for the jet pump instrumentation nozzle replacement and discussed the operation with a radiation protection foreman to determine what considerations were given to use of engineering controls rather than respirators.

b. Respiratory Maintenance, Issue, and Training

The inspector observed the maintenance of respirators with two staff members assigned the task. Respirators are surveyed, tested and maintained by radiation protection technicians in training. The inspector discussed specific equipment training offered respiratory technicians and observed leak testing of repaired respirators. The inspector reviewed recent changes to respirator maintenance and issue procedures. The inspector discussed respiratory protection training with workers.

c. Uptake Assessment

The inspector reviewed the MPC-hour log for 1985 and discussed actions taken for individuals' whose records indicated they had received greater than 40 MPC-hours in one week.

The licensee indicated that the individuals had not received greater than 40 MPC-hrs in a week as reported in the MPC-hour log. There had apparently been an error in transferring this exposure information by computer to the corporate staff, which handles printing of the computer report. The inspector reviewed the records that supported this contention.

No violations or deviations were identified.

9. Maintaining Occupational Doses As Low As Reasonably Achievable (ALARA) (83728)

10 CFR 20.1(c) specifies that licensees should implement programs to keep workers' doses ALARA. FSAR Chapter 12 also contains licensee commitments regarding worker ALARA actions.

a. Worker and Supervisory Actions

The inspector discussed dose control measures with two workers on the job and two contract radiation protection technicians to determine their degree of involvement in dose reduction. The inspector discussed with modification personnel their actions to reduce individual and collective doses, concentrating particularly on staff members with highest doses. The inspector also discussed with the ALARA Engineer, the actions to set dose goals for tasks, methods used to reduce doses, and techniques used to monitor performance against goals.



b. ALARA Procedure Changes

The inspector reviewed recent changes to administrative procedures that implemented the elements of ALARA. The inspector discussed these changes with the Health Physics Supervisor and the ALARA Engineer.

c. ALARA Reviews

The inspector reviewed the ALARA review documentation for the 2A and 2B jet pump instrumentation nozzle replacement. The estimated exposure was 23.6 man-rem with the actual being 44.4. The increased amount of man-rem was due to a gross underestimate of the Special Work Permit man-hours required to complete the task. The inspector then discussed resulting actions with the ALARA Engineer and his staff.

d. ALARA Reports

The inspector reviewed the ALARA committee meeting minutes for 1985 and discussed the results with the ALARA Engineer and the Health Physics Supervisor. The original estimate of 1463 man-rem had been revised downward to 912 man-rem as a result of decreased Special Work Permit man-hours during the course of the year. The revised goal for 1985 is now 821 man-rem. Total exposure through October 1985 was 838 man-rem.

No violations or deviations were identified.

10. Low Power Range Monitoring (LPRM) Incident (92701)

At approximately 0900 hours, on November 21, 1985, operations personnel were transporting an old LPRM from the Unit 2 reactor to the spent fuel pool. During the movement operation, the LPRM got caught behind the source pin rack which is located in the spent fuel pool. While attempting to free the LRM a Boilermaker Foreman and HP Technician noted the LPRM hot end had risen to about 18" below the water's surface. The HP Technician relocated to the west end of the spent fuel pool to monitor the hot end. The HP Technician noted a dose rate increasing to 2 R/hr.

The following actions occurred almost simultaneously:

- (1) The HP Technician turned to inform Operations to stop raising and to lower the LPRM.
- (2) The Ludlum 300 ARM on the Refueling Bridge and the ARM on the north wall (see Attachment 2) of the Refueling Floor alarmed.
- (3) The LPRM was lowered by Operations.

The above events occurred sufficiently fast that the operator lowered the LPRM before the HP Technician could verbally transmit the direction to stop



the movement of the LPRM. The HP Technician estimated the event to last about 2 seconds. The increased dose rate initiated secondary containment isolation and standby gas treatment (SBGT). The alarm returned to normal (cleared immediately upon lowering the LPRM).

The exposures of the seven persons involved in this event was from 5 mRem to 30 mRem. The inspector reviewed records associated with this event and discussed with licensee representatives the root causes and corrective actions proposed by the licensee to prevent future occurrence. The inspector had no further questions.

No violations or deviations were identified.

11. Personnel Contamination Event

On November 13, 1985, during a radiological drill, an event occurred resulting in five TVA employees being contaminated with short-lived radioactive material (Technetium 99m) that was used to add realism to the simulation of a contaminated injured man. The inspector attended a meeting between the State and TVA on November 21, 1985, to discuss the causes of the event and the results of the dose assessment by the TVA corporate staff. The inspector reviewed the methodology used, the decontamination procedures and the documentation of the event. The inspector discussed with licensee representatives, the calculation methodology and assumptions utilized for the dose assessment of 3.1 Rem to the skin of the whole body for the highest exposed individual. The doses calculated for the other individuals ranged from 1.0 to 8.0 milliRem. The inspector had no further questions.

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b. Dosimetry Results

The inspector reviewed the TLD results for 1985. For three individuals, the inspector examined each individual's dosimetry file to determine if NRC Form 4s had been completed.

c. Management Review of Dosimetry Results

The inspector discussed the dosimetry results with the Health Physics Supervisor and a dosimetry foreman to determine their understanding of radiological controls for their staff. The inspector reviewed records of administrative dose control extensions for the month of November 1985, and discussed the extensions with selected supervisors and staff.

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9. Maintaining Occupational Doses As Low As Reasonably Achievable (ALARA) (83728)

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a. Worker and Supervisory Actions

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The inspector reviewed recent changes to administrative procedures that implemented the elements of ALARA. The inspector discussed these changes with the Health Physics Supervisor and the ALARA Engineer.

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The inspector reviewed the ALARA review documentation for the 2A and 2B jet pump instrumentation nozzle replacement. The estimated exposure was 23.6 man-rem with the actual being 44.4. The increased amount of man-rem was due to a gross underestimate of the Special Work Permit man-hours required to complete the task. The inspector then discussed resulting actions with the ALARA Engineer and his staff.

d. ALARA Reports

The inspector reviewed the ALARA committee meeting minutes for 1985 and discussed the results with the ALARA Engineer and the Health Physics Supervisor. The original estimate of 1463 man-rem had been revised downward to 912 man-rem as a result of decreased Special Work Permit man-hours during the course of the year. The revised goal for 1985 is now 821 man-rem. Total exposure through October 1985 was 838 man-rem.

No violations or deviations were identified.

10. Low Power Range Monitoring (LPRM) Incident (92701)

At approximately 0900 hours, on November 21, 1985, operations personnel were transporting an old LPRM from the Unit 2 reactor to the spent fuel pool. During the movement operation, the LPRM got caught behind the source pin rack which is located in the spent fuel pool. While attempting to free the LRM a Boilermaker Foreman and HP Technician noted the LPRM hot end had risen to about 18" below the water's surface. The HP Technician relocated to the west end of the spent fuel pool to monitor the hot end. The HP Technician noted a dose rate increasing to 2 R/hr.

The following actions occurred almost simultaneously:

- (1) The HP Technician turned to inform Operations to stop raising and to lower the LPRM.
- (2) The Ludlum 300 ARM on the Refueling Bridge and the ARM on the north wall (see Attachment 2) of the Refueling Floor alarmed.
- (3) The LPRM was lowered by Operations.

The above events occurred sufficiently fast that the operator lowered the LPRM before the HP Technician could verbally transmit the direction to stop



the movement of the LPRM. The HP Technician estimated the event to last about 2 seconds. The increased dose rate initiated secondary containment isolation and standby gas treatment (SBGT). The alarm returned to normal (cleared immediately upon lowering the LPRM).

The exposures of the seven persons involved in this event was from 5 mRem to 30 mRem. The inspector reviewed records associated with this event and discussed with licensee representatives the root causes and corrective actions proposed by the licensee to prevent future occurrence. The inspector had no further questions.

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No violations or deviations were identified.

