



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

JAN 28 1993

Report No.: 50-348/92-34 and 50-364/92-34

Licensee: Southern Nuclear Operating Company, Inc.  
600 North 18th Street  
Birmingham, AL 35291-0400

Docket No.: 50-348 and 50-364

License No.: NPF-2 and NPF-8

Facility Name: Farley 1 and 2

Inspection Conducted: December 7-9, 1992 and January 26, 1993

Inspector: R. B. Shortridge 1/29/93  
R. B. Shortridge Date Signed

Approved by: W. H. Rankin 1/29/93  
W. H. Rankin, Chief Date Signed  
Facility Radiation Protection Section  
Radiological Protection and Emergency Preparedness Branch  
Division of Radiological Safety and Safeguards

SUMMARY

Scope:

This routine, unannounced inspection was conducted to review the licensee's investigation of the exposure of a workers thermoluminescent dosimeter (TLD) to 3770 millirem (mrem).

Results:

Based on a review of licensee data, interviews with the worker with the high TLD reading and health physics (HP) supervision, the inspector determined that the licensee conducted an adequate investigation and their findings were acceptable. These findings were reported in Licensee Event Report 92-002, dated January 26, 1993. It was concluded that the high TLD badge results did not represent an exposure to the individual. Based on the licensee's evaluation, a wholebody dose of 330 mrem was assigned to the individual for the month of November 1992.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

G. Boulter, Acting Plant Health Physicist  
\*P. Harlos, Auditor, SAER  
\*R. Hill, General Manager, Plant Farley  
\*R. Livingston, Environmental Supervisor  
\*R. Marlow, Technical Supervisor  
\*M. Mitchell, Superintendent, Health Physics  
\*C. Nesbitt, Manager, Operations  
\*J. Osterholtz, Assistant General Manager, Support  
\*L. Stinson, Assistant General Manager, Operations  
\*J. Thomas, Manager, Maintenance  
\*J. Walden, Operation Supervisor, Health Physics

Other licensee employees contacted during this inspection included craftsmen, engineers, operators, mechanics, security force members, technicians, and administrative personnel.

#### NRC Resident Inspector

\*F. Cantrell, DRP Section Chief  
\*G. Maxwell, Senior NRC Resident

\*Attended Exit Meeting

### 2. Description of the Event (92700)

On December 1, 1992, the licensee discovered during the regular TLD processing for the month of November, that a Waste and Decon Technician's (W&DT) TLD read 3770 mrem. The licensee's TLD had two chips (1st and 2nd) behind a stainless steel shield to record deep dose and one chip (3rd) under a window (opening in the TLD holder) to record shallow dose. The licensee read the first and third chip and determined the deep dose delivered to the TLD was 3770 mrem. The worker was excluded from the radiologically controlled area (RCA) of the plant until the high TLD reading could be satisfactorily resolved. The licensee sent the TLD to the vendor to read the second chip which was a backup for the first chip under the stainless steel shield.

#### a. Investigation

The licensee performed the following to determine the circumstances surrounding the high TLD reading. The licensee removed all digital alarming dosimeters (DADs) from service that the W&DT had used in November. All checked out within calibration when recalibrated on December 7, 1992. The subject workers' DADs were processed for the month of November and showed cumulative dose of 290 mrem in lieu of the 3770 mrem as registered on the TLD. The W&DT also wore extremity dosimetry during the month of

November. The extremity badges were issued at the start of the job and were to be worn for all high radiation work done at Farley Nuclear Station in the 4th quarter. The worker routinely wore his extremity dosimetry during all high radiation work in both October and November. The licensee contacted all coworkers that worked alongside the W&DT during November to ascertain their DAD exposure and their TLD exposure. All pertinent personnel were interviewed to gather the facts of the event and circumstances surrounding dose intensive work in November.

The licensee found through a review of DAD records for the W&DT for November that on the 14th the worker was exposed to a field of 3004 mrem per hour and on the 18th the worker was exposed to a field of 1205 mrem per hour. The job on November 14, 1992, involved removing the "B" steam generator (S/G) platform tent and on November 18, 1992, required the W&DT to clean the trough of the Unit 1 containment sump and screen.

#### b. Investigation Results

The vendor processed the second (backup gamma) chip of the TLD on December 3, 1992, and reported a reading of 4210 mrem deep dose. The vendor noted no damage to the chips or foreign material on them, thus verifying that an exposure occurred to the TLD above regulatory limits. However, DAD readings for the month were in the order of 150-300 mrem. The W&DT's extremity dosimetry read 330 mrem for the right hand, 330 mrem for the left hand, 270 for the right foot and 270 for the left foot. When the DADs that were used by the W&DT during November were calibration checked, all as found data was satisfactory and within calibration tolerances. Both jobs dealing with high intensities of radiation on the 14th and 18th were reviewed for sufficient cause for the exposure. The W&DT stated when interviewed that during the cleaning of the sump trough on the 18th of November, he noted that his DAD alarmed several times. The DAD was in a plastic bag along with the TLD and tied to the workers chest. The W&DT stated that in the process of tapping the DAD to turn the alarm off, (the alarm can be silenced three times by tapping before a fourth alarm which is continuous and requires the worker to exit the RCA), that crud from the sump trough was deposited via his gloves onto the plastic bag. The TLD was thought to be in front of the DAD in the plastic bag and thus the exposure to the TLD was determined to have occurred. Statements by other co-workers substantiated the W&DT's account of the event on November 18, 1992. The total reading for the DAD, which was between the source (crud) and the body was 47 mrem. Licensee general area surveys showed radiation levels of 20 to 120 mrem/hr with bags of trash and crud being removed from the trough reading as high as 1000 mrem/hr. After working in the area for one and one half hours, the worker unsuited and transferred the plastic bag with the DAD and TLD to the step off pad with cotton gloves on (a normal practice at some power plants). After removal of the cotton gloves and during

monitoring, the W&DT was found to have contaminated hands which indicates that substantial levels of contamination could have been on the plastic bag containing the dosimetry and been transferred to the worker's hands. The W&DT hands were decontaminated, his TLD pulled for processing, and he was restricted from work in the RCA until resolution of the exposure was completed.

The inspector interviewed the W&DT to better understand all aspects of the unplanned exposure to the TLD. The W&DT had six years experience in his field and displayed a good knowledge of radiological concepts and precautions to take to maximize one's exposure. The W&DT stated to the effect that based on the type of work he had performed, that he did not believe the TLD exposure of 3770 millirem was possible and that his coworkers dose during the month better approximated his dose. The W&DT also was knowledgeable about biological effects of radiation and stated that had the dose of 3770 mrem been to the whole body that no discernable effects from the radiation would be experienced. The inspector concluded the interview noting that there was no information that the licensee did not already have.

c. Regulatory Implications

10 CFR 20.101(b)(1) states that during any calendar quarter the total occupation dose to the whole body shall not exceed 3 rems (3000 mrem).

10 CFR 20.405(a)(1) states in addition to any notification required by 20.403 of this part, each licensee shall make a report in writing concerning any one of the following types of events within 30 days of its occurrence: (i) each exposure of an individual to radiation in excess of the applicable limits in 20.101 or 20.104(a) of this part, or the license.

The inspector reviewed all licensee data related to the high TLD reading and interviewed the superintendent of Health Physics and the Waste and Decon Technician. At the completion of the inspection the licensee had not completed their investigation; however, on January 26, 1993, Region II received the licensee's Plant Event Report 92-002 detailing the investigation and final corrective actions. Review of the report noted that the licensee did conclude that the bag containing the subject TLD was contaminated resulting in the high reading. An exposure of 330 mrem was assigned to the employee for the month of November 1992, based on the highest extremity TLD value (also the most conservative of the various measured exposures). Based on the licensee's investigation findings and NRC onsite review of the findings, interviews and a review of data, the NRC concluded that the investigation was adequate, that the extra precautions to record personnel exposure taken by the licensee were prudent and resulted in assigning a more correct whole body dose to the W&DT than that indicated by the TLD.

### 3. Exit Interview

The inspection scope and results were summarized on December 8, 1992, with those persons indicated in Paragraph 1. The inspector acknowledged that the licensee's investigation was not yet completed and that additional communication regarding the inspection might be necessary upon the completion for the inspector to close out the inspection. The licensee agreed to forward a completed copy of the investigation to Region II via the Resident Inspector. The inspector did not receive any dissenting remarks or review any proprietary material.

The licensee's final evaluation of this matter was contained in Licensee Event Report 92-002 which was received and reviewed by the NRC on January 26, 1993. Based on this review, the NRC considered the licensee's evaluation and actions on this matter to be adequate.