



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

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Report Nos.: 50-348/92-27 and 50-364/92-27

Licensee: Alabama Power Company  
600 North 18th Street  
Birmingham, AL 35291-0400

Docket Nos.: 50-348 and 50-364

License Nos.: NPF-2 and NPF-8

Facility Name: Farley 1 and 2

Inspection Conducted: October 19-23, 1992

Inspectors:

*R. B. Shortridge*  
R. B. Shortridge

*11/18/92*  
Date Signed

*Elizabeth S. Pharr*  
E. B. Pharr

*11/18/92*  
Date Signed

Approval by:

*W. H. Rankin*  
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Radiological Protection and Emergency  
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Division of Radiation Safety and Safeguards

*11/18/92*  
Date Signed

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the area of occupational radiation exposure during extended outages. Specific elements of the program examined during the inspection included organization and management controls, audits and appraisals, external and internal exposure control, control of radioactive materials and contamination, surveys and monitoring, and maintaining occupational exposures as low as reasonably achievable (ALARA).

Results:

In the areas inspected, no violations or deviations from NRC regulations were identified. The licensee's routine external and internal exposure programs were effectively implemented. Personnel exposures were less than 10 CFR Part 20 limits. Strengths were noted in the licensee's program for maintaining personnel exposures ALARA during outage activities by way of dose reduction initiatives. The inspector observed the conduct of operations in Unit 1

containment and noted that the radiological performance of both health physics technicians and craftsmen was good. An additional licensee strength was noted in the posting and labeling of radioactive materials throughout the Radiation Controlled Area (RCA). Overall, the licensee's radiation protection program was functioning adequately to protect the health and safety of the public and plant personnel.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*G. Boulter, Acting Plant Health Physicist
- \*S. Freeman, Auditor, Safety Audit and Engineering Review (SAER)
- \*M. Graves, Supervisor, Radwaste
- \*P. Harlos, Auditor, SAER
- \*M. Mitchell, Health Physics (HP) Superintendent
- \*C. Nesbitt, Manager, Operations
- \*J. Osterholtz, Technical Manager
- \*K. Patton, Site Services Manager, Westinghouse
- \*M. Stinson, Assistant General Manager, Operations
- \*J. Thomas, Manager, Maintenance
- \*J. Walden, HP Supervisor

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

#### Nuclear Regulatory Commission

- \*N. Economos, Region II Inspector
- \*G. Maxwell, Senior Resident Inspector
- \*M. Morgan, Resident Inspector

\*Attended October 23, 1992 Exit Meeting

### 2. Organization and Management Controls (83729)

The inspector reviewed the radiation protection (RP) program during the Unit 1, cycle 11, refueling/maintenance outage. The licensee's outage exposure goal was 362.726 person-rem. At the time of the onsite inspection the licensee was maintaining their accumulated dose below the projected dose goals. The licensee was performing eddy current testing in three steam generators (S/Gs) in parallel, sludge lancing, and refurbishing the head seating surface of the reactor vessel flange during the inspection. In addition, in-service-inspection (ISI) was in progress on reactor coolant pumps. The inspector attended several outage planning meetings and noted that radiological concerns were discussed with what appeared to be the proper emphasis and priority, with management fully supportive of the RP program.

The inspector reviewed the licensee's RP organization staffing levels and lines of authority as they related to the refueling/maintenance outage and verified that the licensee had not made changes that would adversely affect their ability to implement critical elements of the RP program.

No violations or deviations were identified

### 3. Audits and Appraisals (83729)

The licensee utilizes several methods to internally identify problem areas and initiate corrective actions as management tools to maintain a highly efficient RP program. The primary method is in the form of audits performed by their Safety Audit and Engineering Review (SAER) group. In discussions with the lead RP auditor the inspector noted that an audit of the RP program was in progress at the time of the inspection. The inspector reviewed Radiological Controls Audit, SAER-WP-02, dated June 1, 1992 through July 30, 1992 and found the audit to be performance based with the findings substantive and corrective actions performed in a timely manner.

Based on previous inspector comments regarding root cause determination the licensee evaluated the adequacy of FNP-O-RCP-10, Radiation Incident Reports, Personnel Contamination Events, and Radiological Warnings, Revision 20, and made changes to effect better evaluation and documentation of radiological deficiencies. Event description forms now have ample room for the description of the event and requires more information than the old forms. Licensee representatives stated that the more comprehensive information collected now allows for better evaluation by management at a later date. The inspector's review of the radiation incident reports (RIRs) generated since implementation of the procedure improvements, verified that the new RIR forms are more comprehensive in their evaluation and documentation of events.

No violations or deviations were identified.

### 4. External Exposure Control (83729)

10 CFR 20.101 requires that no licensee possess, use, or transfer licensed material in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter a total occupational dose in excess of 1.25 rems to the whole body, head and trunk, active blood forming organs, lens of the eyes, or gonads; 18.75 rems to the hands, forearms, feet and ankles; and 7.5 rems to the skin of the whole body.

10 CFR 20.202(c) requires, in part, that dosimeters used to comply with 10 CFR 20.202(a) shall be processed and evaluated by a dosimetry processor holding current accreditation from the National Voluntary Laboratory Accreditation Program (NVLAP) for the types of radiation for which the individual is monitored.

The inspector reviewed the licensee's investigations and exposure assessments relating to two external contamination incidents which occurred during the Unit 1 outage. During a September 30, 1992 incident a contract worker was performing a local leak rate test (LLRT) on the pressurizer steam sample valves when the test hose ruptured, spraying the contractor with Reactor Coolant System (RCS) water from the pressurizer sample line. HP surveys detected general contamination dispersion on the individual's skin and clothing with the maximum

contamination being 600,000 disintegrations per minute per a 100 square centimeter area (dpm/100cm<sup>2</sup>). During an October 19, 1992 incident, an individual performing work on the containment water chillers alarmed the contamination monitors located at the Unit 1 control point after exiting the containment building. Subsequent HP surveys revealed a 250,000 dpm hot particle on the individual's elbow.

For the individual contaminated during the LLRT the licensee decontaminated the worker to a localized 3000 dpm/probe area prior to his release from site on September 30, 1992 and as of October 19, 1992 the licensee detected 1000 dpm/probe area on the individual's scalp. Whole body counts during the period from September 30, - October 19, 1992 were not indicative of an internal exposure and the assigned whole body skin exposure during the same period, based on an exposure to Co-58 (Co-58), was 53 millirem (mrem). The individual contaminated with the hot particle was assigned an extremity dose of 2.88 rem. The dose was based on a 0.295 microcurie-hour (uCi-hr) exposure to the individual's elbow by beta emitting isotopes identified by an isotopic analysis of the captured particle and a stay time encompassing the time the individual entered the RCA until the particle was removed.

Following review of the incidents, the inspector determined that the licensee used appropriate HP controls prior to and following the incidents. During both incidents HP appropriately surveyed the individuals to determine the sources of exposure and then continued proper followup monitoring to assess the individuals' total exposures. The inspector concluded that the licensee monitored whole body skin and extremity doses adequately and that the individuals' assigned external exposures were within 10 CFR 20 limits.

The inspector also noted that since the previous NRC inspection conducted April 6-10, 1992, a NVLAP audit had been conducted for renewal of the licensee's accreditation for the Personnel Radiation Dosimetry Laboratory Accreditation Program. The licensee holds NVLAP certification as a sub-facility of a major vendor of dosimetry services. During the audit, concerns and deficiencies were identified which the vendor and the licensee sub-facility responded to in order to maintain NVLAP accreditation. The inspector reviewed the audit and found it to be thorough with many of the identified issues being administrative in nature. Following discussions with licensee representatives the inspector was informed that many of these administrative issues were resolved during a subsequent NVLAP accreditation audit of the vendor. During review of the vendor's response to the audit findings the inspector noted that appropriate actions had been initiated by both the vendor and licensee to satisfactorily resolve NVLAP concerns so that the licensee's sub-facility was granted accreditation renewal.

No violations or deviations were identified.



5. Internal Exposure Control (83729)

10 CFR 20.103(a)(1) states that no licensee shall possess, use, or transfer licensed material in such a manner as to permit any individual in a restricted area to inhale a quantity of radioactive material in any period of one calendar quarter greater than the quantity which would result from inhalation for 40 hours per week for 13 weeks at uniform concentrations of radioactive material in air specified in Appendix B, Table 1, Column 1.

10 CFR 20.103(a)(3) requires, in part, that the licensee, as appropriate, use measurements of radioactivity in the body, measurements of radioactivity excreted from the body, or any combination of such measurements as may be necessary for timely detection and assessment of individual intakes of radioactivity by exposed individuals.

10 CFR 20 Appendix A, Footnote (d), requires adequate respirable air of the quality and quantity in accordance with NIOSH/MSHA certification described in 30 CFR Part 11 to be provided for the atmosphere-supplying respirators.

30 CFR 11.121 requires that compressed, gaseous breathing air meet the applicable minimum grade requirements for Type 1 gaseous air set forth in the Compressed Gas Association (CGA) Commodity Specification for Air, G-7.1 (Grade D or higher quality).

The inspector discussed with licensee representatives and reviewed internal exposures during the ongoing Unit 1 refueling outage. The inspector noted the results of the licensee's internal dose assessment efforts and determined that no exposures in excess of the 40 Maximum Permissible Concentration-hours (MPC-hr) weekly control measure had occurred during outage activities.

The inspector also reviewed licensee procedures and records for sampling of breathing air to ensure compliance with Grade D specifications. The inspector determined that the licensee provided appropriate procedural guidance for sampling breathing air to verify Grade D compliance of the service air system during routine operations, as well as for startup, periodic checks, and shutdown of the containment breathing air system. The inspector verified that, in accordance with the applicable procedures, appropriate sampling was conducted and all results met Grade D specifications.

No violations or deviations were identified.

6. Surveys, Monitoring, and Control of Radioactive Material and Contamination (83729)

10 CFR 20.201 (b) states that each licensee shall make or cause to be made such surveys as (1) may be necessary for a licensee to comply with regulations in this part, and (2) are reasonably under the circumstances to evaluate the extent of radiation hazards that may be present.

During tours of the Unit 1 containment and the auxiliary building the inspector performed radiation and contamination surveys and compared the results with surveys performed by the licensee. No discrepancies were noted. The inspector also examined and verified that no radiation protection instrumentation was out of calibration.

The inspector reviewed records of personnel contamination events (PCEs) and noted that the licensee had experienced 35 PCEs since the start of the outage with 18 being hot specks or hot particles. Licensee representatives stated that preventative measures were in place to minimize the extent of hot particle contaminations. These measures included utilization of paper suits over protective clothing, hot particle work zones, and routine removal of personnel from work areas at prescribed intervals to allow personnel monitoring to ensure the time element would be minimized. The total number of PCEs to date this year have been 43 which appeared to be low compared to the time in the year and the workscope completed. The licensee continues to maintain an aggressive contamination control program as approximately 94 percent of the 114,197 square foot radiologically controlled area (RCA) is maintained as clean or less than 1,000 disintegrations per minute per 100 centimeters square (1000 dpm/100 cm<sup>2</sup>).

10 CFR 20.203 (f) requires each container of licensed radioactive material to bear a durable, clearly visible label identifying the contents when quantities of radioactive material exceeded those specified in Appendix C.

The inspector noted during tours of the Unit 1 containment and auxiliary building that all containers with radioactive material were clearly and visibly marked with a radioactive materials label. A previous inspection report identified this area a weakness and the licensee made appropriate procedure changes and took effective actions to correct the problem. The improvements in this area was also noted by NRC Region II management during previous tours of the RCA.

No violations or deviations were identified.

7. Program for Maintaining Exposures As Low As Reasonably Achievable (ALARA) (83729)

10 CFR 20.1(c) states that persons engaged in activities under licenses issued by the NRC should make every reasonable effort to maintain radiation exposures as low as reasonably achievable.

The inspector reviewed the licensee's program to maintain occupational exposures ALARA. During discussions with licensee representatives the inspector was informed that the cumulative dose through the third quarter of 1992 was 466.162 person-rem, with the licensee projecting an annual site cumulative dose goal of 848 person-rem. The inspector was also informed that the licensee's cumulative dose goal for the ongoing Unit 1 outage was 362 person-rem. As of outage day 27 of the projected

54 day outage the licensee's collective dose for the outage was 164.878 person-rem whereas the projected outage-to-date dose goal was 184 person-rem. The licensee further informed the inspector that as of the end of outage day 26 the licensee was approximately 60 hours behind schedule.

The inspector discussed with licensee representatives the outage work scope to date. During discussions with licensee representatives and plant workers the inspector was informed that dose rates in the containment building appeared to be lower than previous outages. Licensee representatives informed the inspector that this reduction could, in part, be attributed to the removal of the resistance temperature detectors (RTD) during the previous Unit 1 outage and a successful crud burst and cleanup during reactor shutdown, which removed approximately 1300 Ci of Co-58 from the RCS. The licensee continues to reduce the out of core source term since performing lithium/boron coordinated chemistry. Dose rates in the S/G channel heads are approaching 50 percent of what they were when forced oxidation was performed at mid-plane of the reactor vessel nozzles.

During discussions with licensee representatives and review of records the inspector noted that the work activities to remove pits in the seating surface of the reactor flange were expected to be completed with dose accumulation being as projected. Normally, the dose rates at the reactor flange were approximately 1.2 rem/hr. However, after installation of a shielding designed particularly for the flange work, dose rates were reduced to approximately 60 mrem/hr. Additionally, remote tooling was used in the actual repair of the flange seating surface and the inspector observed workers utilizing additional shielding in the reactor cavity when not actively involved in performing flange related work activities. The licensee projected a total dose accumulation of 14 rem following completion of all work activities relating to reactor flange repairs.

Licensee representatives stated that at the time of the onsite inspection the only unexpected dose accumulation was due to 10 full steam generator bowl entries. These entries were made in response to problems with robotic installation of the nozzle dams and at the time of the onsite inspection had contributed to accumulation of 4.23 rem. Additionally, the inspector was informed that at the time of the inspection only one Radiation Work Permit (RWP) had exceeded 100 percent of the total job projected dose. This RWP was related to the MOVATS work scope and since the particular RWP did not account for valve packing but this work was performed under the RWP, the projected dose had been exceeded. Licensee representatives informed the inspector that although the RWP dose was currently 103 percent of the projected dose, this dose was still expected and projected for, but under a different RWP.



The inspector informed licensee representatives that their program for maintaining personnel exposures ALARA during outage activities appeared to be functioning adequately.

No violations or deviations were identified.

8. Exit Meeting

The inspector met with licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on October 23, 1992. The inspector summarized the scope of the inspection and did not receive any dissenting comments. The licensee did not identify any documents given to the inspector as proprietary.