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

MAY 20 1988

Report Nos.: 50-348/88-10, 50-364/88-10

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

Docket Nos.: 50-348, 50-364 License Nos.: NPF-2, NPF-8

Facility Name: Farley 1 and 2

Inspection Conducted: March 28 - May 11, 1988

Inspector: John B Kahle for S. S. Adamovitz — 5/19/88 Date Signed

Approved by: John B Kahle J. B. Kahle, Section Chief — 5/19/88 Date Signed
Division of Radiation Safety and Safeguards

SUMMARY

Scope: This routine, unannounced inspection was conducted in the areas of liquid and gaseous radioactive waste management, effluent monitoring, and followup on an unresolved item.

Results: One violation was identified - failure to make detector specific attenuation corrections for solid calibration geometries used to determine the isotopic activities in gaseous effluents.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*W. Bayne, Chemistry and Environmental Supervisor
*T. Burr, Data Control Technician
J. Daiter, Plant Instructor
S. Fulmer, Supervisor, Safety Auditing and Engineering Review Group
*D. Grissette, Environmental and Emergency Planning Supervisor
*R. Hill, Operations Manager
D. Hostetter, Plant Instructor
L. Huey, System Performance Engineer
M. Mitchell, Health Physics Supervisor
*D. Morey, Assistant General Manager - Operations
*V. Murphy, SAER Auditor
*W. Shipman, Assistant General Manager - Support
*R. Wood, Plant Chemist
*J. Woodard, General Manager

NRC Resident Inspectors

*W. Bradford
*W. Miller

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on April 1, 1988, with those persons indicated in Paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection. The inspector contacted the licensee via telephone on April 18, 20, 26 and 28, 1988, to gain further information concerning gaseous calibration crosscheck studies. The licensee was contacted May 11, 1988, and informed that failure to make detector specific attenuation corrections for solid calibration geometries used to determine the isotopic activities in gaseous effluents was considered a violation (Paragraph 3).

3. Licensee Action on Previous Enforcement Matters (92701)

(Closed) Unresolved Item (URI) 50-348, 364/87-18-01: Validation studies of 1 liter and 4 liter Marinelli gaseous calibration.

In Inspection Report Nos. 50-348/83-08, 50-364/83-06, an Inspector Followup Item (IFI) was identified because results of the confirmatory

measurements for Xe-133 and Xe-135 concentrations from waste decay tanks were not in agreement. The disagreements were attributed to the fact that the licensee's calibration technique used a polymer matrix having a significantly higher density than gas. This resulted in the attenuation of low energy photons and a lower counting efficiency causing over reporting of noble gases (42 to 81 percent). The licensee agreed, at that time, to recalibrate using gas standards.

In Inspection Report Nos. 50-348/85-27, 50-364/85-27, validation studies of gas geometries were discussed. Apparently, validation studies were completed only for the 12 cc (14 ml) vial geometry. The IFI was closed and a new IFI (50-348/85-27-01, 50-364/85-27-01) was opened regarding conducting additional studies for larger volume geometries, a 100 cc gas bomb and a 4 liter gas Marinelli.

In Inspection Report Nos. 50-348/87-18, 50-364/87-18, the results of the gaseous calibration crosschecks for 1 liter and 4 liter Marinelli geometries conducted in March 1986 and April 1987, were reviewed. A known amount of a gas standard containing Xe-133, Xe-127 and Kr-85 was counted on the licensee's detector systems using the 1 liter and 4 liter counting geometries. The 1 liter and 4 liter counting geometries had been calibrated with the polymer matrix spiked with nine mixed gamma isotopes. The ratios of the "counted" results to the "known " spike values were calculated and compared for the 1986 and 1987 studies. The 1987 study results showed a much higher bias than the 1986 results. The IFI 50-348/87-18, 50-364/87-18 was closed and escalated to an unresolved item (URI 50-348/87-18-01, 50-364/87-18-01). The licensee representatives agreed to conduct further crosschecks in order to evaluate the differences.

During this inspection, a review of the licensee's evaluation showed that a study conducted in September 1987, closely agreed with the April 1987 study. The data from a study conducted in September 1985 also showed comparable data. The reason that the March 1986 data did not correlate with the September 1985, April 1987 and September 1987 data was unclear but it was possibly due to gas transfer techniques or errors. From the September 1987 study, the ratios of the "counted" to "known" activities for the 1 liter Marinelli ranged from 0.84 to 1.45. The range for the 4 liter Marinelli was 0.86 to 1.73.

As a result of these studies the licensee discontinued the use of the 4 liter Marinelli geometry. For the 1 liter Marinelli, the licensee discounted the Xe-127 data because of the complex summing corrections needed for the Xe-127 gamma photons. An average of the 4 detectors for the counting results were compared to the known gas values for Xe-135 and Kr-85. Since the average value of the 4 detectors was within in 20 percent of the known valve the licensee accepted the method for measuring and reporting gas samples.

Previous reported results using the 4 liter Marinelli, possibly high by as much as 63 percent, were not corrected because gaseous releases from the plant were only a small fraction of regulatory limits.

A comparative summary of the ratios of the "counted" results to the "known" values for the September 1987 study is presented in Attachment 1.

The licensee's evaluation averaged the results of the 4 detectors for each of the the isotopes. Averaging the results was misleading with regard to the accuracy of an individual detector and did not represent a true overall accuracy of the counting system. Also, there was no basis for disregarding the Xe-127 isotopic results because of the complex summary corrections needed for the Xe-127 gamma photons.

Even though most results for gas counting were biased high, the purpose of detection equipment calibration was to minimize errors and to provide for the most accurate and reliable quantitative measurements possible. Consequently, the attenuation of gamma photons in the solid polymer matrix should have been considered in the calibration of the detector systems for counting gases and correction factors should not have been averaged among detectors. This would have resulted in inaccurate measurements in the noble gaseous effluents.

The licensee was informed via telephone on May 11, 1988, that this would be considered a violation; failure to make adequate surveys (50-348, 364/88-10-01).

4. Changes to Equipment and Procedures (84723, 84724)

   a. Within the review areas of this inspection, no changes to liquid or gaseous effluent treatment or effluent monitoring systems had been made since the previous inspection.

   b. Technical Specification 6.8.1 requires the licensee to establish, implement, and maintain procedures covering areas such as liquid and gaseous radwaste management, radiological process and effluent instrumentation, the Offsite Dose Calculation Manual and the Process Control Program. All procedures listed had been reviewed and approved by appropriate plant management, as provided in the Technical Specification.

      (1) FNP-0-RCP-25, Radiation Control and Protection Procedure, Rev. 25, March 3, 1988

          Appendix A: Sampling Radiological Streams During a Radiological Accident (RCS/RHR, PZR, VCT)

          Appendix B: Sampling Effluent Streams During a Radiological Accident (Containment and Plant Vent Stack)

Appendix E: Preparation of Reactor Coolant Samples for Radiological and Chemical Analysis During a Radiological Accident

(2) FNP-1-RCP-252, Radiation Monitoring System Setpoints, Rev. 16, May 19, 1987

(3) FNP-0-RCP-269, Isotopic Calibration of Offline Radiogas Monitors RE0012, RE0013, RE0015, and RE0022, Rev. 7, February 18, 1988

(4) FNP-0-RCP-270, Isotopic Calibration of the Plant Vent Stack Monitor RE0014, Rev. 2, February 24, 1988

(5) FNP-0-RCP-271, Isotopic Calibration of Monitors RE0010, RE0011, RE0021, Rev. 7, February 18, 1988

(6) FNP-0-RCP-271, Isotopic Calibration of the Eberline Remote Detector Assemblies RE0015B, C, RE0060A-D and RE0066A-F, Rev. 8, February 24, 1988

(7) FNP-1-RCP-601, Sampling the Reactor Coolant System, Rev. 12, January 1, 1988

(8) FNP-0-RCP-706, Gaseous Waste Release Program, Rev. 10, February 15, 1988

(9) FNP-1-STP-714, Waste Monitor Tank Surveillance, Rev. 5, December 22, 1987

(10) FNP-1-STP-728, Plant Vent Stack Surveillance, Rev. 5, December 22, 1987

(11) FNP-1-STP-750, Waste Gas Decay Tank Curie Content Determination, Rev. 6, December 17, 1987

(12) FNP-2-STP-759, Implementation of the Liquid Waste Release Program, Rev. 0, August 1, 1986

No violations or deviations were identified.

5. Audits and Appraisals (84723, 84724)

Technical Specification 6.5.2.8 requires audits of the radiological effluent program and the results thereof at least once per 12 months, the Offsite Dose Calculation Manual and implementing procedures at least once per 24 months, and the Process Control Program and implementing procedures at least once per 24 months. Technical Specification 6.2.3 designates the Safety Audit and Engineering Group as being responsible for audit requirements.

The inspector reviewed the following audits:

Counting Room Activities, conducted January 28-March 19, 1987

Environmental Monitoring, Radiological and Nonradiological (SAER-AP-05, Group 1) conducted February 23-April 10, 1987

Offsite Dose Calculation Manual (Spot Audit, SAER-WP-21), conducted August 3-September 14, 1987

Audit reports contained detailed summaries of program noncompliances, deficiencies and comments. Each noncompliance item was assigned a corrective action number for tracking purposes. Followup actions and projected completion dates were also identified, and item close-out required subsequent evaluations by the Safety Auditing and Engineering Group.

No violations or deviations were identified.

6. Semiannual Effluent Release Reports (84723, 84724)

Technical Specification 6.9.1.8 requires the licensee to submit within 60 days after January 1 and July 1 of each year, routine radioactive effluent release reports covering the operation of the unit during the previous six months of operation.

The inspector reviewed the Semiannual Radiological Release Reports for the periods July 1 through December 31, 1986, January 1 through June 30, 1987, and July 1 through December 31, 1987. The effluent release data summarized in Attachment 2 was obtained from current and previous Semiannual Effluent Release Reports.

There were five abnormal releases during the calendar year 1987, three liquid releases and two gaseous releases. The inspector reviewed plant incident reports and radiochemistry incident reports concerning these releases. The gaseous releases occurred on Unit 2 and totalled 8.7 E-6 Ci. These monitored, planned releases were caused by steam generator pressure pulse cleaning and steam generator helium leak testing. The abnormal liquid releases occurred on Unit 1 and a total of 8.65 E-5 Ci were released. Two of the releases were due to recurrent leaks from penetrations in the Refueling Water Storage Tank barrier, and estimated volumes released were 20 gallons and 2.4 gallons respectively. The third abnormal release was caused by a leak in the pumping equipment on the Reactor Makeup Water Storage Tank and a total of 0.5 gallons was calculated to have been spilled into the yard drain. Incident reports (RCIR 1-87-017, RCIR 1-87-024, and IR 1-87-42) documented the licensee's followup actions, which included details of sampling and cleanup activities, identification and quantification of the isotopic releases, and calculation of probable doses. The licensee's assessments of these releases indicated all isotopic concentrations were less than 10 CFR 20, Appendix B limits.

No violations or deviations were identified.

7. Testing of Air Cleaning Filtration Systems (84724)

Technical Specifications 3.7.7, 3.7.8, and 3.9.14 provide requirements for the testing of charcoal adsorber sample retention efficiency for methyl iodide and for in-place leak testing of HEPA filtration and charcoal adsorption sections of exhaust and atmosphere cleanup filtration systems.

The inspector discussed system maintenance and testing with cognizant licensee representatives and reviewed selected records pertaining to system testing. A Filter Testing Log provided summary data for laboratory charcoal efficiency tests for iodine retention, HEPA in-place filter leak test, freon in-place charcoal bed penetration test, and design flow check. The inspector reviewed portions of the Filter Testing Log 1978-1988 including:

Penetration Room Unit 1, Trains A and B
Containment Purge Unit 1
Penetration Room Unit 2, Trains A and B
Containment Purge Unit 2
Shared Control Room Pressurization, Trains A and B
Shared Control Room Recirculation, Trains A and B
Shared Control Room

No violations or deviations were identified.

8. Reactor Coolant and Secondary Water Chemistry (84723)

Technical Specification Table 4.4-4 specifies sampling and analysis frequencies of coolant analyses for gross radioactivity dose equivalent I-131, radiochemical E-Bar determination, and isotopic analyses for I-131, I-133, and I-135.

Technical Specification Table 3.4-2 specifies the maximum coolant concentration limits for dissolved oxygen, chloride, and fluoride when the coolant temperature is above 250°F. Sampling frequencies are specified in Technical Specification Table 4.4-3.

The inspector discussed analytical methods and reviewed selected portions of plant chemistry records including:

a. Reactor Coolant System Plots

Unit 1, November 1986 - February 1988
Unit 2, May 1986 - October 1987, December 1987 - January 1988

Parameters that were plotted included:

Gross Activity (Beta/Gamma), Power
Dose Equivalent Iodine, I-131, I-133
Iodines (I-132, I-134, I-135)
Xenons (Xe-133, Xe-135, Xe-138)
Cesiums (Cs-138, Cs-137, Cs-134)
I-131/I-133 Ratio

b. Secondary Water System Plots for Units 1 and 2, January 1987 - February 1988

Systems and parameters that were tracked included:

Steam Generator (SG) Blow Down
SG Cation Conductivity
SG Specific Conductivity
SG Silica
Condenser Hotwell Cation Conductivity
Condensate Pump Discharge Dissolved Oxygen

The inspector verified that analyses were conducted at the required internals, that isotopic activities were within the required limits and that the necessary documents were maintained.

No violations or deviations were identified.

9. Radioactive Liquid Wastes and Liquid Effluent Treatment Systems (84723)

Technical Specifications 3.11.1.1, 3.11.1.2, and 3.11.1.3 establish limits for concentrations of radioactive materials in liquid effluents, require the liquid effluent treatment system to be operable, and require the use of the liquid effluent treatment system under certain conditions.

The facility was equipped with two waste monitor tanks per unit. Prior to discharge, each tank was analyzed for gamma isotopic, and tritium activity was determined from the tank's previous month's composite sample. Discussions with licensee representatives indicated the frequency for liquid releases was typically one to two tanks per day.

The inspector reviewed selected liquid release permits for Units 1 and 2 covering the period January 1987 to March 1988. The permits were examined for content and completeness. The inspector also verified that the records required by Technical Specification 6.10 were maintained in terms of frequency and content.

Technical Specification 3.11.1.2 requires the licensee to limit the dose or dose commitment to an individual from radioactive materials in liquid effluent releases to:

a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ, and

b. During any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 3 mrem to the total bor, and to less than or equal to 10 mrem to any organ.

The inspector reviewed the ODCM, selected release permits, and dose calculation records, and verified the requirements of Technical Specification 3.11.1.2 were met.

No violations or deviations were identified.

10. Radioactive Gaseous Wastes and Gaseous Effluent Treatment Systems (84724)

Technical Specifications 3.11.2.1 through 3.11.2.6 define the operating requirements, radioactive gaseous effluent release limits, and surveillance requirements for the gaseous radwaste treatment systems.

The licensee maintained continuous gaseous release permits for the plant vent stack, containment purge, and the steam jet air ejector (SJAE), and issued release permits for the waste gas decay tanks (WGDT) when required. The facility was equipped with eight waste gas decay tanks per unit, and a licensee representative estimated approximately 20 tank releases per unit per year. Each tank's curie content was determined weekly by gamma isotopic analysis if the tank had had a gaseous addition during the past seven days. The chemists checked Daily Water Reports for increased tank pressure and the Operation's Log to determine if additions had been made to the tanks. The continuous gaseous release permits were updated weekly and a new permit was issued monthly. Analytical requirements for the continuous permits included iodines and particulates on weekly samples and noble gases and tritium on monthly grab samples.

The inspector reviewed selected portions of the following records:

a. Waste Gas Decay Tanks Release Permits

WGDT #4 Unit 1 1/15/88
WGDT #8 Unit 1 1/16/88
WGDT #2 Unit 1 1/29/88
WGDT #8 Unit 2 2/15/88

b. Continuous Gaseous Waste Release Permits for the Plant Vent Stack, Condenser SJAE, and the Containment Purge

Unit 1 May 19, 1987
Unit 2 May 21, 1987
Unit 1 December 2, 1986
Unit 2 December 4, 1986

c. Continuous Release Analytical Data Packs Units 1 and 2

January - December 1987

d. Weekly Analysis Documents for WGDTs

January - December 1987

No violations or deviations were identified.

11. Radioactive Liquid and Gaseous Effluent Monitoring (84723, 84724)

Technical Specifications 3.3.3.10 and 3.3.3.11 define the operating and surveillance requirements for monitoring radioactive liquid and gaseous effluent streams. The inspector and the licensee toured selected effluent monitoring locations and sampling stations and verified Control Room strip charts and direct read-outs were operational. The inspector also reviewed selected portions of the following radiation monitor calibrations and work authorizations:

a. RE-14 Plant Vent Stack

Unit 1 July 29, 1986
Unit 2 October 28, 1987, December 31, 1987, January 4, 1988

b. RE-15A Condenser Air Ejector

Unit 1 August 21, 1987
Unit 2 January 14, 1988

c. RE-18 Inline Westinghouse Liquid Radiation Monitor

Unit 1 October 14, 1987
Unit 2 January 12, 1988

d. RE-21 Vent Stack Air Particulate

Unit 1 January 9, 1988
Unit 2 November 26, 1986

e. RE-22 Vent Stack Radiogas Monitor

Unit 1 January 30, 1987
Unit 2 August 17, 1988

f. RE-23B Steam Generator Blowdown

Unit 1 January 11, 1987
Unit 2 January 28, 1988

No violations or deviations were identified.

12. Offsite Dose Calculation Manual (84723, 84724)

The inspector discussed the Farley ODCM with licensee representatives and determined that no changes had been made to the dose calculation methodology since the last inspection (87-01, January 12-16, 1987). The annual Land Use Survey had been conducted during July 1987 to meet the requirements of Technical Specifications 3.12.2 and 4.12.2.

No violations or deviations were identified.

13. Post-Accident Sampling System (PASS) (84723)

Technical Specification 6.8.3.d requires the licensee to have the installed capability of sampling and analyzing plant fluids and gases in the event of an accident.

The inspector, accompanied by a licensee representatives, toured the Units 1 and 2 PASS facilities and discussed system operation and maintenance. The local PASS panels were used routinely every 48 hours for sampling dissolved gas from the reactor coolant, and maintenance procedures were performed every six months. The inspector discussed PASS training with plant instructors and noted that training was required every six months for all count room technicians. This training was often performed in conjunction with the routine six-month's maintenance. The NRC inspector determined that the PASS systems were utilized and maintained sufficiently in order to reasonably assure operability and worker familiarity during accident use.

No violations or deviations were identified.

14. Gaseous Release Incidents Review (84724)

The inspector reviewed two incidents concerning gaseous releases which occurred when licensee personnel were attempting to sample the Unit 1 volume control tank (VCT) gas space. The incidents occurred on March 25, 1988 14:19 and March 26, 1988 07:50, respectively. The March 25 event occurred as a chemist was taking a VCT gas sample in the Unit 1 primary sample room, when the R-14 monitor (Plant Vent Stack - High Range) and the R-22 monitor (Vent Gas - Low Range) went into high alarm. The VCT gas sampling apparatus in the Unit 1 sample room consisted of the required sampling lines, valves, and a permanently installed metal gas canister. The chemist had followed the routine procedure - made the necessary valve line-up, purged the gas through the sampling lines and canister for the specified time, isolated the canister, and then vented the excess pressure from the canister into a fume hood which vented to the plant stack. At this point, the plant stack monitors went into high alarm. The licensee checked gas pressure on the volume control tank and the waste gas decay tanks and verified that the tank pressures had not changed. Health Physics personnel had determined that the source of the gas leak was from the Unit 1 primary sample room. The licensee had considered that one possible cause of the stack monitors pegging was due to the technician

venting the sample canister too quickly. The sampling procedure was subsequently changed to emphasize cracking the canister purge valve slowly in order to prevent a monitor spike. The inspector reviewed the incident report (IR 1-88-93), observed a "simulated" sampling in the Unit 1 sample room, and checked the R-14 monitor strip charts in the Control Room. A peak indicating high activity was noted on the strip chart which corresponded to the time of the VCT gas sampling; however other samplings of the VCT gas caused little or no fluctuation on the R-14 strip chart.

The second incident occurred on March 26, 1988, within 24 hours of the first. The licensee was again attempting to sample the Unit 1 VCT gas. The sampling system was in continuous purge, and as the technician closed the VCT sample route isolation valve, the RE-14 and RE-32 (next elevation area radiation monitor) went into high alarm. Unlike the first event, the RE-14 monitor alarmed prior to venting the sample canister. The licensee checked all pertinent sample lines and valves and found a slight "weeping" in one valve, the VCT isolation valve, HS-3117. The licensee had investigated the possibility that there were other events that caused the RE-32 area radiation monitor to alarm but had found none. It was also noted that between these two events, two gas samples had been obtained on the night shift with no problems.

In reviewing the plant incident reports (IR 1-88-93 and IR 1-88-94) the inspector noted that the offsite dose calculation had been performed and that the calculated dose rates were below reporting levels. As of the end of this inspection, the causes of these events were still under investigation by the licensee.

No violations or deviations were identified.

ATTACHMENT 1

Ratio: Counted Activity/Known Activity

4 Liter Geometry

Isotope	Sample Number	Detector U1MCA1	Detector U1MCA2	Detector U2MCA1	Detector U2MCA2	Average
Xe-133	0853	1.36	0.86	1.25	0.98	1.12
Xe-133	0854	1.38	0.86	1.27	0.98	1.12
Xe-133	0855	1.40	0.86	1.25	0.98	1.13
Xe-127	0853	1.60	1.72	1.61	1.62	1.63
Xe-127	0854	1.59	1.69	1.61	1.57	1.61
Xe-127	0855	1.60	1.73	1.61	1.59	1.64
Kr-85	0853	1.35	1.36	1.33	1.33	1.35
Kr-85	0854	1.36	1.35	1.37	1.33	1.35
Kr-85	0855	1.34	1.39	1.36	1.33	1.35

1 Liter Geomety

Isotope	Sample Number	Detector U1MCA1	Detector U1MCA2	Detector U2MCA1	Detector U2MCA2	Average
Xe-133	0853	1.19	0.85	1.11	0.91	1.01
Xe-133	0854	1.18	0.84	1.13	0.90	1.01
Xe-133	0855	1.22	0.84	1.13	0.91	1.03
Xe-127	0853	1.34	1.47	1.28	1.24	1.33
Xe-127	0854	1.32	1.45	1.31	1.25	1.33
Xe-127	0855	1.37	1.45	1.32	1.29	1.37
Kr-85	0853	1.18	1.21	1.13	1.09	1.15
Kr-85	0854	1.19	1.19	1.17	1.09	1.15
Kr-85	0855	1.22	1.20	1.17	1.11	1.16

ATTACHMENT 2

Table - Effluent Release Summary of
Farley Units 1 and 2

Liquids (curies)

Calendar Year	Fission and Activation Products	Tritium
1985	7.08 E-2	1.11 E+3
1986	1.85 E-1	1.34 E+3
1987	9.72 E-2	1.14 E+3

Gases (curies)

Calendar Year	Fission and Activation Products	Iodine	Tritium
1985	2.37 E+3	5.84 E-3	4.70 E+2
1986	3.12 E+3	2.02 E-3	2.15 E+2
1987	2.02 E+3	4.04 E-4	1.51 E+2