UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

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Report Nos: 50-348/94-14 and 50-364/94-14

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: May 2-6, 1994

Inspector: N. G. McNeill 6-2-94
Date Signed

Approved by: T. R. Decker, Chief 6/2/94
Date Signed
Radiological Effluents and Chemistry Section
Radiological Protection and Emergency Preparedness Branch
Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, announced inspection was conducted in the areas of the personnel training and qualifications, plant water chemistry, Confirmatory Measurements samples analysis, the Annual Radiological Environmental Operating Report for 1993, Meteorological Tower data, the Semiannual Effluent Release Report for 1993, audits, and the Zinc Addition and Monitoring System.

Results:

The licensee's training of the Chemistry Department and radioactive material processing and shipping personnel satisfied Technical Specification (TS) requirements (Paragraph 2).

Plant water chemistry was maintained well within limits specified by the TSs (Paragraph 3).

Confirmatory Measurements samples were analyzed successfully for all of the radionuclides provided to the licensee (Paragraph 4).

The licensee had submitted an Annual Radiological Environmental Operating Report which detailed minimal impact on the environment surrounding the Farley Nuclear Plant (Paragraph 5).

The Meteorological Tower equipment was operable and maintained according to TSs (Paragraph 6).

The Semiannual Effluent Release Report was reviewed by the inspector and showed data comparable with past reports and was well within TSs (Paragraph 7).

The licensee was performing program audits in compliance with TSs (Paragraph 8).

The licensee had installed the Zinc Addition and Monitoring System and was preparing to begin zinc addition to the primary system (Paragraph 9).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

W. Bayne, Safety Audit and Engineering Review (SAER) Auditor
*C. Black, Technical Manager
*S. Fulmer, Superintendent, Operations Support
O. Graves, Radwaste Supervisor
*R. Hamm, Engineer, Chemistry and Environmental
*R. Hill, General Manager - Nuclear Plant
*J. Kale, Superintendent, Chemistry and Environmental
*R. Livingston, Environmental Supervisor
M. Mitchell, HP Superintendent
N. McGilvray, Nuclear Specialist I
C. Nesbitt, Manager, Operations
*J. Osterholtz, Technical Manager
*L. Stinson, Assistant General Manager of Operations
G. Terry, Safety Audit and Engineering Review (SAER) Auditor
R. Wood, Chemistry Supervisor

Other licensee employees contacted during this inspection included engineers, operators, technicians, and administrative personnel.

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*M. Morgan, Resident Inspector

*Attended exit interview

Acronyms and Initialisms used throughout this report are listed in the last paragraph.

2. Training and Qualification (84750)

TS 6.4.1 requires the licensee to maintain a training program for the plant staff to assure that the minimum education and experience requirements of Section 5.5 of ANSI N18.1-1971 and Appendix A of 10 CFR 55 and the supplemental requirements specified in Sections A and C of Enclosure 1 of the March 28, 1980 NRC letter to all licensees are met before a person can be considered to be qualified to perform his duties independently. The program shall include familiarization with the relevant operational experience.

The inspector interviewed the licensee's Technical Training Supervisor about the Training/Qualification Program in general and more specifically in the areas of Chemistry and Environmental program. There had essentially been no changes to the training program since the last inspection which would adversely affect the licensee's ability to perform the requirements of the program.

The inspector noted that qualifications were kept up to date and maintained for those personnel who were observed performing various operations during the week. The levels of experience for those qualified ranged from two months to twelve years. In addition, the procedures required to be performed for certification were reviewed.

The procedures appear to meet the minimum requirements for performance of the required tasks. In addition, some of the actual tests which were required to be passed before certification could be received by technicians were reviewed. The inspector noted that there appeared to be adequate training and testing of the chemistry and environmental personnel who were observed during the inspection.

No violations or deviations were identified.

3. Plant Water Chemistry (84750)

TS 3.4.8 specifies that the concentrations of DO, chloride, and fluoride in the RCS be maintained below 0.10 ppm, 0.15 ppm, and 0.15 ppm, respectively. TS 3.4.9 specifies that the specific activity of the primary coolant be limited to less than or equal to 1.0 uCi/g DEI.

These parameters are related to corrosion resistance and fuel integrity. The oxygen parameter is based on maintaining levels sufficiently low to prevent general and localized corrosion. The chloride and fluoride parameters are based on providing protection from halide stress corrosion. The activity parameter is based on minimizing personnel radiation exposure during operation and maintenance.

Pursuant to these requirements, the inspector reviewed tabular daily summaries which correlated reactor power output to chloride, fluoride, and dissolved oxygen concentrations of the reactor coolant for the period of September 1993 to the present date and determined that the parameters were maintained well below TS limits. Typical values for DO, chloride, and fluoride were less than 10 ppb, less than 20 ppb, and less than 10 ppb, respectively, for both units. DEI values ranged from 1.11E-06 to 5.00E-03 uCi/ml. The data also revealed some indication of a small fuel leak which was confirmed after shutdown as being a pinhole leak in one rod in a fuel bundle in Unit 1. Sipping performed during RF 12 confirmed this.

The inspector concluded that the Plant Water Chemistry was being maintained well within the TS requirements and that the frequency of the sampling was also being met.

No violations or deviations were identified.

4. Confirmatory Measurements sample Analysis (84750)

10 CFR 20.1501 requires the licensee to perform surveys as necessary to evaluate the extent of radiation hazards.

The licensee uses measurements of effluent streams to assess doses to the public resulting from the operation of the plant. In order for the licensee to assess the doses accurately, it is imperative that the measurements of the different streams be representative and accurate.

Pursuant to these requirements, the inspector evaluated the licensee's analytical capability to make accurate radioactivity measurements. Prior to the inspection, samples containing beta/gamma-emitting radionuclides were shipped to the licensee. These samples, which are one portion of the NRC's Confirmatory Measurements Program, are supplied by the Department of Energy's RESL at INEL in Idaho Falls, Idaho.

The results of the licensee's analysis were received by the Radiological Effluents and Chemistry Section within the allotted 60 day time frame. The results of the licensee are presented in Attachment 1 and a discussion of the NRC's acceptance criteria is included in Attachment 2.

The results submitted by the licensee were found to be in agreement for all radionuclides contained in the sample. These values were within the acceptability limits as detailed in the NRC's Acceptance Criteria.

No violations or deviations were identified.

5. Annual Radiological Environmental Operating Report (84750)

TS 6.9.1.6 requires that the Annual Radiological Environmental Operating Report be submitted prior to May 1 of the year following the Annual Radiological Environmental Operating Report. TS 6.9.1.6 also states format and content requirements for the Annual Radiological Environmental Operating Report.

The Farley Nuclear Plant Environmental Monitoring Program is designed to detect the effects, if any, of plant operation on environmental radiation levels by monitoring airborne, waterborne, ingestion, and direct radiation pathways in the area surrounding the plant site. Indicator sampling stations are located where detection of the radiological effects of the plant's operation would be most likely, where the samples collected should provide a significant indication of potential dose to man, and where an adequate comparison of predicted radiological levels might be made with measured levels. Control stations are located where radiological levels are not expected to be significantly influenced by plant operation, i.e., at background locations. An environmental impact assessment of plant operation is made from the radiological measurements at the sampling stations.

The inspector concluded that the licensee had a good program in place to detect the effects of radiological effluents, direct radiation, etc. due to plant operations and that those operations had caused minimal impact to the environment and virtually no dose to the general public.

No violations or deviations were identified.

6. Meteorological Tower and Instrumentation (86750)

TS 3/4.3.3.4 states operability and surveillance requirements of the meteorological monitoring system. Requirements are implemented by Procedure FNP-ENV-17, Revision 17, issued April 9, 1991.

The inspector and an Environmental Technician inspected the Primary and Secondary Meteorological Towers associated instrument buildings, including equipment and logbooks, to verify TS compliance and to evaluate instrument operability. The inspector noted that both towers were located such that there would be no interference with the flow of air. The Primary Tower was 150 feet tall with instrument packages at the 35- and 50-foot levels. Calibrations were done on a semi-annual basis for both towers. The Chemistry and Environmental Group performed checks three times per week. The primary system had three channels for the vertical temperature differential, which was used to determine the air stability index.

Wind speed and horizontal wind direction were measured at each level. Temperature and dew point were measured at the 35-foot level. A solar radiation measuring instrument was located on a platform near the Primary Tower. A rain gauge was located near the instrument building and was observed to be in good operating order. The inspector noted that they were operating properly. A mercury barometer was mounted on the interior wall of the primary tower's instrument building.

The Secondary Tower served as a backup to the Primary Tower. It was 10 meters tall with detectors at a single level. This tower was equipped with a system for horizontal and vertical components as well as wind speed and ambient temperature.

From examination of the above addressed systems, the inspector determined that the meteorological measurement system was capable of fulfilling its required functions.

The inspector reviewed selected calibration records and maintenance records of the past several years for both the Primary and Secondary Meteorological Towers to verify TS compliance and/or identify chronic problems. No irregularities were noted by the inspector.

The inspector concluded that the Meteorological Towers and their associated instrumentation were well-maintained and satisfied the TS requirements.

No violations or deviations were identified.

7. Semiannual Radioactive Effluent Release Report (84750)

TS 6.9.1.8 requires the licensee to submit a Semiannual Radiological Environmental Release Report within the specified time periods covering the operation of the facility during the previous six months of operation. TS 6.9.1.9 identifies the requirements for the content and format of the report. The inspector reviewed the reports for the first half and second half of 1992 to verify TS compliance. These data are summarized below for the respective entire calendar years.

Radioactive Effluent Release Summary

Farley, Units 1 and 2	1991	1992	1993
Abnormal Releases			
Gaseous	2	1	0
Liquid	0	2	2
Activity Released (curies)			
a. Liquid			
1. Fission and Activation Products	4.05E-1	1.77E-1	1.87E-1
2. Tritium	1.24E+2	8.18E+2	1.82E+3
b. Gaseous			
1. Fission and Activation Gases	4.64E+2	2.67E+1	2.20E+2
2. Particulates and Iodines	1.62E-3	4.66E-5	3.06E-5
3. Tritium	1.39E+2	3.51E+1	7.23E+1

An abnormal release was noted in the Liquid Release Program. This event occurred on Unit 2 during Quarter 1 in that approximately 139 gallons of contaminated CCW leaked into the SW during the February 6-8, 1993 time frame. Subsequently the CCW to SW Heat Exchanger leak was repaired. The doses and curies due to this release were an insignificant portion of the total doses and curies released from Unit 2 during the first Quarter of 1993.

Another abnormal release from the Liquid Release Program occurred on Unit 2 during Quarter 4 in that approximately 64 gallons of contaminated CCW leaked into the SW via the 2C CCW Heat Exchanger. The activity and overall dose due to this release was insignificant and is included in the effluent summaries.

No changes to the PCP were made during the reporting period.

The inspector concluded that the Semiannual Radioactive Effluent Release Report satisfied the requirements of the TSs.

No violations or deviations were identified.

8. Audits (84750 and 86750)

TS 6.5.2.8 specifies the types and frequencies of audits to be conducted under the direction of the Manager-SAER. The inspector reviewed audits conducted during the past year by SAER within the scope of this report. In order to evaluate compliance with the TSs and assess quality of the licensee's program, the inspector reviewed the following audits:

- Onsite Environmental Monitoring Program, SAER-WP-01, Appendices A and D (Section I) - February 4, 1994
- Surveillance Testing, Chemistry SAER-WP-01, Appendices B, C, D, E - February 7, 1994 thru March 10, 1994
- Offsite Dose Calculation Manual, SAER WP-01, Appendix F - October 18 thru 27, 1993
- Chemistry, SAER-WP-06, Appendix A - June 1 thru September 28, 1993
- Chemistry, SAER-WP-34, Appendix B and C - April 1 thru May 25, 1993

The audits were found to be well planned and documented and included several findings of procedural noncompliance which were being tracked or that had been closed out. A corrective action audit was undertaken every six months by the SAER Group. Findings were closed out formally at that time or left open. The inspector noted that the comments and recommendations were detailed and would aid the implementation or adequate corrective actions. The inspector verified that the audit program was conducted in accordance with the TSs.

The inspector concluded that the audit process was capable of identifying programmatic weaknesses and making recommendations for corrective actions.

No violations or deviations were identified.

9. Proposed Zinc Addition System (86750)

The inspector was notified during the inspection that the licensee was continuing preparations for instituting the zinc injection system for the Primary Reactor Coolant System of the facility. Information on this system was collected to keep the Region informed of activities relative to water chemistry at the facility.

The licensee had concluded discussions with Westinghouse about the potential benefits of the proposed ZAMS. The system and the associated proposal outlined the potential benefits of adding low concentrations of zinc (about 40 ppb) added as zinc borate to the primary reactor coolant of a PWR.

The potential benefits are listed as: reduced general corrosion rates of most materials of construction, reduction of both initiation and propagation of PWSCC in Alloy 600 and other primary system materials, and reduced radiation levels due to reduced corrosion product transport. The possible problems associated with Zinc-65 radioactivity, as experienced in BWRs, are addressed in the proposal. The lesser radiological hazards of the Zinc-65 as opposed to the Cobalt-60 and Cobalt-58 are key in the reduction of potential radiological hazards.

The system is now onsite and is being installed by the licensee and the effects of it's implementation are being reviewed by management. The licensee had decided to utilize commercial grade zinc which contains concentrations of Zinc-64, as high as 40 percent, as opposed to the much more costly, depleted zinc (which contains about 1 percent Zinc-64). As the Zinc-64 is the precursor for Zinc-65, with it's already discussed high dose rate characteristics, the effect of using commercial grade zinc in the system will be examined when the system is operational. At the time of the inspection this was planned for early summer 1994.

The licensee was notified that the progress on this system would be reviewed in future inspections and would be followed with interest.

No violations or deviations were identified.

10. Exit Interview

The inspection scope and results were summarized on May 6, 1994, with those persons indicated in Paragraph 1. The inspector described the areas inspected and discussed the inspection results, including likely informational content of the inspection report with regard to documents and/or processes reviewed during the inspection. The licensee did not identify any such documents or processes as proprietary. Dissenting comments were not received from the licensee.

11. Acronyms

ANSI - American National Standards Institute, Inc.
C&E - Chemistry and Environmental
CFR - Code of Federal Regulations
Ci - curie
DEI - Dose Equivalent Iodine
DO - Dissolved Oxygen
DOT - Department of Transportation
FNP - Farley Nuclear Plant
FSAR - Final Safety Analysis Report
IR - Incident Report

l - liter
LLD - Lower Level of Detection
LLW - Low Level Radwaste
LWRP - Liquid Radwaste Release Permit
mg - milligram
mrem - millirem
NCV - Noncited Violation
No. - Number
NOV - Notice of Violation
NRC - Nuclear Regulatory Commission
ODCM - Off-site Dose Calculation Manual
PCP - Process Control Program
ppb - parts per billion
ppm - parts per million
PWSCC - Primary Water Stress Corrosion Cracking
QR - Qualification Records
RCS - Reactor Coolant System
RETS - Radiological Effluent Technical Specifications
TS - Technical Specification
uCi - micro-Curie (1.0E-6 Ci)
ZAMS - Zinc Addition and Monitoring System

ATTACHMENT 1

RESULTS OF FARLEY ANALYSIS OF CONFIRMATORY MEASUREMENTS SAMPLES

Isotope	NRC (pCi/mL)	Licensee (uCi/mL)	Resolution	Ratio (Licensee/NRC)	Comparison
H-3	101.44	1.03E-05	20	1.02	Agreement
Sr-89	NDA	LLD	___	____	_____
Sr-90	17.97	1.61E-05	20	0.896	Agreement
Fe-55	9.81	0.851E-05	20	0.867	Agreement

ATTACHMENT 2

CRITERIA FOR COMPARING ANALYTICAL MEASUREMENTS

This enclosure provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In this criteria, the judgement limits denoting agreement or disagreement between licensee and NRC results are variable. This variability is a function of the NRC's value to its associated uncertainty. As the ratio of the NRC value to its uncertainty, referred to in this program as the resolution[1] increases, the range of acceptable differences between the NRC and licensee values should be more restrictive. Conversely, poorer agreement between NRC and licensee values must be considered acceptable as the resolution decreases.

For comparison purposes, a comparison ratio[2] of the licensee value to the NRC value for each individual nuclide is computed. This ratio is then evaluated for agreement based on the calculated resolution. The corresponding resolution and calculated ratios which denote agreement are listed in Table 1 below. Values outside of the agreement ratio for a particular nuclide are considered in disagreement.

TABLE 1

Confirmatory Measurements Acceptance Criteria
Resolutions vs. Comparison Ratio

Resolution	Comparison Ratio for Agreement
< 4	0.40 - 2.5
4 - 7	0.50 - 2.0
8 - 15	0.60 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
> 200	0.85 - 1.18