ALABAMA POWER COMPANY

ANNUAL ENVIRONMENTAL OPERATING REPORT

PART B: RADIOLOGICAL

JOSEPH M. FARLEY NUCLEAR PLANT

UNIT NO. 1

LICENSE NO. NPF-2

AND

UNIT NO. 2

LICENSE NO. NPF-8

PERIOD ENDING DECEMBER 31, 1987

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ANNUAL ENVIRONMENTAL OPERATING REPORT
PART B: RADIOLOGICAL

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OPERATIONAL RADIOLOGICAL ENVIRONMENTAL PROGRAM

JOSEPH M. FARLEY NUCLEAR PLANT

UNITS 1 AND 2

I. Introduction

The Joseph M. Farley Nuclear Plant, owned and operated by Alabama Power Company (APCo), located in Houston County, Alabama is approximately fifteen miles east of Dothan, Alabama on the west bank of the Chattahoochee River. Unit 1, a Westinghouse Electric Corporation Pressurized Water Reactor (PWR) with a rated power output of 860 megawatts electrical (MWe) achieved initial criticality on August 9, 1977. The unit was declared "commercial" on December 1, 1977. Unit No. 2, also a 860 MWe Westinghouse PWR, achieved initial criticality on May 8, 1981 and was declared "commercial" on July 30, 1981.

During 1987, Unit No. 1 was off-line from April 6-15 and December 7-17 for maintenance. Unit No. 2 was off-line January 10-24 for maintenance activities and October 3 through December 5 for the fifth refueling outage. Unit No. 2 was also off-line December 9-31 for additional maintenance activities.

The sample collection and analysis schedule for the operational off-site radiological environmental monitoring program implemented in May 1977 and as modified on July 1, 1980 with the addition of 14 TLD stations was continued during 1987 for both Units No. 1 and 2. The program was further modified effective April 1982 to reflect Amendment No. 26 to the Unit 1 Technical Specifications issued March 1, 1982. This program was designed to monitor any radioactivity contribution to the environs from the plant through either the airborne or waterborne pathways. The type of samples monitored, and number and type of sampling stations are shown in Table 1. Indicator sampling stations are located, where practical, at locations where detection of the radiological effects of the plant's operation is thought to 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. The control stations are placed at locations where radiological levels are not expected to be significantly influenced by plant operation, i.e., at background locations. For some airborne radioactivity samples, community stations are located at the principal population centers between the indicator and the control stations (3-8 miles). These in normal operation could be used, if desired, as additional control stations, and alternatively, as indicator stations in the nearest population centers in the event of a major airborne release of radioactivity from the plant.

II. Radiological Sampling and Analysis

A detailed outline of the operational radiological sampling and analysis activities for the environmental program to meet the requirements of the Unit 1 and 2 Technical Specifications is given in Tables 1 and 2. For each parameter only one sample was collected and one analysis performed to meet the specifications for both Units No. 1 and 2.

The samples were collected by APCo's technical staff except for the in situ high purity germanium (HP(Ge)) gamma-ray spectroscopy measurements of soil. The latter were made by staff members of the University of Georgia(UGA), Center for Applied Isotope Studies. All sample analyses were contracted to UGA. The minimum detectable concentration (MDC), specified for the various samples and their respective analyses are given in Table 3. The reporting levels for radioactivity concentrations in environmental samples are provided in Table 4. Sampling and analysis deviations during 1987 are listed in Table 5.

A. Airborne Particulates and Iodine

All airborne particulate and iodine monitoring stations shown in Figures 3.12-1 through 3.12-3 were equipped with Roots vacuum pumps which operated continuously at a flow rate of approximately 0.04 m^3/min (1.5 ft^3/min). The particulates were collected on Gelman Metricel 47mm (or equivalent) filters. In series with, but downstream of the particulate filters, F&J 50 mm (or equivalent) activated charcoal cartridges were used for collection of iodine. The Roots system has the sample collector mounted outside of the cabinet horizontally to the ground with a Singer gas meter measuring the cumulative air flow. The gas meters were calibrated against a certified flow meter. Both the particulate filters and charcoal cartridges were collected weekly and sent to UGA for radioactivity analysis.

Gross beta radioactivity measurements were performed on each air particulate filter using a Tennelec low background alpha-beta counting system. The filters from each station, composited at the end of each quarter, were analyzed for gamma emitters using a fifteen percent relative efficiency low background germanium lithium (Ge(Li)) detector and a Canberra 4096 channel computer-based multichannel analyzer (MCA).

All air monitoring station locations shown in Figures 3.12-1 through 3.12-3 have the capability of monitoring airborne iodine. Weekly routine samples were analyzed for I-131 by UGA using a Canberra 1024 channel MCA and two 1" x 3" NaI detectors and matched photomultiplier tubes.

B. External Radiation

For the continuous measurement of environmental gamma radiation, natural Lithium Fluoride (LiF) (TLD-700) chips, manufactured by Harshaw-Filtrol Chemical Company, were used. TLD packets each containing four annealed LiF chips were sealed in opaque mylar to produce a packet that was light-tight, weather-proof, and which had a low mass attenuation for radiation (approximately 50mg/cm^2). On the plant site, all TLD packets were kept in a lead safe with 2-inch walls except for those receiving field exposure or those in the process of being exchanged.

At each external radiation monitoring station, shown in Figures 3.12-1, 3.12-2, and 3.12-3, two TLD packets, one changed and read quarterly and one changed and read annually, were exposed side-by-side on metal stakes at a height of one meter above the ground. For the computation of the net field doses, a log of all exposure periods was maintained for each TLD packet.

C. Milk

The milk sample locations are as indicated on Figure 3.12-3. All milk samples, collected bi-weekly, were analyzed by UGA for I-131 and gamma emitters. As a preservative for shipment, 1 ml of 25 weight percent merthiolate (Thimerasol) solution was added to each one gallon sample. The I-131 concentration in each sample was determined by collection on anion exchange resin, elution with sodium hypochlorite, followed by organic extraction and counting, by beta-gamma coincidence, the resultant toluene-iodine solution in a low level liquid scintillation counter. Stable iodine carrier was added to each sample for determination of the radiochemical yield.

A one liter quantity of each sample was placed in a marinelli beaker and then analyzed for gamma emitters using a 15 percent relative efficiency low background Ge(Li) detector and a Canberra 4096 channel computer-based MCA.

D. Vegetation: Forage

Monthly, forage was collected from indicator grass plots located near the air monitoring stations at the plant site perimeter in sectors 7 (SSE) and 16 (N), or alternate plots if needed, and from a control grass plot located near the air monitoring station in Dothan. After drying and pulverizing, the samples were analyzed by UGA for gamma emitters using a 15 percent relative efficiency low background Ge(Li) detector and a Canberra 4096 channel computer-based MCA.

E. Soil

Annual in situ gamma-ray spectroscopy measurements were made by UGA using a 10 percent relative efficiency high purity germanium detector and gamma-ray spectroscopy system specially designed for field use. Measurements were taken at the seven indicator locations and at the five community and control (background) locations listed in Table 2. A 1024 channel Canberra MCA interfaced to a Hewlett-Packard 9825A calculator was used for data storage and analysis.

F. Surface Water: River Water

Samples of water from the Chattahoochee River, above and below the plant site at the locations shown in Figure 3.12-4 were collected on a semi-continuous basis with Instrumentation Specialties Company (ISCO) samplers. Monthly composites were sent to UGA for radioactivity analysis. Two liter aliquots from each monthly composite were placed in trays lined with plastic film and evaporated to dryness at 100°C. The residue and plastic film was folded to fit a petri-dish and analyzed for gamma emitters using a 15 percent relative efficiency Ge(Li) low background detector and a Canberra 4096 channel computer-based MCA.

At the end of each quarter, for each sampling location, the balance of the three monthly composites were combined to give a quarterly composite sample. Approximately 50 ml from each quarterly composite sample was distilled and a 25 ml aliquot taken for tritium analysis using a large volume (100 ml) Hewlett-Packard 200 low background liquid scintillation counter.

G. Groundwater: Well Water

In the Farley Plant area there are no true indicator sources of groundwater. A well which serves Great Southern Paper Company as a source of potable water located on the east bank of the Chattahoochee River about four miles south-southeast of the plant, was sampled on a quarterly basis and designated as an indicator station. A deep well which supplies water to the Whatley residence located about 1.2 miles southwest of the plant was sampled on a quarterly basis and designated as a control (background) station. Samples from both were sent to UGA for radioactivity analysis. An aliquot from each sample was taken for tritium analysis. After distillation, 25 ml samples were analyzed using a large volume (100 ml) low background liquid scintillation counter. From the remainder of each sample, a two liter aliquot was taken and evaporated to dryness at 100°C in a tray lined with plastic film. The residue and film was folded to fit a petri dish and analyzed for gamma emitters using a 15 percent relative efficiency Ge(Li) detector and a Canberra 4096 channel computer-based MCA.

H. Fish: River

Semi-annually, two types of fish, game and bottom feeding, were collected from the Chattahoochee River at the locations shown in Figure 3.12-4, and sent to UGA for gamma-ray spectroscopy analysis. Both semi-annual fish samples sent to UGA consisted of fish fillets that had been split with Alabama Bureau of Radiological Health. These fish samples were coarsely chopped at UGA and were analyzed for gamma emitters using a 15 percent relative efficiency low backgro_ d Ge(Li) detector and 4096 channel Canberra computer-based MCA.

I. Sediment: River

Semi-annually, sediment samples were collected from the Chattahoochee River at the locations shown in Figure 3.12-4. Approximately one kg of sample was sent to UGA where it was dried, mixed, and analyzed for gamma emitters using a 15 percent relative efficiency low background Ge(Li) detector and a Canberra 4096 channel computer-based MCA. One semi-annual sediment sample was split with Alabama Bureau of Radiological Health.

III. Results and Discussion

During the operational period, no known atmospheric nuclear tests were conducted. Identifiable radioactivity effects from the last test conducted by the Peoples Republic of China on October 16, 1980, were minimally existent during 1987. No radiological effects from the Chernobyl Nuclear Power Plant accident in the U.S.S.R. in April of 1986 were evidenced in 1987.

For measurements involving radioactivity concentrations by volume or mass the designation "minimum detectable concentration" (MDC) is defined in Table 3.

For measurements involving a quantity of radioactivity or radiation that is independent of the sample volume or mass the designation "lower limit of detection" (LLD) is used to denote the limit of detection applicable at the 95 percent confidence level. The LLD is defined as "the smallest amount of sample activity that will yield a net count for which there is confidence at a predetermined level that activity is present." Its application is limited to measurement systems which denote a limiting detection capability without respect to the size of sample and/or radiochemical yield and to measurements which by their nature do not involve concentrations, e.g. radiation dose rates (mrad/hr., mrad/qtr., etc.)

A. Airborne Particulates

The results of the radioactivity analyses of airborne particulate filters are shown in Table 1987-01. The mean gross beta activity value for the air particulate indicator sampling locations was lower than the community and control sampling locations. The indictor and control gross beta activity means were slightly lower than the 1986 values; however, the gross beta activity mean for the community location was higher than in 1986. All air particulate activity was lower than the preoperational values.

The gross beta and gamma-ray spectroscopy data for the air particulate filter composites showed a decrease of beta gamma, Cs-134, Cs-137, and I-131 in indicator, control and community samples as compared to 1986. All values for Cs-134, Cs-137, and I-131 were below the measured MDC.

B. Airborne Iodine

The results of the radioactivity analyses of iodine charcoal cartridges are shown in Table 1987-02. The iodine activity for 1987 samples at all locations was less than the minimum detectable concentration values. These activity levels were lower than the iodine levels of 1986 and the preoperational period.

C. External Radiation

The results of the external radiation measurements using TLD packets, each containing four LiF chips, are shown in Table 1987-03. As found during the preoperational measurement period and during 1986, the data reflect the differences in site specific soil radioactivity. Exposures recorded by quarterly TLDs in 1987 were greater than those recorded in 1986 for all sampling locations. The exposures recorded by annual TLDs in 1987 were also greater than that observed in 1986 and during the preoperational period. However, no deviate trends can be concluded since the data for 1987 is comparable to that recorded in 1985 and 1983. Also evident in 1987 as in previous years, the exposure recorded by annual TLDs were less than the sum of the exposure from the four quarterly TLDs.

C. Milk

The results from the radioactivity analyses of milk are shown in Table 1987-04. Milk from the Silcox Dairy was sampled from January through August and from the Lewis Dairy from September through December as the control. An indicator milk location provided a sample during August. Only naturally occurring radioactive isotopes were detected in both the indicator and control samples.

E. Vegetation

Forage was the only vegetation sampled during this operational period. The radioactivity analysis results are shown in Table 1987-05. Forage, as during the preoperational period, continued to be a very effective and sensitive indicator of airborne radioactivity. The specific activity values for the various gamma emitting radionuclides at indicator locations were slightly higher than the control locations. Traces of Cs-137 were found in some indicator samples; however, the values were lower than 1986. The data for 1987 indicated fewer fission product radionuclides than the preoperational data.

F. Soil

The results of the in situ HP(Ge) gamma-ray spectroscopy analysis of soil during this operational period are shown in Table 1987-06. The only man-made radioactivity found in all measurements was Cs-137. During the preoperational period, the fission products Zr-95, Nb-95 and Cs-134 were seen at most of the locations in addition to Cs-137. The 1987 levels of Cs-137 found at indicator locations were not significantly different from control locations. These levels were approximately the same as the 1986 period and lower than the preoperational period.

G. Waterborne: Surface Water

The results of radioactivity analysis of surface water are shown in Table 1987-07. Cs-134 and Cs-137 activity levels were below the measured MDC values. These values were also less than the 1986 and preoperational data.

The average surface water indicator tritium level was higher than the control, less than that observed in 1986 and as in previous years higher than that observed during the preoperational period.

H. Waterborne: Ground Water

The results of the radioactivity analysis of ground water are shown in Table 1987-08. The Cs-134, Cs-137, and I-131 activity values were less than MDC which was comparable to 1986 values.

I. Sediment: River

The results of radioactivity analysis of sediment samples from the Chattahoochee River are shown in Table 1987-09. There were no manmade isotopes detected in any sediment sample.

J. Fish: River (Game)

The results of gamma-ray spectroscopy analysis of the edible portions of game fish taken from the Chattahoochee River are shown in Table 1987-10. Cs-137 was found at low levels in both the indicator and control samples of game fish with the indicator Cs-137 level higher than the control value. The 1987 average indicator and control Cs-137 values were found to be higher than 1986 data but lower than the preoperational data.

K. Fish: River (Bottom Feeding)

The results of gamma-ray spectroscopy analysis of the edible portions of bottom feeding fish taken from the Chattahoochee River are shown in Table 1987-11. Cs-137 was found at low levels in both indicator and control samples of bottom-feeding fish. The indicator Cs-137 level was slightly higher than the control value. The 1987 Cs-137 levels for both sampling locations were higher than 1986 but lower than the preoperational period.

IV. Land Use Census and Interlaboratory Comparison Program

A. Land Use Census

The results of the July, 1987, Land Use Census are given in Attachment 1 to this report.

B. Interlaboratory Comparison Program

During 1987, the University of Georgia Center for Applied Isotope Studies (UGA) was a participant in the EPA Crosscheck Program. The UGA EPA Program code designation is EA. Although Farley Nuclear Plant (FNP) also participates in the EPA Crosscheck Program under code designation FU, none of the environmental analyses reported herein were performed by FNP.

V. Data Trends and Conclusion

A review of the 1987 environmental data indicated some changes in the parameters monitored when compared to previous years' data.

Slight increases of Cs-137 in fish were observed as well as external gamma radiation as measured by TLD. These Cs-137 levels, though slightly higher than 1986, were lower than the preoperational values. The external gamma radiation values were comparable to the 1985 and 1983 TLD measurements. The review also indicated either no change or decreases in numerous parameters including air particulates, milk, vegetation, soil, water, and sediment. Therefore, data obtained during the 1987 sampling year demonstrated that there was no significant adverse impact on the surrounding environs of Farley Nuclear Plant as a result of its operation.

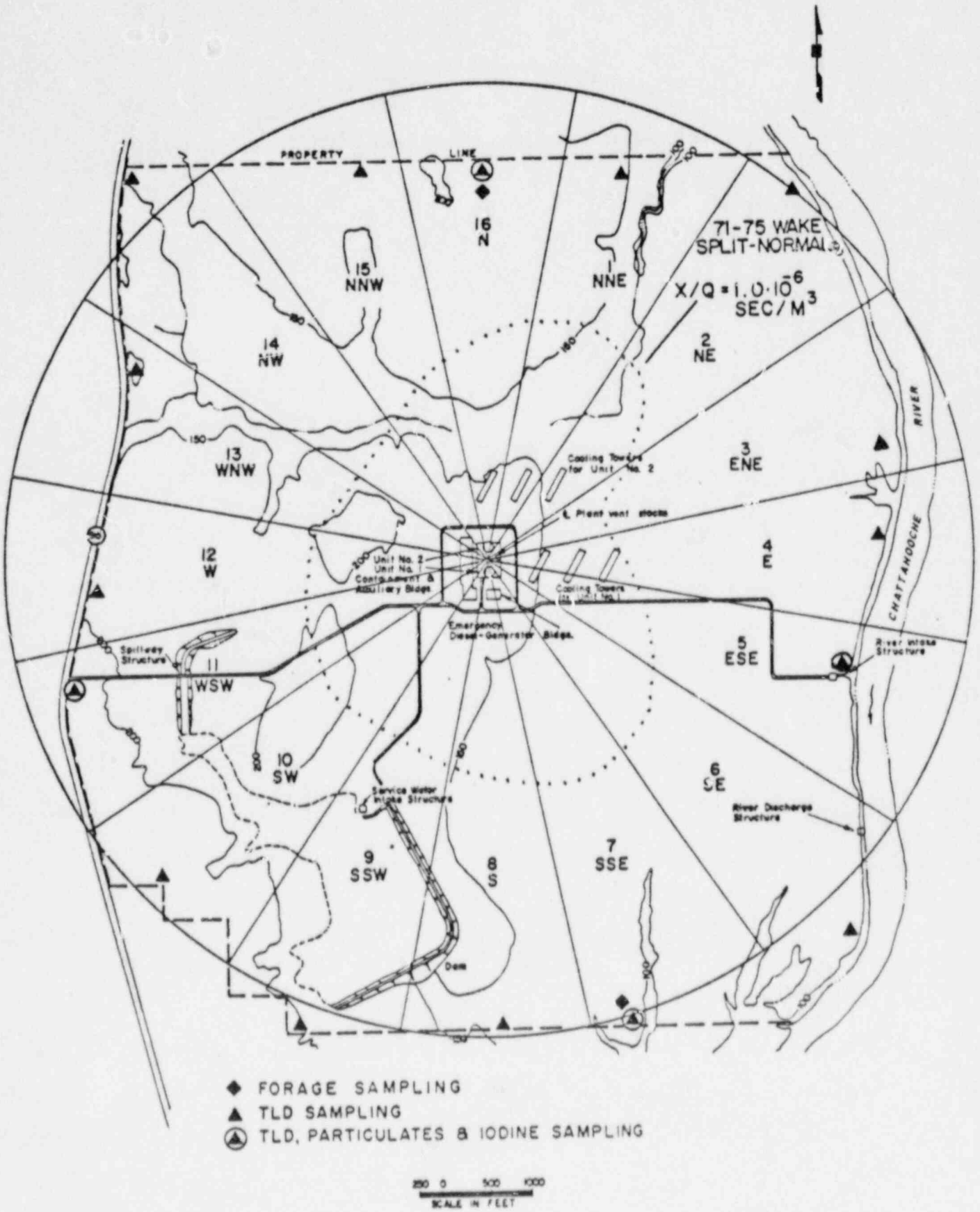


FIGURE 3.12-1 INDICATOR SAMPLING LOCATIONS FOR AIRBORNE ENVIRONMENTAL RADIOACTIVITY AT THE FARLEY NUCLEAR PLANT.

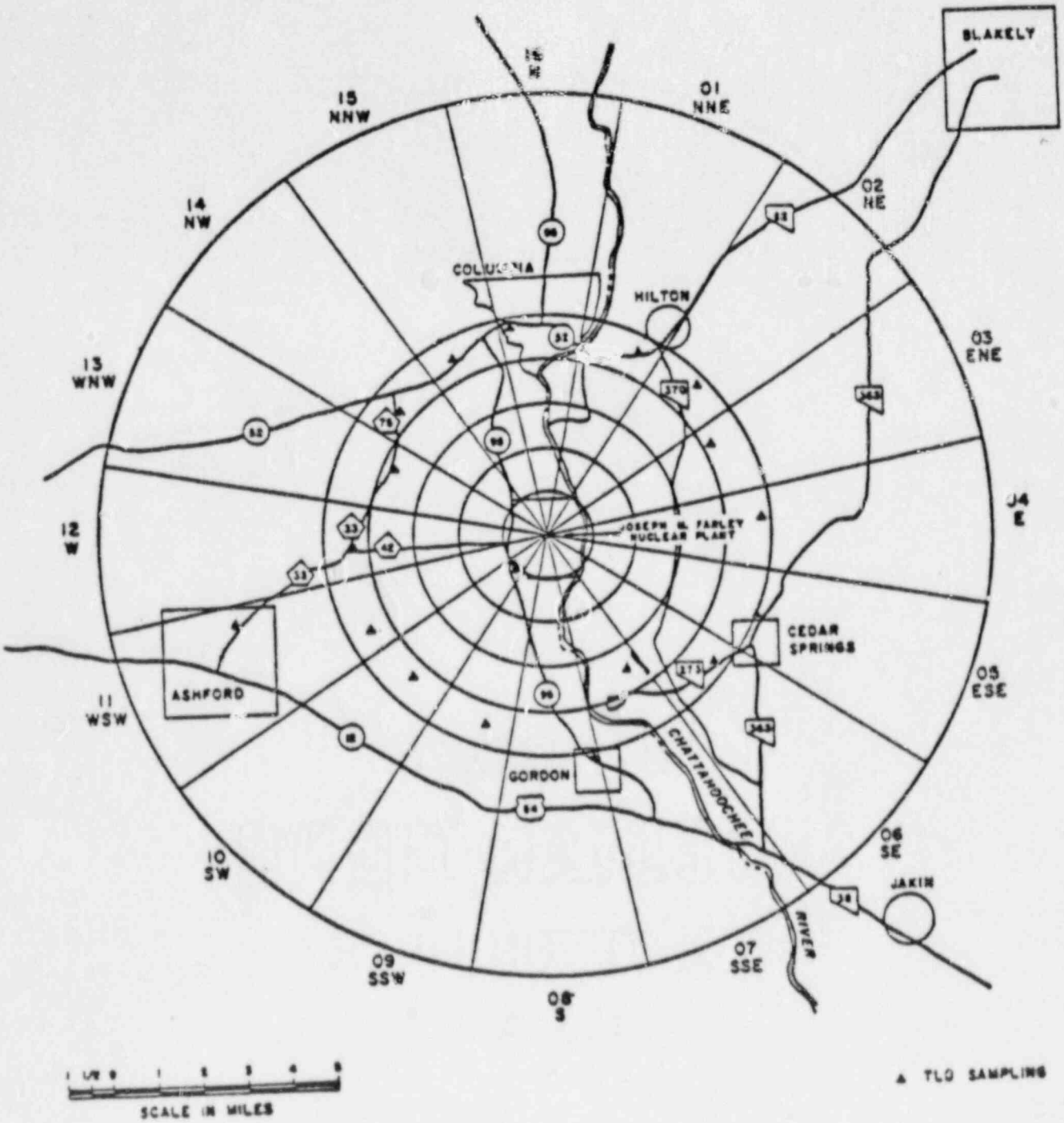


FIGURE 3.12-2 COMMUNITY (INDICATOR II) SAMPLING LOCATIONS FOR AIRBORNE RADIOACTIVITY IN THE FARLEY NUCLEAR PLANT AREA.

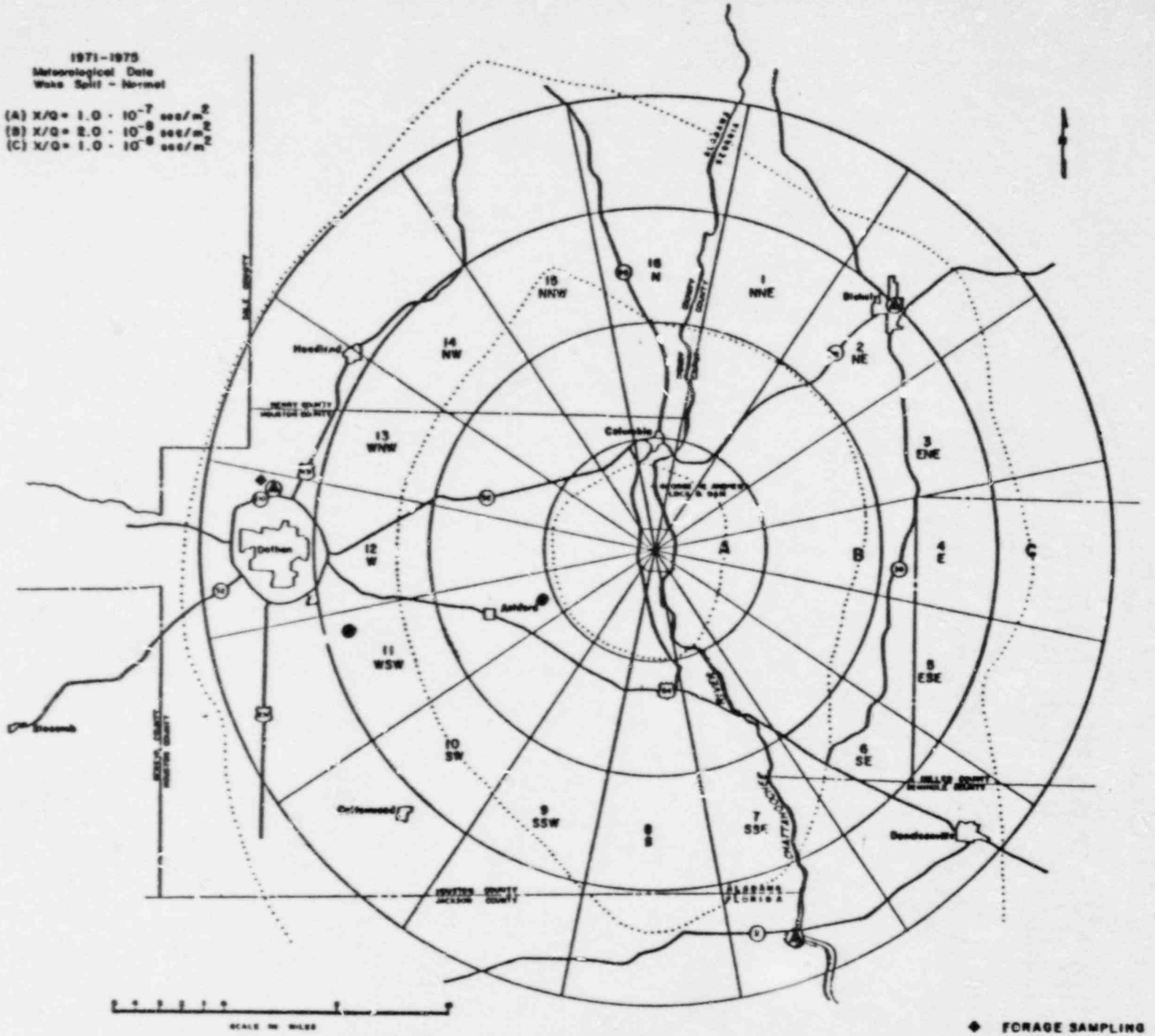
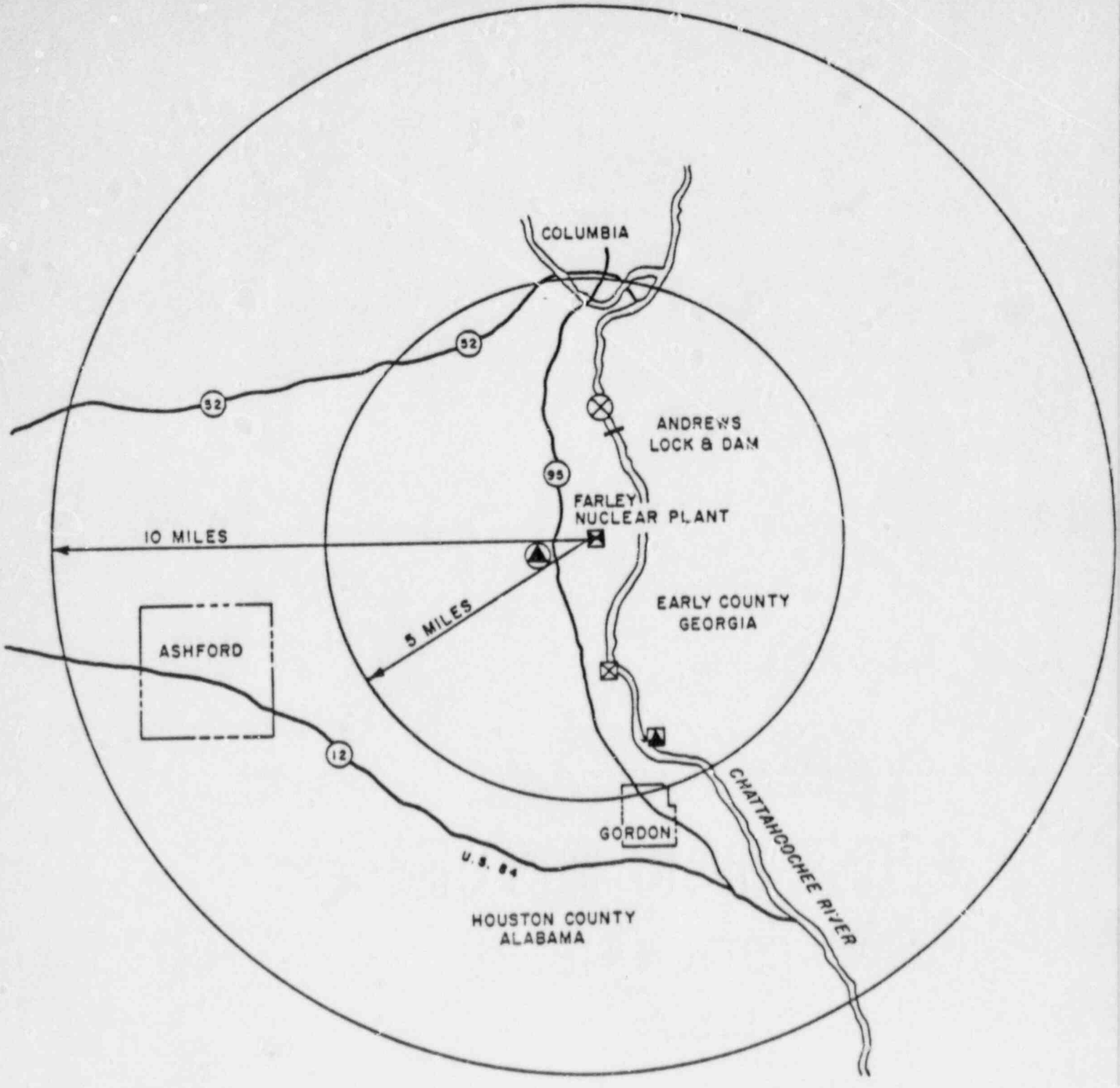


FIGURE 3.12-3 CONTROL SAMPLING LOCATIONS FOR AIRBORNE ENVIRONMENTAL RADIOACTIVITY IN THE FARLEY NUCLEAR PLANT AREA.

◆ FORAGE SAMPLING
▲ TLD SAMPLING
TLD, PARTICULATES AND IODINE SAMPLING
● MILK SAMPLING



INDICATOR STATIONS

- SURFACE AND GROUND WATER
- FISH AND SEDIMENT

CONTROL STATIONS

- SURFACE WATER, FISH, AND SEDIMENT
- GROUND WATER

FIGURE 3.12-4 INDICATOR AND CONTROL SAMPLING LOCATIONS FOR WATERBORNE ENVIRONMENTAL RADIOACTIVITY IN THE FARLEY NUCLEAR PLANT AREA.

TABLE 1

SCOPE OF OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM AT THE FARLEY NUCLEAR PLANT DURING 1987

Principal Pathway	Type of Samples	Number of Sampling Stations		
		Indicator	Community	Control
Airborne	Airborne Particulates	3	3	3
	Airborne Iodine	3	1	3
	External Radiation	16	18	4
	Milk	-	-	1
	Forage[a]	2	-	1
	Soil[b]	7	3	2
Waterborne	River Water	1	-	1
	Groundwater	1	-	1
	River Fish	1	-	1
	River Sediment	1	-	1

[a] Forage sampling in lieu of vegetable and fruit. Vegetable and fruit sampling discontinued with implementation of Unit 1 Technical Specification Upgrade (Amendment No. 26, issued March 1, 1982).

[b] Annual In Situ Gamma Measurements continued by choice of licensee during 1987.

TABLE 2

OUTLINE OF OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM FOR FARLEY NUCLEAR PLANT DURING 1987

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
AIRBORNE		
Particulates	Continuous operation of sampler with sample collection being performed as required by dust loading, but at least once per 7 days.	Particulate sampler Analyze for gross beta radioactivity > 24 hours following filter change. Perform gamma isotopic analysis on each sample when gross beta activity is >10 times the yearly mean of control samples. Perform gamma isotopic analysis on composite (by location) sample at least once per 92 days.
Indicator Stations: North Perimeter (N-0.8) South Perimeter (SSE-1.0) Plant Entrance (WSW-0.9) River Intake Structure (ESE-0.8)		
Community Stations: Columbia, AL. (N-5) Great Southern Paper Co. (SSE-3) Ashford, AL. (WSW-8)		
Control Stations: Blakely, Ga. (NE-15) Dothan, AL (W-18) Neals Landing, FL. (SSE-18)		
Iodine	Continuous sampler operation with charcoal canister collection performed once per 7 days.	Radioiodine canister Analyze at least once per 7 days for I-131.
Indicator Stations: North Perimeter (N-0.8) South Perimeter (SSE-1.0) Plant Entrance - (WSW)-0.9 River Intake Structure (ESE-0.8)		

TABLE 2 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
Community Stations: Great Southern Paper Co. (SSE-3) Control Stations: Blakely, GA. (NE-15) Dothan, AL. (W-18) Neals Landing, FL. (SSE-18)		
Soil	Annual in situ Ge(Li) gamma-ray spectroscopy measurements.	Gamma Isotopic Annually
Indicator Stations: Seven Stations along the plant perimeter (N-0.8, NE-1.0, E-0.8, SSE-1.0, SSW-1.0, WSW-0.9, and NNW-0.8) Community Stations: Columbia [illegible] (N-5) Great Sou[illegible]n Paper Co.(SSE-3) Ashford, [illegible]SW-8) Control Stations: Blakely, Ga. (NE-15) Dothan, Al. (W-18)		
DIRECT RADIATION	At least once per 92 days	Gamma dose Readout at least once per 92 days

TABLE 2 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
Indicator I Stations: Sixteen stations, one in each meteorological sector along the plant perimeter (N-0.8, NNE-0.9, NE-1.0, ENE-0.9, E-0.8, ESE-0.8, SE-1.1, SSE-1.0, S-1.0, SSW-1.0, SW-0.9, WSW-0.9, W-0.8, WNW-0.8, NW-1.1, and NNW-0.9). Indicator II (Community) Stations: Eighteen stations, one in each meteorological sector at a distance of 4-5 miles (NNE-4, NE-4, ENE-4, E-5, ESE-5, SE-5, SSE-3, S-5, SSW-4, SW-5, WSW-4, W-4, WNW-4, NW-4, NNW-4, and N-5). Additional stations located at WSW-8 and SW-1.2. Control Stations: Blakely, Ga. (NE-15) Neals Landing, Fl. (SSE-18) Dothan, AL. (W-18) Dothan, AL. (W-15)		
WATERBORNE		
Surface Water Indicator Station: Great Southern Paper Co., (3 miles below plant discharge, River Mile-40)	Composite taken with proportional semi-continuous sampler, having a minimum sampling frequency not exceeding two hours collected over a period ≤ 31 days.	Monthly gamma isotopic analysis of each composite sample. Tritium analysis of each composite sample at least once per 92 days.

TABLE 2 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
Control Station:		
Upstream of Andrews Lock and Dam (~3 miles above plant intake, River Mile 47)		
Ground Water	Grab sample taken at least once per 92 days.	Gamma isotopic and tritium analyses of each sample once per quarter.
Indicator Station:		
Great Souther Paper Co., Well (SSE-4)		
Control Station:		
Whatley Residence, Well (SW-1.2)		
River Sediment	Grab sample taken at least once per 184 days.	Gamma isotopic analysis of each sample twice per year.
Indicator Station:		
Downstream of plant discharge at Smith's Bend (River Mile - 41)		
Control Station:		
Upstream of plant discharge at Andrews Lock & Dam Reservoir (River Mile - 47)		

TABLE 2 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
INGESTION		
Milk		
Indicator Station: Mr. Bobby Searcy Ashford, AL (WSW-01)	At least once per 16 days (NOTE: Indicator sample collected only once during 1987)	Gamma isotopic and I-131 analysis of each bi-weekly sample when animals are on pasture.
Control Station: Silcox Dairy, Ashford, AL. (WSW-10)		
Lewis Dairy Avon, AL (WSW-14)		
Fish	One sample of the following species at least once per 184 days: 1. Game Fish 2. Bottom Feeding Fish	Gamma isotopic analysis on edible portions once per 184 days.
Indicator Station: Downstream of plant discharge in vicinity of Smith's Bend (River Mile - 41)		
Control Station: Upstream of plant discharge in Andrews Lock & Dam Reservoir (River Mile - 47)		
Forage	Grab sample cut from green forage at least once per 31 days.	Gamma isotopic analysis which includes I-131 analyses of each monthly sample.
Indicator Station: North Perimeter (N-0.8) South Perimeter (SSE-1.0)		
Control Station: Dothan, AL. (W-18)		

TABLE 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS
FOR FARLEY NUCLEAR PLANT

VALUES FOR THE MINIMUM DETECTABLE CONCENTRATION(MDC)[a,b]

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg. wet)	Milk (pCi/l)	Food Products (pCi/kg. wet)	Sediment (pCi/kg. dry)
Gross beta	4	1×10^{-2}	NA	NA	NA	NA
H-3	2000	NA	NA	NA	NA	NA
Mn-54	15	NA	130	NA	NA	NA
Fe-59	30	NA	260	NA	NA	NA
Co-58, 60	15	NA	130	NA	NA	NA
Zn-65	30	NA	260	NA	NA	NA
Zr-95	30	NA	NA	NA	NA	NA
Nb-95	15	NA	NA	NA	NA	NA
I-131	1[c]	7×10^{-2}	NA	NA	NA	NA
Cs-134	15	5×10^{-2}	130	15	60	150
Cs-137	18	6×10^{-2}	150	18	60	180
Ba-140	60	NA	NA	60	NA	NA
La-140	15	NA	NA	15	NA	NA

[a] The MDC is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$MDC = \frac{4.66\ S_b}{E \quad V \quad 2.22 \quad Y \quad \exp(-\lambda \Delta t)}$$

Where:

MDC is the "a priori" lower limit of detection as defined above (as picocurie per unit mass or volume).

S_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute).

E is the counting efficiency (as counts per transformation).

V is the sample size (in units of mass or volume).

2.22 is the number of transformations per minute per picocurie.

Y is the fractional radiochemical yield (when applicable).

λ is the radioactive decay constant for the particular radionuclide.

Δt is the elapsed time between sample collection (or end of the sample collection period) and time of counting (for environmental samples, not plant effluent samples).

The value of S_b used in the calculation of the MDC for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the MDC for a radionuclide determined by gamma-ray spectroscopy, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., Potassium-40 in milk samples). Typical values of E, V, Y and Δt shall be used in the calculations.

[b] The MDC's for Tritium, Gross beta, and Radioiodine were obtained using blank background (A Priori), whereas, for gamma-ray spectroscopy actual sample backgrounds were used (A Posteriori).

[c] MDC for drinking water.

TABLE 4

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Reporting Levels				
	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg. wet)	Milk (pCi/l)	Food Products (pCi/kg. wet)
H-3	2×10^4 [a]	NA	NA	NA	NA
Mn-54	1×10^3	NA	3×10^4	NA	NA
Fe-59	4×10^2	NA	1×10^4	NA	NA
Co-58	1×10^3	NA	3×10^4	NA	NA
Co-60	3×10^2	NA	1×10^4	NA	NA
Zn-65	3×10^2	NA	2×10^4	NA	NA
Zr/Nb-95	4×10^2	NA	NA	NA	NA
I-131	2	0.9	NA	3	1×10^3
Cs-134	30	10	1×10^3	60	1×10^3
Cs-137	50	20	2×10^3	70	2×10^3
Ba/La-140	2×10^2	NA	NA	3×10^2	NA

[a] For drinking water samples.

TABLE 5
SAMPLING AND ANALYSIS DEVIATIONS DURING 1987

Component	Time Period	Reason for Deviation/Comments
Air Monitoring Station 1601	1-29-87 to 2-5-87	Low flow rate due to improper setting. Adjusted flow rate to proper setting.
Forage at 1601	2-3-87	Substituted 1501 forage plot due to unavailability of forage.
Air Monitoring Station 1601	2-5-87 to 2-12-87	Low flow rate due to loose fan belt. Belt tightened.
Air Monitoring Station 1108	2-12-87 to 2-19-87 2-26-87 to 3-5-87 3-5-87 to 3-12-87	Sample missing due to failed motor. Motor replaced 3-11-87.
Air Monitoring Station 1605	2-19-87 to 2-26-87	Low flow rate due to loose fan belt. Fan belt tightened.
Forage at 1601	3-5-87	Substituted 1501 forage plot due to unavailability of forage.
Air Monitoring Station 0718	3-12-87 to 3-19-87	Low flow rate due to faulty pump. New pump installed 5-1-87.
Air Monitoring Station 1218	3-12-87 to 3-19-87 3-19-87 to 3-26-87	Low flow rate due to manual unloading valve being closed. Valve opened 3-27-87.
TLD RC-1104	1st Quarter, 1987	Destroyed by vandals.
Forage at 1601	4-6-87	Substituted 1501 due to lack of adequate forage.
Air Monitoring Station 1101	4-2-87 to 4-9-87	Low air volume due to blown fuse. Fuse replaced.
Air Monitoring Station 1108	4-16-87 to 4-30-87	Low air flow due to pump failure. New pump installed 4-25-87.
Air Monitoring Station 0718	4-23-87 to 4-30-87	Low air flow due to failed pump. Pump replaced 5-1-87.
Air Monitoring Station 0718	4-30-87 to 5-7-87	Low air flow due to manual unloading valve being closed. Valve opened.
Air Charcoal I-131	4-30-87 to 5-7-87	MDC not achieved due to low air flow. Flow increased by opening manual unloading valve.

Table 5 (cont.)

Component	Time Period	Reason for Deviation/Comments
Air Monitoring Station 0215	5-14-87 to 5-21-87	Low flow rate due to failed motor. New motor installed 5-26-87.
Air Charcoal I-131	5-14-87 to 5-21-87	Failure to achieve MDC due to low air flow. Flow restored by new motor 5-26-87.
Air Monitoring Station 0215	5-21-87 to 5-28-87	Sample missing due to failed motor. Motor rewired.
Air Monitoring Station 0501	5-21-87 to 5-28-87	Sample missing due to blown fuse. Fuse replaced.
Air Monitoring Station 0703	5-21-87 to 5-28-87	Low flow rate due to blown fuse. Fuse replaced.
Forage at 1501	6-2-87	Substituted for 1601 due to inadequate forage.
Air Monitoring Station 0215	5-28-87 to 6-4-87	Sample missing due to failed motor. Motor rewired 6-5-87.
Air Monitoring Station 0215	6-4-87 to 6-11-87	Low flow rate. Flow rate adjusted.
TLD RC-1104	2nd Quarter 1987	Destroyed by vandals. Relocated TLD stake to nearby area.
TLD RC-1504	2nd Quarter 1987	Destroyed by vandals.
TLD RC-1215	2nd Quarter 1987	Destroyed by lawn mowing equipment.
Air Monitoring Station 0215	6-25-87 to 7-2-87	Low flow rate. Rate adjusted to proper setting.
Air Monitoring Station 1108	6-25-87 to 7-2-87	Low flow rate due to blown fuse. Fuse replaced.
Air Monitoring Station 1108	7-9-87 to 7-16-87	Low flow rate due to loose fan belt. Fan belt tightened and muffler replaced.
Forage at 1601	8-4-87	Substituted 0201 due to inadequate forage.
Air Monitoring Station 1108	7-30-87 to 8-6-87 8-13-87 to 8-20-87	Low flow rate due to loose motor. Motor base plate tightened and insect nest removed from motor 8-22-87.

Table 5 (cont.)

Component	Time Period	Reason for Deviation/Comments
Air Monitoring Station 1601	8-13-87 to 8-20-87	Low flow rate due to damaged power source. Power source and cables repaired.
		Charcoal sample missing due to defective cartridge. Charcoal spilled as cartridge was removed from monitor.
Air Monitoring Station 1101	8-20-87 to 8-27-87	Low flow rate due to blown fuse. Fuse replaced.
Air Monitoring Station 1108	8-20-87 to 8-27-87	Low flow rate due to motor failure. Motor shaft replaced and motor cleaned.
Air Monitoring Station 1601	8-20-87 to 8-27-87	Low flow due to failed motor. Motor replaced.
Milk at 1101	8-27-87	Failure to achieve MDC due to aged sample from shipping delay by United Postal Service.
Air Monitoring Station 1601	8-27-87 to 9-3-87	Low flow due to power source to station damaged by lightning. Power source repaired.
Forage at 1601	9-3-87	Substituted 0201 forage plot due to inadequate forage.
Air Monitoring Station 1101	9-10-87 to 9-17-87	Low flow due to electrical short in breaker. Breaker repaired.
Air Monitoring Station 1218	9-24-87 to 10-1-87	Low flow rate due to blown fuse. Fuse replaced.
TLD RI-0401	3rd Quarter 1987	Destroyed by tractor while cutting grass.
Air Monitoring Station 1605	10-1-87 to 10-8-87	Low flow rate due to loose fan belt. Belt replaced.
Air Monitoring Station 1108	10-1-87 to 10-8-87	Low flow due to loose fan belt. Fan belt replaced.
Air Monitoring Station 0701	10-15-87 to 10-22-87	Low flow due to blown fuse. Fuse replaced.

Table 5 (cont.)

Component	Time Period	Reason for Deviation/Comments
Air Monitoring Station 0703	10-29-87 to 11-12-87 11-12-87 to 12-17-87	Failure to achieve MDC due to low flow rate. Sample missing due to no air flow. Gas totalizer changed out for calibration 12-14-87. Flow restored.
Air Monitoring Station 1108	11-5-87 to 11-12-87	Low flow due to broken fan belt. Fan belt replaced.
Forage at 1601	11-2-87	Substituted 0201 due to lack of forage.
Air Monitoring Station 1108	11-12-87 to 12-31-87	Sample missing due to broken motor pulley. New pulley ordered.
Air Monitoring Station 1601	11-19-87 to 12-31-87	Sample missing due to loss of power to station - power cables damaged.
Forage at 1601	12-2-87	Substituted 0201 forage plot due to lack of adequate forage.
8 Day Sample Period	12-23-87 to 12-31-87	Work Schedule.
TLD RC-1108	4th Quarter 1987	Destroyed by vandals. Placed TLD stake inside locked fence at same location.
TLD RI-0401	Annual 1987	Destroyed by tractor.
TLD RI-0801	Annual 1987	Destroyed by farm machinery.
TLD RB-1215	Annual 1987	Destroyed by vandals.
TLD RC-1104	Anuual 1987	Destroyed by vandals. Relocated TLD stake to nearby area.
TLD RC-1108	Annual 1987	Destroyed by vandals. Placed TLD stake inside locked fence at same location.

TABLE 1987-01
AIRBORNE: PARTICULATES- OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN		COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
				NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)		
Air Particulates. (pci/m**3)	GROSS BETA 473	.004	.009(168/169) (0.001- 0.020)	PLANT ENTR. 0.9 MI. WSW	.010(52/ 52) (0.001- 0.020)	.017(145/147) (0.002- 0.385)	.011(156/156) (0.003- 0.023)
	BE-7 38	.009	.102(15/ 15) (0.021- 0.340)	NORTH PERIM. 0.8 MI. N	.119(4/ 4) (0.040- 0.340)	.127(11/ 11) (0.032- 0.380)	.132(12/ 12) (0.034- 0.580)
	CS-134 38	.001	< MDC (0/ 15)			< MDC (0/ 11)	< MDC (0/ 12)
	CS-137 38	.001	< MDC (0/ 15)			< MDC (0/ 11)	< MDC (0/ 12)
	I-131 38	.001	< MDC (0/ 15)			< MDC (0/ 11)	< MDC (0/ 12)
	K-40 1	.00				.110(1/ 1)	

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

TABLE 1987-02
AIRBORNE: IODINE - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN		COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
				NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)		
Air Iodine (pci/m**3)	IODINE 372	.196	< MDC (0/166)			< MDC (0/ 49)	< MDC (0/157)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

TABLE 1987-03
EXTERNAL RADIATION - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN MEAN (C/D) RANGE (C)	COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
TLD-Quarter	GROSS 145	10.000	20.807(63/ 63)	EAST PERIM.	28.512(4/ 4)	18.058(67/ 67)	20.048(15/ 15)
	GAMMA		(9.97- 39.71)	1.0 MI. NE	(18.53- 39.71)	(9.63- 29.31)	(12.19- 30.31)
(MRAD)							
TLD-Annual	GROSS 33	10.000	67.797(14/ 14)	EAST PERIM.	101.110(1/ 1)	55.469(16/ 16)	67.446(3/ 3)
	GAMMA		(52.96- 101.11)	1.0 MI. NE		(47.84- 62.82)	(60.26- 76.70)
TLD-Annual-E	GROSS 38	10.000	81.929(16/ 16)	EAST PERIM.	114.050(1/ 1)	66.199(18/ 18)	75.202(4/ 4)
	GAMMA		(67.51- 114.05)	1.0 MI. NE		(25.61- 82.55)	(66.26- 84.43)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Lower limit of Detection as defined in HASL-300, for LiF TLDs as achievable in practice.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.
(E) Sum Of Four Quarters For Comparative Purposes

TABLE 1987-04
MILK - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN		COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
				NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)		
Milk (pci/l)	BA-140 28	54.142	< MDC (0/ 1)				< MDC (0/ 27)
	CS-134 28	14.107	< MDC (0/ 1)				< MDC (0/ 27)
	CS-137 28	13.714	< MDC (0/ 1)				< MDC (0/ 27)
	I-131 27	.259					< MDC (0/ 27)
	K-40 28	143.392	1460.000(1/ 1)	PLANT ENTR. 0.9 MI. WSW	1460.000(1/ 1)		1350.370(27/ 27) (1200.00- 1630.00)
	LA-140 28	10.821	< MDC (0/ 1)				< MDC (0/ 27)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

TABLE 1987-05
VEGETATION: FORAGE - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED		NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)	COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
Forage(E) (pci/kg-dry)	AC-228	4	284.250	561.666(3/ 3) (166.00- 837.00)	SOUTH PERIM. 1.0 MI. SSE	837.000(1/ 1)		278.000(1/ 1)
	BE-7	36	564.888	6262.000(25/ 25) (1500.00-17900.00)	SOUTH PERIM. 1.0 MI. SSE	6226.666(12/ 12) (2070.00-17900.00		8069.454(11/ 11) (1920.00-46404.00)
	BI-212	1	1170.000	1520.000(1/ 1)	SOUTH PERIM. 1.0 MI. SSE	1520.000(1/ 1)		
	BI-214	3	158.000	615.500(2/ 2) (415.00- 816.00)	SOUTH PERIM. 1.0 MI. SSE	816.000(1/ 1)		183.000(1/ 1)
	CS-134	36	81.416	< MDC (0/ 25)				< MDC (0/ 11)
	CS-137	36	69.305	137.200(5/ 25) (57.00- 339.00)	NORTH PERIM. 0.9 MI.NNW (F)	167.333(3/ 3) (57.00- 339.00		< MDC (0/ 11)
	K-40	36	605.257	13753.600(25/ 25) (1900.00-40500.00)	NORTH PERIM. 0.8 MI. N	19975.000(4/ 4) (6500.00-40500.00		17560.000(11/ 11) (8290.00-30000.00)
	PB-214	2	142.000	611.000(2/ 2) (351.00- 871.00)	SOUTH PERIM. 1.0 MI. SSE	871.000(1/ 1)		
	PB-212	5	99.400	393.500(4/ 4) (75.00- 886.00)	SOUTH PERIM. 1.0 MI. SSE	496.500(2/ 2) (107.00- 886.00		134.000(1/ 1)
	RA-226	1	1370.000	1770.000(1/ 1)	SOUTH PERIM. 1.0 MI. SSE	1770.000(1/ 1)		
	TL-208	5	77.800	240.333(3/ 3) (80.00- 370.00)	SOUTH PERIM. 1.0 MI. SSE	370.000(1/ 1)		89.000(2/ 2) (85.00- 93.00)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.
(E) Mean Wet/Dry Ratio for 1987 was 2.933
(F) Substitute Location Due to Unavailibity of Forage During some Sample Periods.

TABLE 1987-06
SOIL - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN MEAN (C/D) RANGE (C)	COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
Soil (In Situ) (pci/kg-Dry)	AC-228 12	316.666	2101.428(7/ 7) (1006.00- 4300.00)	EAST PERIM. 1.0 MI. NE	4300.000(1/ 1)	1344.666(3/ 3) (1121.00- 1740.00)	1835.500(2/ 2) (1590.00- 2081.00)
	BE-7 2	575.500	1138.000(1/ 1)	WEST PERIM. 0.8 MI. WNW	1138.000(1/ 1)	937.000(1/ 1)	
	BI-212 12	855.583	1622.400(5/ 7) (754.00- 2652.00)	EAST PERIM. 1.0 MI. NE	2652.000(1/ 1)	1109.333(3/ 3) (1001.00- 1287.00)	923.000(1/ 2)
	BI-214 12	309.666	1386.142(7/ 7) (868.00- 2224.00)	EAST PERIM. 1.0 MI. NE	2224.000(1/ 1)	963.666(3/ 3) (875.00- 1032.00)	1265.500(2/ 2) (1070.00- 1461.00)
	CS-137 12	45.166	251.000(7/ 7) (119.00- 438.00)	WEST PERIM. 0.8 MI. WNW	438.000(1/ 1)	186.666(3/ 3) (120.00- 311.00)	242.000(2/ 2) (193.00- 291.00)
	K-40 12	1136.333	5607.285(7/ 7) (634.00-16800.00)	EAST PERIM. 0.8 MI. E	16800.000(1/ 1)	1171.333(3/ 3) (792.00- 1714.00)	2462.500(2/ 2) (1339.00- 3586.00)
	PB-214 12	276.166	1438.428(7/ 7) (945.00- 2295.00)	EAST PERIM. 1.0 MI. NE	2295.000(1/ 1)	938.333(3/ 3) (869.00- 1006.00)	1341.500(2/ 2) (1122.00- 1561.00)
	PB-212 12	311.000	2003.714(7/ 7) (1189.00- 3894.00)	EAST PERIM. 1.0 MI. NE	3894.000(1/ 1)	1447.000(3/ 3) (1197.00- 1876.00)	1785.500(2/ 2) (1556.00- 2015.00)
	RA-226 3	1090.000	1421.000(2/ 2) (1162.00- 1680.00)	EAST PERIM. 1.0 MI. NE	1680.000(1/ 1)	< MDC (0/ 1)	
	TL-208 12	112.333	707.428(7/ 7) (371.00- 1455.00)	EAST PERIM. 1.0 MI. NE	1455.000(1/ 1)	408.000(3/ 3) (306.00- 540.00)	578.500(2/ 2) (528.00- 629.00)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

TABLE 1987-07
WATERBORNE: SURFACE WATER - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN MEAN (C/D) RANGE (C)	COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
Surface Water(River) (pCi/l)	TRITIUM 8	103.625	291.750(4/ 4) (156.00- 484.00)	GSPC RIVER MI.40	291.750(4/ 4) (156.00- 484.00		116.500(2/ 4) (103.00- 130.00)
	BA-140 24	16.583	< MDC (0/ 12)				< MDC (0/ 12)
	CS-134 24	3.625	< MDC (0/ 12)				< MDC (0/ 12)
	CS-137 24	3.750	< MDC (0/ 12)				< MDC (0/ 12)
	CO-58 24	3.333	< MDC (0/ 12)				2.000(1/ 12)
	CO-60 20	2.700	< MDC (0/ 11)				< MDC (0/ 9)
	FE-59 20	6.150	< MDC (0/ 9)				< MDC (0/ 11)
	I-131 1	.450	< MDC (0/ 1)				
	K-40 1	.00					36.000(1/ 1)
	LA-140 22	3.190	< MDC (0/ 10)				< MDC (0/ 12)
	MN-54 24	3.500	< MDC (0/ 12)				< MDC (0/ 12)
	NB-95 24	3.625	< MDC (0/ 12)				< MDC (0/ 12)

TABLE 1987-07
WATERBORNE: SURFACE WATER - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN		COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
				NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)		
Surface Water(River) (pci/l)	ZN-65 24	5.916	5.000(1/ 12)	GSPC RIVER MI.40	5.000(1/ 1)		< MDC (0/ 12)
	ZR-95 24	6.083	< MDC (0/ 12)				< MDC (0/ 12)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

TABLE 1987-08
WATERBORNE: GROUND WATER - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN		COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
				NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)		
Ground Water(Well) (pCi/l)	TRITIUM 8	76.237	< MDC (0/ 4)				< MDC (0/ 4)
	BA-140 8	17.000	< MDC (0/ 4)				< MDC (0/ 4)
	CS-134 8	3.500	< MDC (0/ 4)				< MDC (0/ 4)
	CS-137 8	3.750	< MDC (0/ 4)				< MDC (0/ 4)
	CO-58 8	3.500	< MDC (0/ 4)				< MDC (0/ 4)
	CO-60 8	2.857	< MDC (0/ 4)				< MDC (0/ 4)
	FE-59 8	6.250	< MDC (0/ 4)				< MDC (0/ 4)
	I-131 7	.270	< MDC (0/ 3)				< MDC (0/ 4)
	K-40 1	.00	55.000(1/ 1)	GSPC 4 MI.SSE	55.000(1/ 1)		
	LA-140 7	3.000	< MDC (0/ 4)				< MDC (0/ 3)
	MN-54 8	3.125	< MDC (0/ 4)				< MDC (0/ 4)
	NB-95 8	3.750	< MDC (0/ 4)				< MDC (0/ 4)

TABLE 1987-OP
WATERBORNE, GROUND WATER - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED	NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN		COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
				NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)		
Ground Water(Well) (pCi/l)	ZN-65 8	6.125	< MDC (0/ 4)				< MDC (0/ 4)
	ZR-95 8	6.000	< MDC (0/ 4)				< MDC (0/ 4)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

TABLE 1987-09
SEDIMENT: RIVER - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED		NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)	COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
Sediment (River) (pci/kg-Dry)	AC-228	4	76.500	1675.000(2/ 2) (470.00- 2880.00)	SMITH'S BEND RIV.MI.41-42	1675.000(2/ 2) (470.00- 2880.00		890.000(2/ 2) (872.00- 908.00)
	BI-212	2	392.000	3770.000(1/ 1)	SMITH'S BEND RIV.MI.41-42	3770.000(1/ 1)		1180.000(1/ 1)
	BI-214	4	47.000	850.000(2/ 2) (320.00- 1380.00)	SMITH'S BEND RIV.MI.41-42	850.000(2/ 2) (320.00- 1380.00		599.500(2/ 2) (563.00- 636.00)
	CS-134	4	24.750	< MDC (0/ 2)				45.000(1/ 2)
	CS-137	4	24.250	< MDC (0/ 2)				< MDC (0/ 2)
	K-40	4	170.500	12715.000(2/ 2) (2430.00-23000.00)	SMITH'S BEND RIV.MI.41-42	12715.000(2/ 2) (2430.00-23000.00		27640.000(2/ 2) (5080.00-50200.00)
	PB-214	4	48.250	851.000(2/ 2) (342.00- 1360.00)	SMITH'S BEND RIV.MI.41-42	851.000(2/ 2) (342.00- 1360.00		637.500(2/ 2) (627.00- 648.00)
	PB-212	4	47.500	1426.000(2/ 2) (372.00- 2480.00)	SMITH'S BEND RIV.MI.41-42	1426.000(2/ 2) (372.00- 2480.00		643.500(2/ 2) (582.00- 705.00)
	RA-226	3	370.666	1085.000(2/ 2) (470.00- 1700.00)	SMITH'S BEND RIV.MI.41-42	1085.000(2/ 2) (470.00- 1700.00		761.000(1/ 1)
	TL-208	4	26.250	620.500(2/ 2) (181.00- 1060.00)	SMITH'S BEND RIV.MI.41-42	620.500(2/ 2) (181.00- 1060.00		312.500(2/ 2) (296.00- 329.00)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

TABLE 1987-10
FISH; RIVER(GAME) OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASURMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED		NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)	COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
Fish(Game) (pci/kg) Wet tissue	CS-134	4	25.500	< MDC (0/ 2)				< MDC (0/ 2)
	CS-137	4	22.750	83.000(1/ 2)	SMITH'S BEND RIV.MI.41-42	83.000(1/ 1)		46.000(2/ 2) (34.00- 58.00)
	CO-58	4	19.750	< MDC (0/ 2)				< MDC (0/ 2)
	CO-60	4	16.750	< MDC (0/ 2)				< MDC (0/ 2)
	FE-59	4	45.750	< MDC (0/ 2)				< MDC (0/ 2)
	K-40	4	217.250	2985.000(2/ 2) (2530.00- 3440.00)	SMITH'S BEND RIV.MI.41-42	2985.000(2/ 2) (2530.00- 3440.00		3110.000(2/ 2) (2770.00- 3450.00)
	MN-54	4	19.250	< MDC (0/ 2)				< MDC (0/ 2)
	ZN-65	4	43.500	< MDC (0/ 2)				< MDC (0/ 2)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

TABLE 1987-11
FISH: RIVER (BOTTOM FEEDING) OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8 HOUSTON COUNTY ALABAMA
SUMMARY REPORT FROM 010187 TO 123187 (A)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBERS OF ANALYSIS PERFORMED		NOMINAL MDC(B)	ALL INDICATOR LOCATIONS MEAN (C/D) RANGE(C)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN		COMMUNITY LOCATIONS MEAN (C/D) RANGE (C)	CONTROL LOCATION MEAN (C/D) RANGE (C)
					NAME DISTANCE AND DIRECTION	MEAN (C/D) RANGE (C)		
Fish (Bottom Feeding) (pci/kg)	CS-134	4	22.000	< MDC (0/ 2)				< MDC (0/ 2)
	CS-137	4	19.250	25.000(1/ 2)	SMITH'S BEND RIV.MI.41-42	25.000(1/ 1)		19.000(1/ 2)
	CO-58	4	18.500	< MDC (0/ 2)				< MDC (0/ 2)
	CO-60	4	15.500	< MDC (0/ 2)				< MDC (0/ 2)
	FE-59	4	37.250	< MDC (0/ 2)				< MDC (0/ 2)
	K-40	4	191.000	2600.000(2/ 2) (2530.00- 2670.00)	SMITH'S BEND RIV.MI.41-42	2600.000(2/ 2) (2530.00- 2670.00)		2625.000(2/ 2) (2390.00- 2860.00)
	MN-54	4	18.500	< MDC (0/ 2)				< MDC (0/ 2)
	ZN-65	4	45.500	< MDC (0/ 2)				< MDC (0/ 2)

(A) No Nonroutine Anomalous Measurements Reported During This Period.
(B) Mean Minimum Detectable Concentration Calculated Per Table 3 Of This Report.
(C) Mean and Range Of Number Of Measurements With Detectable Activity Only.
(D) Total Number Of Measurements Taken.

ATTACHMENT 1

LAND USE SURVEY
FOR
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
JOSEPH M. FARLEY NUCLEAR PLANT
JULY 6-10, 1987

This Land Use Survey was performed to meet the requirements of the Farley Units 1 and 2 Technical Specifications, Section 3.12.2 and 4.12.2.

A. Houston County, Alabama

Lamar Nichols, Houston County Livestock Agent, was contacted for the purpose of reviewing known locations of milk animals in the county. He knew of no individual milk cows in the county. He did give information concerning a dairy owned by Mr. Ray Lewis of Avon, Alabama.

A house-to-house canvas of Alabama residents in a five-mile radius of the plant was conducted along Highways 95 and 52, Houston County Roads 42, 33, 75 and the interconnecting light-duty roads. Milk animals were located across Highway 95 on the Calhoun property in Sector 11, WSW of Farley Nuclear Plant. These cows had been milked in the past to provide milk for human consumption, but were not being milked at the time the census was performed. Individuals interviewed were: Mr. Walter Whatley, Mr. Bobby Searcy, Mrs. Marvin T. Homes, and Mrs. Billy Ryals.

Simultaneous with the milk animal survey, the nearest resident in each meteorological sector was identified. A new residence was found in Sector 14, NW of Farley Nuclear Plant, which was occupied by Billy and Lyteasa Ryals.

B. Early County, Georgia

Mr. Micky Fouracres, Early County Extension Agent, was contacted to determine if any milk animals were currently present in the county. He knew of no individual milk animals nor dairies in Early County.

A house-to-house canvas of residents in the area across the Chattahoochee River east of Farley Nulcear Plant revealed several goats in Sector 5, ESE. The goats were not not being milked. No milk cows were located. The census of Georgia residents was conducted along Highways 62 and 370, Early Contry Roads 219, 239, 140 and the interconnecting light-duty roads. Individuals interviewed were Mr. Tony Knighton, Mr. Richardson, and Mr. Cecil Garrett.

Simultaneous with the milk animal survey, the nearest resident in each meteorological sector was identified.

C. Results and Conclusions

The results of the Land Use Survey are shown in Table I. Based on the survey results, milk samples will be obtained when available from the cows located across Highway 95 from Farley Nuclear Plant.

TABLE I
OF
ATTACHMENT 1

JOSEPH M. FARLEY NUCLEAR PLANT
LAND USE SURVEY
JULY 1-7, 1987

RADIAL SECTORS (22.5 DEGREES)	(DISTANCE MILES TO NEAREST) RESIDENT	MILK ANIMAL
North Northeast (01)	2.5	> 5
Northeast (02)	2.4	> 5
East Northeast (03)	2.4	> 5
East (04)	2.8	> 5
East Southeast (05)	2.8	> 5
Southeast (06)	3.4	> 5
South Southeast (07)	> 5	> 5
South (08)	4.3	> 5
South Southwest (09)	2.9	> 5
Southwest (10)	1.2	> 5
West Southwest (11)	2.4	1.0
West (12)	1.3	> 5
West Northwest (13)	2.1	> 5
Northwest (14)	1.5	> 5
North Northwest (15)	2.0	> 5
North (16)	2.6	> 5

Alabama Power Company
600 North 18th Street
Post Office Box 2641
Birmingham, Alabama 35291-0400
Telephone 205 250-1835

R. P. McDonald
Senior Vice President

NT-88-0199

Alabama Power
the southern electric system

April 26, 1988

Docket Nos. 50-348
50-364

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

RE: Joseph M. Farley Nuclear Plant
Annual Environmental Operating Report

Gentlemen:

The attached "Annual Environmental Operating Report, Part B: Radiological" for the period January 1, 1987 through December 31, 1987, is transmitted in accordance with the Joseph M. Farley Nuclear Plant Unit 1 and Unit 2 Technical Specifications Sections 6.9.1.6 and 6.9.1.7.

If you have any questions, please advise.

Yours very truly,

W. G. Hairston III for
R. P. McDonald

RPM/MAT:emb

Attachment

cc: Dr. J. N. Grace
U. S. Nuclear Regulatory Commission
Mr. W. H. Bradford
Mr. E. A. Reeves
U. S. Nuclear Regulatory Commission
Director, Bureau of Radiological Health
State of Alabama
Director, Environmental Protection Division
State of Georgia

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