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, 1984

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RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

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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 1984, Unit No. 1 was shut down for a scheduled refueling outage from February 10 to April 22. Unit No. 2 was not shut down for a scheduled refueling outage during 1984. Unit 2 was shut down from August 31 to September 15 for steam generator tube plugging.

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 1984 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 off-site environmental program to meet the requirements of the Unit 1 and 2 Technical Specifications is given in Table 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 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.

A number of sampling problems and/or deviations from the sampling schedule were encountered during 1984. These are listed in Table 5. The deviations were chiefly mechanical problems such as failure of the air or water samplers. During the winter months, grazing by deer and rabbits resulted in inadequate forage at established forage sampling plots, thus samples were taken at alternate locations on several occasions. Several TLD's were lost but only at station 1215 was the number lost excessive compared to prior years. Vandalism was so severe at station 1215 that all data was lost except for second quarter 1984. Tentative plans have been made to protect it from future vandalism. New air monitoring stations were installed during August of 1984 to replace the existing stations. This installation resulted in some 6-Day and 8-Day air sampling periods. Lightning struck the underground cable supplying power to station 0701. As a result, the cable was so badly damaged that repair was impossible. Design changes have been submitted to provide power to the station. Station 0501 was turned on to compensate for 0701. Also iodine collection was started at station 0703, Great Southern Paper Co., in Cedar Springs, GA, at the request of Georgia Department of Natural Resources for the NRC Comparative Program.

A. Airborne Particulates and Iodine

All airborne particulate and iodine monitoring stations shown in Figure 3, 12-1 and 3.12-3 and the community stations listed in Table 2 were equipped with Bell and Gossett vacuum pumps which operated continuously at a flow rate of approximately $0.04/m^3$/min (1.5 ft^3/min) from January to August. During the month of August new Roots vaccum pump systems were installed. The new systems also operate continuously at a flow rate of approximately $0.04/m^3$/min ($1.5ft^3$/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. In the Bell and Gossett system the particulate filter paper and charcoal cartridge were mounted horizontally to the ground with a Rockwell Gas Meter measuring the cumulative air flow. The Roots system has the sample collector mounted on the outside of the cabinet horizontally to the ground with a Singer gas meter measuring the cumulative air flow. Both types of 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 and at the end of each quarter, were analyzed for gamma emitters using a fifteen percent relative efficiency low background Ge(Li) detector and a Canberra 4096 channel computer-based multichannel analyzer (MCA).

All air monitoring station locations shown in Figures 3.12-1 and 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 counter, specially designed and built by UGA for counting I-131 activity in charcoal cartridges, using two 1" x 3" NaI detectors and matched photomultiplier tubes.

B. External Radiation

For the continuous measurement of environmental gamma radiation, natural LiF (TLD-700) chips were supplied by Harshaw-Filtrol Chemical Company. TLD packets each containing four annealed LiF chips were supplied on both a quarterly and an annual basis. The chips were first sealed in opaque mylar to give 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

An indicator milk supply was located in Cedar Springs, GA (four miles from the plant in sector 6). The supply consisted of 1 milk cow owned by Mr. Walter Mills. This location was added to the milk sampling scheduled from January 1 until March 12 when FNP was notified that milking had been terminated, and if milking was to resume FNP would be contacted. The background sample location remained 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 percent (by weight) merthiolate (Thimerasol) solution was added to each 1.0 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 specially designed by UGA. Stable iodine carrier was added to each sample for determination of the radiochemical yield.

A 1 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

Once each month, 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), 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 per cent 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 per cent relative efficiency high purity germanium detector and gamma-ray spectroscopy system specially designed for field use. Measurements were taken at the 7 indicator locations and at the 5 community and control (background) locations listed in Table 2. A 1024 channel Canberra MCA was interfaced to a Hewlett-Packard 9825A calculator 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^{0}C. The residue and plastic film was folded to fit a petri-dish and analyzed for gamma emitters using a 15 per cent 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 analyis using a large volume (100 ml) low

background liquid scintillation counter specially designed and built by University of Georgia.

G. Groundwater: Well Water

In the Farley Plant area, there are no indicator sources of groundwater in the true sense of the definition. 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 center 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^{0}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

On a semi-annual basis two types of fish, game and bottom feeding, were collected from the Chattahoochee River at the locations shown in Figure 3.12-4, and were sent to UGA for gamma-ray spectroscopy analysis. The edible tissue was removed and coarsely chopped then analyzed for gamma emitters using a 15 per cent relative efficiency low background Ge(Li) detector and 4096 channel Canberra computer-based MCA.

I. Sediment: River

On a semi-annual basis sediment samples were collected from the Chattahoochee River below the plant site at the location shown in Figure 3.12-4. Approximately 1 kg was sent to UGA for gamma-ray spectroscopy analysis. The samples were dried, mixed, and analyzed using a 15 per cent relative efficiency low background Ge(Li) detector and a Canberra 4096 channel computer-based MCA.

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 essentially non-existent during 1984.

For measurements involving radioactivity concentrations by volume or mass the designated minimum detectable concentration 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 per cent confidence level. The LLD is defined as "the smallest amounts of sample activity that will yield a net count for which there is confidence at a predetermined level that activity is present". Its applications are limited to measurement systems which denote a limiting detection capability without respect to the size of sample and/or radiochemical yield and to measurments which by their nature do not involve concentrations, such as radiation dose rates (mrad/hr., mrad/qtr., etc.)

A. Airborne Particulates and Iodine

The results of the radioactivity analyses of airborne particulate filters and iodine charcoal cartridges are shown in Table FO8-1. The mean gross beta activity value for the indicator sampling locations was lower than the community and control sampling locations. The average mean gross beta values for all sampling locations were slightly lower than the respective 1983 values and lower by a factor of eight to the pre-operational values.

The gamma-ray spectroscopy data for the air particulate filter composites showed traces of Cs-134 and Cs-137 in a few samples. All iodine-131 values were below the measured MDC as was found in 1983 and during the preoperational period.

B. External Radiation

The results of the external radiation measurements using TLD packets, each containing four LiF chips, are shown in Table FO8-2. As found during the preoperational measurement period and during 1983, the data reflects the differences in site specific soil radioactivity, with the average indicator values higher than for the community and control values. All the averages were lower than found in 1983, and higher than the averages found during the preoperational period. The sums for the four quarterly measurements were higher than the averages for the annual TLD's as was found in 1983. During the preoperational period it was found that the average values for the annual TLD's was slightly higher than the respective sums of the four quarterly measurements which is the reverse of that found in 1984 and 1983.

C. Milk

The results from the analyses of milk for radioactivity are shown in Table FO8-3. Milk from the Brooks-Silcox Dairy was sampled as the control. An indicator milk location was

sampled for the months of January and February. Only naturally occurring radioactive isotopes were detected in the samples.

D. Vegetation

The vegetation sampled during this operational period included forage only. The radioactivity analysis results for this operational period are shown in Table FO8-4.

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 were not signifcantly different for the indicator locations and the control location. Traces of Cs-134 and Cs-137 were found in some samples. However the data for 1984 indicated fewer fission product radionuclides than the data for the preoperational period.

E. Soil

The results of the one in situ HP(Ge) gamma-ray spectroscopy analysis of soil during this operational period are shown in Table FO8-5. The only man-made radioactivity found at low levels in all measurments was Cesium-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 levels of Cs-137 were lower than the 1983 and preoperational periods.

F. Waterborne: Surface and Ground Water

The results of radioactivity analysis of surface and ground water are shown in Table FO8-6. Traces of Cs-134 and Cs-137 were found in a few river water control and indicator samples. The values were close to those found in 1983 and lower than those observed during the pre-operational period. The average indicator tritium level was higher than the control sample but was lower than that found in 1983 and the pre-operational period.

Two ground water indicator samples contained detectable Cs-137 at very low levels. All indicator and control sample tritium levels were less than the MDC values.

G. Sediment: River

The results of radioactivity analysis of sediment samples from the Chattahoochee River are shown in Table FO8-7. Manmade radioactivity was not found at detectable levels during 1984 which is in agreement with that found during 1981 and during the preoperational period.

H. Fish: River

The results of gamma-ray spectroscopy analysis of the edible portions of two types of fish taken from the Chattahoochee River are shown in Table FO8-8. Cs-137 was found at low levels in both the indicator and control samples. The average Cs-137 values were slightly lower than that found in 1983 and during the preoperational period.

IV. Land Use Cenus and Interlaboratory Comparison Program

A. Land Use Census

The results of the July 1984 Land Use Census are given in Attachment 1 to this report.

B. Interlaboratory Comparison Program

During 1984, 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

Review of the 1984 analytical results showed radioactivity levels lower than those found in 1983 and during the preoperational period. In conclusion no significant trends indicating changes in the radioactivity levels in the environs of the Farley Nuclear Plant as a result of its operation were found.

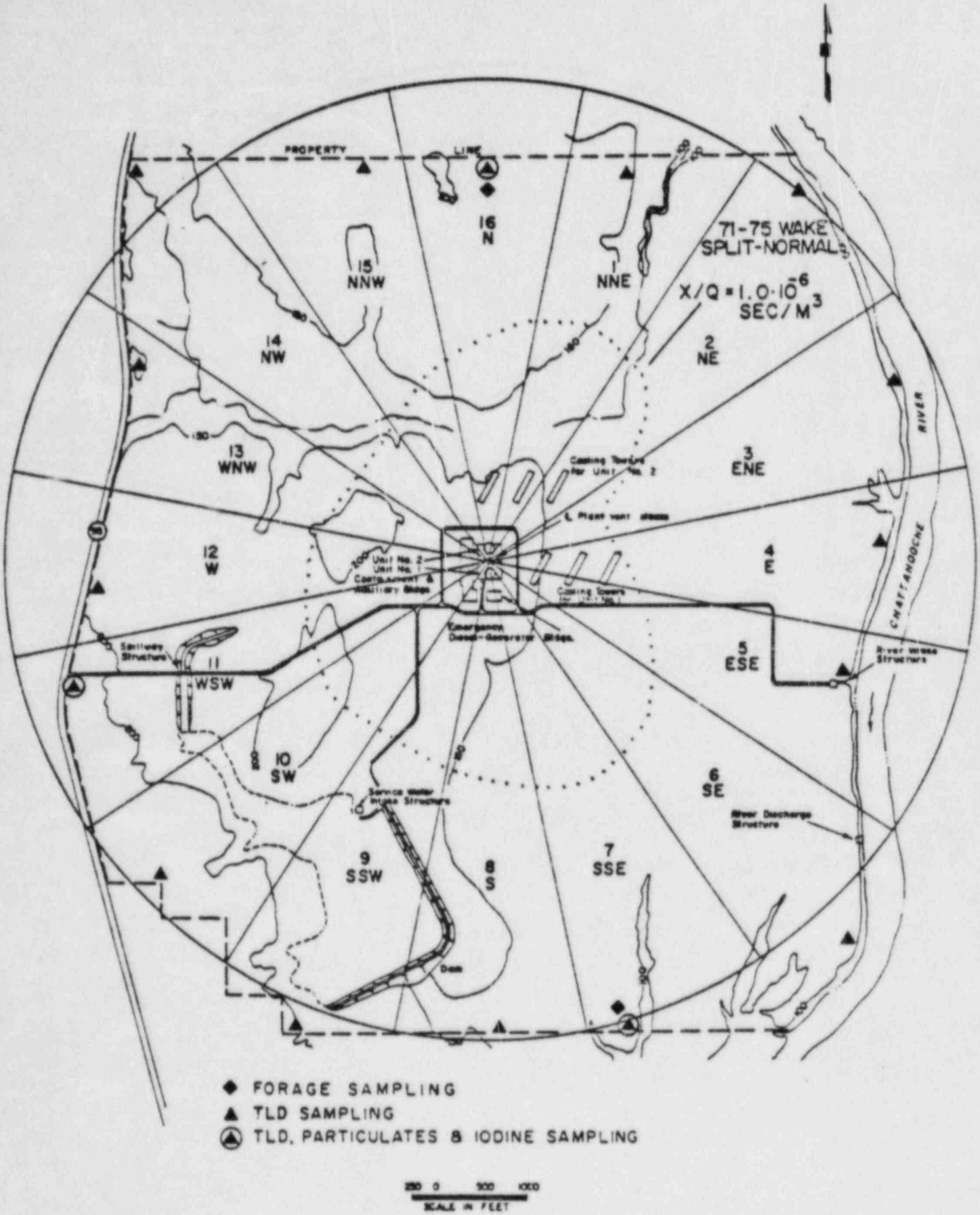


FIGURE 3.12-1 INDICATOR SAMPLING LOCATIONS FOR AIRBORNE ENVIRONMENTAL RADIOACTIVITY AT THE FARLEY NUCLEAR PLANT.

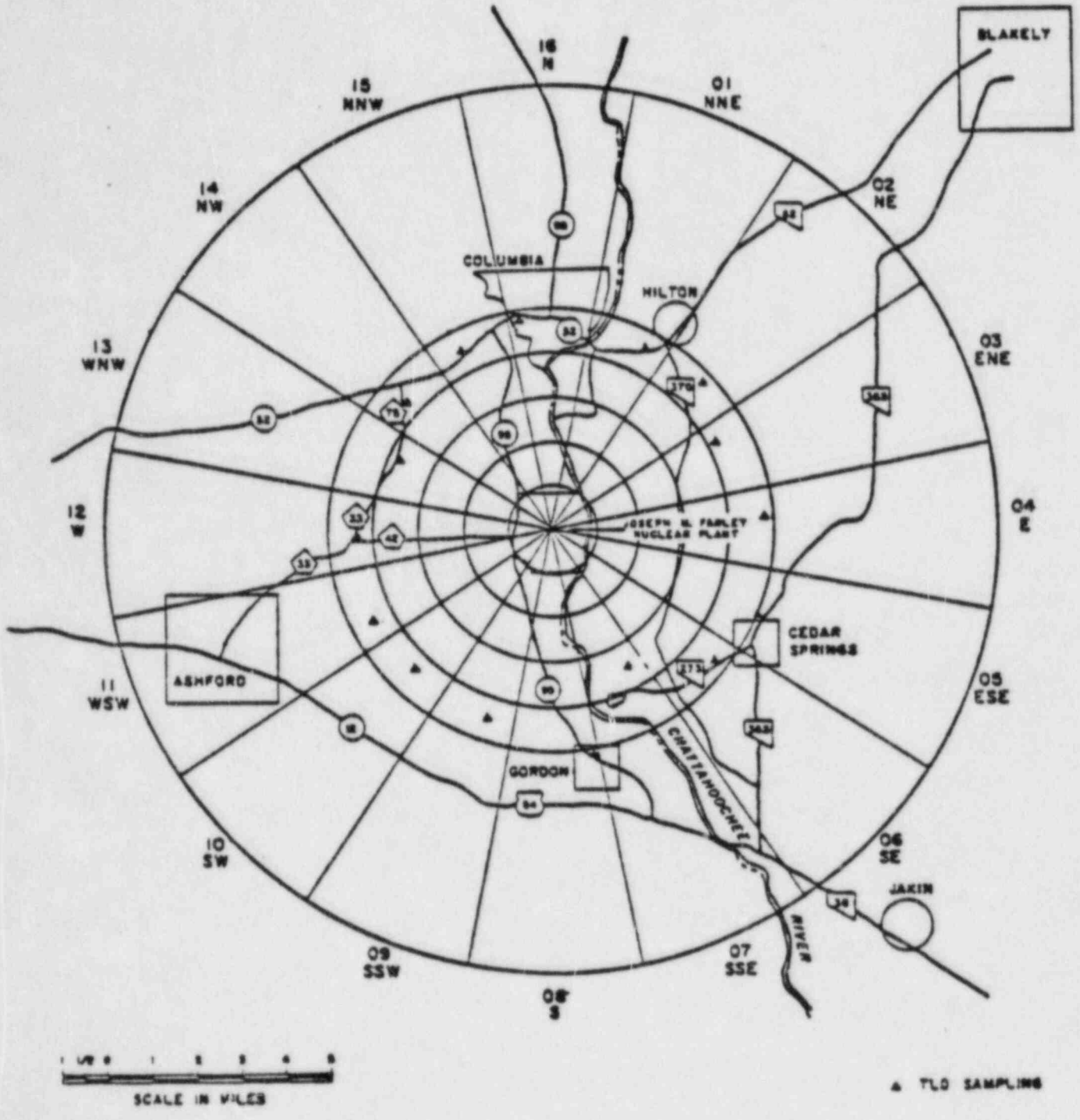


FIGURE 3.12-2 COMMUNITY (INDICATOR II) SAMPLING LOCATIONS FOR AIRBORNE RADIOACTIVITY IN THE FARLEY NUCLEAR PLANT AREA.

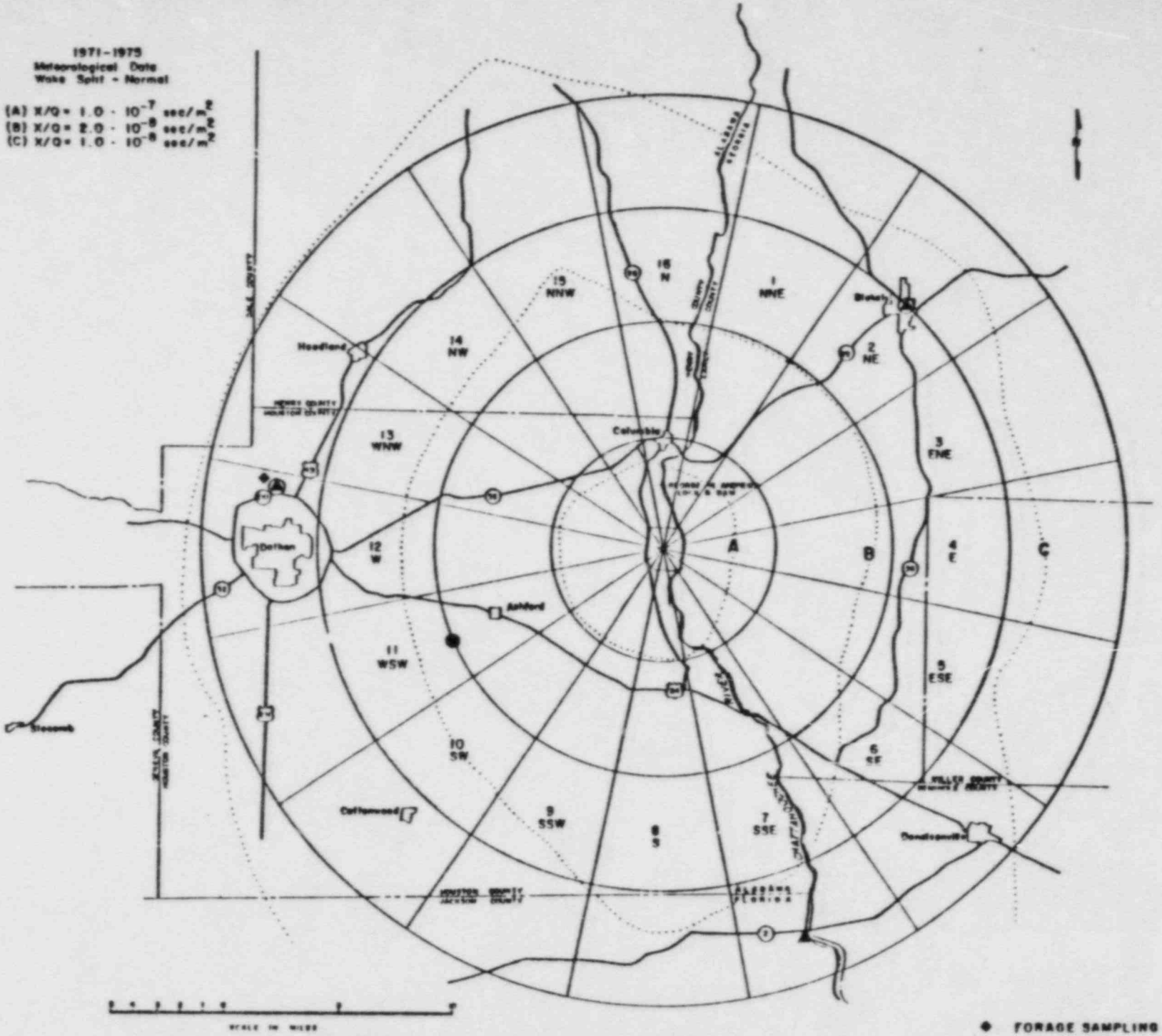
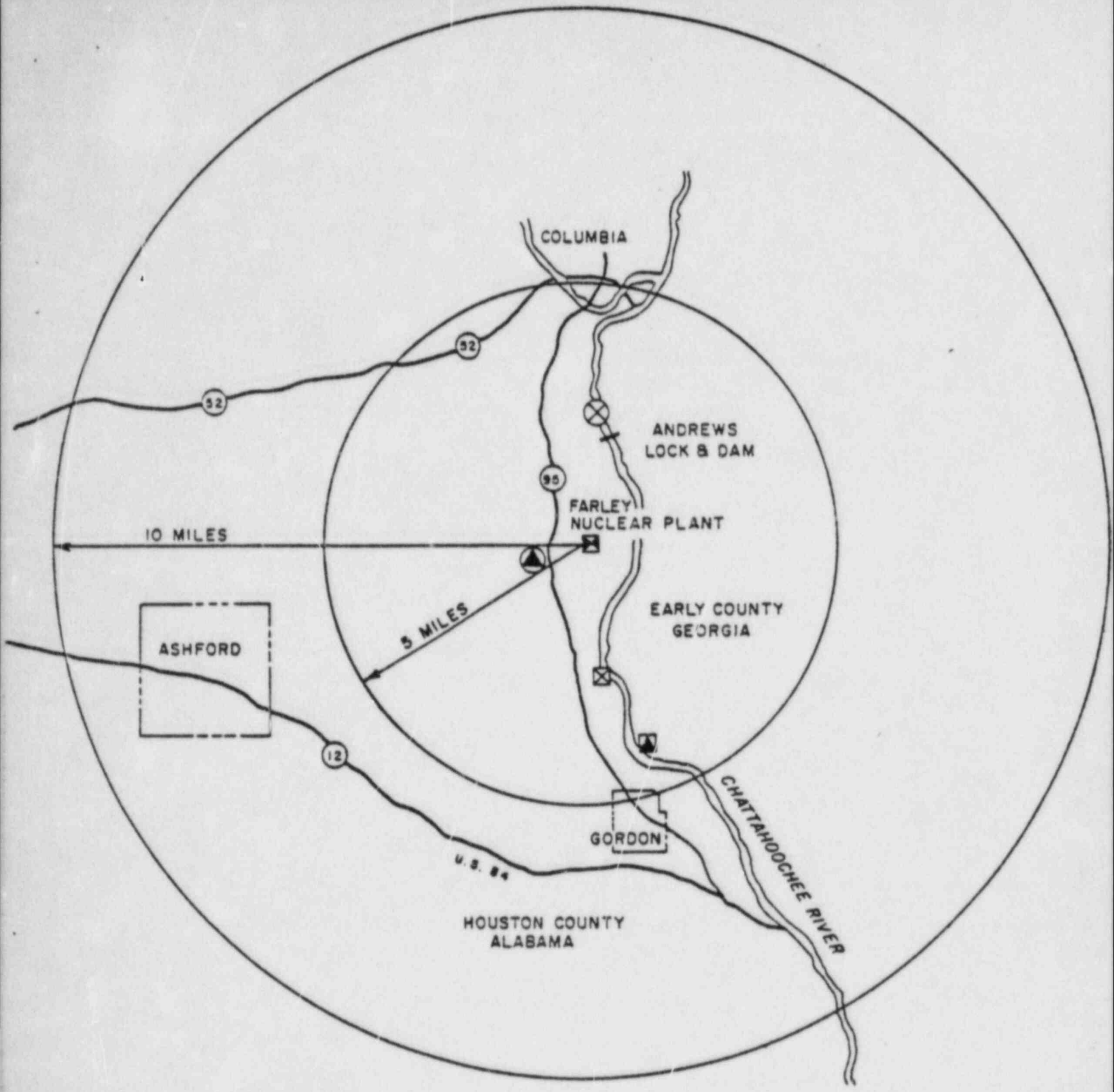


FIGURE 3.12-3 CONTROL SAMPLING LOCATIONS FOR AIRBORNE ENVIRONMENTAL RADIOACTIVITY IN THE FARLEY NUCLEAR PLANT AREA.



INDICATOR STATIONS

- SURFACE AND GROUND WATER
- FISH AND SEDIMENT

CONTROL STATIONS

- SURFACE WATER AND FISH
- 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 1984

Principal Pathway	Type of Samples	Number of Sampling Stations		
		Indicator	Community	Control
Airborne	Airborne Particulates	3	3	2
	Airborne Iodine	3	1	2
	External Radiation	16	17	4
	Milk	1[a]	-	1
	Forage[b]	2	-	1
	Vegetables and Fruits[c]	1	-	1
	Soil[d]	7	3	2
Waterborne	River Water	1	-	1
	Groundwater	1	-	1
	River Fish	1	-	1
	River Sediment	1	-	-

[a]Available for January and February of 1984 only.

[b]Forage sampling in lieu of vegetable and fruit.

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

[d]Annual In Situ Gamma Measurements continued by choice of licensee during 1984.

TABLE 2

OUTLINE OF OPERATIONAL RADIOLOGICAL ENVIRONMENTAL
MONITORING PROGRAM FOR FARLEY NUCLEAR PLANT DURING 1984

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
AIRBORNE	Continuous operation of sampler with sample collection as required by dust loading but at least once per 7 days.	Particulate sampler.
Particulates		Analyze for gross beta radioactivity > 24 hours following filter change. Peform 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 - Nearest Residence (WSE-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)		
Iodine	Continuous Sampler operation with charcoal canister collection weekly.	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 - Nearest Residence (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)		
Soil 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, AL (N-5) Great Southern Paper Co., Ga. (SSE-3) Ashford, AL (WSW-8) Control Stations: Blakely, Ga. (NE-15) Dothan, Al. (W-18)	Annual in situ Ge(Li) gamma-ray spectroscopy measurements.	Gamma Isotopic - annually.
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 permiter. (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: Sixteen 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 station at Ashford, AL. (WSW-8).		
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)	Composite taken with proportional semi-continuous sampler, having a minimum sampling frequency not exceeding two hours collected over a period $\leq$ 31 days.	Gamma isotopic analysis of each composite sample. Tritium analysis of composite sample at least once per 92 days.
Control Station: Upstream of Andrews Lock and Dam (~ 3 miles above plant intake)		

TABLE 2 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
Ground Water		
Indicator Station: Great Southern Paper Co., Well (SSE-4)	Grab sample taken at least once per 92 days.	Gamma isotopic and tritium analyses of each sample.
Control Station: Whatley Residence, Well (SW-1)		
River Sediment		
Indicator Station: Downstream of plant discharges at Smith's Bend (~ 2 miles)	Grab sample taken at least once per 184 days.	Gamma isotopic analysis of each sample.
INGESTION		
Milk		
Indicator Stations: Mr. Mills Cedar Springs, Ga(SE-4)	At least once per 16 days when animals are on pasture; at least once per 31 days at other times.	Gamma isotopic and I-131 analysis of each sample.
Control Station: Brooks-Silcox Dairy, Ashford, AL. (WSW-10)		

TABLE 2 (con'd)

Types of Samples and Sampling Locations (Distances Given in Miles)	Sampling and Collection Frequency	Type and Frequency of Analysis
Fish		
Indicator Station: Downstream of plant discharge in vicinity of Smith's Bend (~ 2 miles)	One sample of the following species at least once per 184 days:	Gamma isotopic analysis on edible portions.
Control Station: Upstream of Andrews Lock and Dam	1. Game Fish 2. Bottom Feeding Fish	
Forage		
Indicator Station: North Perimeter (N-0.8) South Perimeter (SSE-1.0)	Grab sample cut from green forage at least once per 31 days.	Gamma isotopic analysis which includes I-131 analyses of each sample.
Control Station: Dothan, AL. (W-18)		

TABLE 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS
FARLEY NUCLEAR PLANT

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

Analysis	Water (pCi/1)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg. wet)	Milk (pCi/1)	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[b]	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):

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

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 used 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 spectrometry, 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]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 1984

Date	Location and Nature of Deviation
1-5-84	Andrews Dam Water Sampling Station: Low sample volume for 12-29-83 to 1-5-84; New battery was installed.
1-6-84	Direct Radiation Monitoring Station: First Quarter and Annual 1984 TLD's destroyed by vandalism at RC-1605.
1-10-84	North and South Perimeter Forage sampling locations: Cold weather damaged plots 0701 and 1601 so badly that 1101 and 1501 were used as substitutes.
1-12-84	Air Sampling Stations 0701, 1101 and 1218: Low volume for week 1-5-84 to 1-12-84. Flow rate was increased at all stations.
1-17-84	Started sampling indicator milk sample at Cedar Springs, Ga. Supply consists of 1 milk cow.
2-2-84	Dothan Air Sampling Station: Low volume for period 1-26-84 to 2-2-84 due to mechanical failure of the pump. A new pump was installed on 2-8-84.
2-7-84	North and South Permiter Forage Plots: Deer ate forage at plots 1601 and 0701, substituted 1101 and 1501 for forage samples.
2-9-84	Air Sampling Stations 1601, 0701, 1101 and 1218: Low volume for week 2-2-84 to 2-9-84. Station 1218 pump was out of service and not repaired until 2-8-84. Flow rates increased at other stations.
2-10-84	Air Sampling Station at 1108: During the semi-annual calibration of the Rockwell Gas Meters the meter at the above station was found to be in excess of the allowed 10% error. The meter's error was 15.68%. The meter was in service from 7-11-83 to 1-5-84.
3-1-84	Dothan Air Sampling Station. Low volume for period 2-16-84 to 3-1-84 due to mechanical failure of the pump.
3-6-84	North and South Perimeter Forage Plots: Substituted forage at 1101 and 1501 for plots 1601 and 0701 due to no forage available at 1601 and 0701.
3-8-84	Air Sampling Stations 0701, 0215, 0703 and 1218: Low volume for period 3-1-84 to 3-8-84. Work request written on pumps at 0701, 0215 and 1218. No sample from 0703 for the above period due to broken sample line. It was repaired on 3-12-84.
3-12-84	Milk Indicator Station: Milking terminated.

4-5-84	Air Sampling Stations 0701, 1218 and 1101: Low flow for 0701 for period 3-29-84 to 4-5-84 due to no electrical power. Lightning damaged underground cable. PCR written and station 0501 turned on to compensate. Low volume for station 1218 due to mechanical problems with the pump from 3-29-84 to 4-5-84. Lightning damaged the power supply for 1101 resulting in low volume for 3-29-84 to 4-5-84.
4-26-84	Ashford Air Sampling Station: No sample for period 4-19-84 to 4-26-84 due to filter holder screen breaking causing filter paper to crumble. New filter holder was installed.
4-27-84	Direct Radiation Monitoring Stations. First quarter TLD at station RB-1215, annual TLD at station 1601, first quarter TLD at station 0901 and annual TLD at station 1304 were lost.
5-24-84	G.S.P.C. Air Sampling Station: Low volume for period 5-17-84 to 5-24-84 due to mechanical failure of the pump. A new pump was installed on 5-25-84. Started I_2 collection at this station at request of Ga. D.N.R. for the NRC Comparison Program.
5-31-84	Dothan Air Sampling Station: Low volume for period 5-24-84 to 5-31-84 due to mechanical failure of the pump. A new pump was installed on 6-6-84.
6-7-84	Dothan Air Sampling Station: Low volume for period 5-31-84 to 6-7-84 due to mechanical failure of the pump. A new pump was installed on 6-6-84.
6-14-84	Air Sampling Stations 1605, 0215 and 1218. Low volume occurred for the above stations for the period 6-7-84 to 6-14-84. Pump at 1605 was down due to mechanical problems. It was repaired on 6-20-84. Flow rates at the other two stations increased.
6-28-84	Andrews Dam Water Sampling Station: Low volume for 6-21-84 to 6-28-84. New battery installed. This low volume caused monthly composite samples to be low by 0.5 gal.
7-5-84	G.S.P.C. Air Sampling Station: No sample for period 6-28-84 to 7-5-84 due to wasp nest in the intake line. The line was cleaned.
7-12-84	Andrews Dam Water Sampling Station: No sample for period 7-5-84 due to 7-12-84 due to failure of the sampler. A new sampler was installed on 7-13-84.
7-17-84	Air Sampling Stations 0501 and 0215. During the Semi-annual Calibration of the Rockwell Gas Meters the 0501 meter

error was found to be 21% and the 0215 meter error was 15%. The meter at 0501 was in service from 1-12-84 to 6-21-84. The meter at 0215 was in service from 1-5-84 to 6-21-84.

7-18-84 Direct Radiation Monitoring Station: TLD at station 0401 destroyed by a lawn mower.

7-19-84 Ashford Air Sampling Station: No sample for period 7-12-84 to 7-19-84 due to filter holder screen breaking. A new filter holder was installed.

8-1-84 All Air Sampling Stations: New environmental cabinets were installed to replace old cabinets at all existing air sampling stations. This installation caused some 5 or 6 day sample periods. The stations affected were 1101, 1218, 1601, 0501 and 0215.

8-16-84 Columbia Air Sampling Station: Low volume for period 8-9-84 to 8-16-84. The flow rate was increased.

8-23-84 Dothan Air Sampling Station: Low volume for 8-9-84 to 8-23-84 due to mechanical failure of the pump. Pump repaired on 8-20-84.

8-30-84 Dothan Air Sampling Station: Low volume for period 8-23-84 to 8-30-84. Flow rate was increased.

9-6-84 Columbia Air Sampling Station: Low volume for period 8-30-84 to 9-6-84. Flow rate was increased.

9-11-84 Direct Radiation Monitoring Station: All TLD's at RB-1215 lost.

9-13-84 Indicator River Water Sampling Station: No sample for period 9-6-84 to 9-13-84 due to sampler blowing fuse. A new fuse was installed.

9-27-84 Andrews Dam Water Sampling Station: Low volume for week 9-20-84 to 9-27-84. This caused monthly composite sample to be low by $\cong$ 0.2 gal. New sampler was installed.

10-11-84 Blakely Air Sampling Station: Low volume for period 10-4-84 to 10-18-84 due to mechanical problems with the pump. The station was repaired.

10-11-84 Andrews Dam Water Sampling Station: Low volume for 10-4-84 to 10-11-84. A new sampler was installed.

10-25-84 Dothan Air Sampling Station: Low volume for 10-18-84 to 10-25-84, 11-1 to 11-8-84, and no sample for 10-25-84 to 11-1-84 due to mechanical failure of the motor. Motor repaired on 11-6-84.

10-29-84	State of Ga. obtained a grab sample from Chattahoochee River at Great So. Paper Co. water intake. Analysis revealed 10800 pCi/l tritium by State of Ga. Jim Hardeman, Ga. Dept of Natural Resources, notified Ken McCracken of results on 12-4-84. Ken McCracken notified W. R. Bayne of results. Radiochemistry incident report # 1-84-005 states that the 10-29-84 tritium level cannot be related to an obvious increase in H_3 concentration from FNP. The H_3 level was in no way a health hazard to the public. Monthly river water composite sample results were normal.
11-16-84	All Air Sampling Stations: Eight Day sample period due to schedule conflicts.
11-21-84	All Air Sampling Stations: Five Day sample period due to holidays.
11-29-84	All Air Sampling Stations: Eight Day sample period due to holidays.
11-30-84	Direct Radiation Monitoring Station: TLD at station 1215 lost.
12-6-84	Air Sampling Stations at 0703 and 0215: Low volume for period 11-29-84 to 12-6-84. The flow rate at both stations was increased.
12-13-84	Andrews Dam Water Sampling Station: Low volume for period 12-6-84 to 12-13-84 due to sampler's tubing cracking. A new sampler was installed.
12-18-84	South Perimeter Forage Plot: Deer ate rye at plot so forage at 1101 substituted.
12-20-84	Blakely Air Sampling Station: Low volume for period 12-13-84 to 12-20-84. Flow rate was increased.
12-21-84	Direct Radiation Monitoring Stations: Annual TLD at RC-1304 and at RI-0901 could not be found.
12-27-84	Dothan Air Sampling Station: Low volume for period 12-20-84 to 12-27-84 due to mechanical failure of pump. Pump repaired on 12-31-84.

TABLE 6

RADIOLOGICAL ENVIRONMENTAL MONITORING LOCATIONS

EXPOSURE PATHWAY AND/OR SAMPLE	SAMPLING LOCATIONS	SAMPLE IDENTIFICATION
1. AIRBORNE		
a. Particulates	Indicator Stations:	
	River Intake Structure (ESE-0.8)	PI - 0501
	South Perimeter (SSE-1.0)	PI - 0701
	Plant Entrance (WSW-0.9)	PI - 1101
	North Perimeter (N-0.8)	PI - 1601
	Control Stations:	
	Blakely, Ga. (NE-15)	PB - 0215
	Dothan, Ala. (W-18)	PB - 1218
	Community Stations:	
	Great Southern Paper Co. (SSE-3)	PC - 0703
	Ashford, AL. (WSW-8)	PC - 1108
	Columbia, AL. (N-5)	PC - 1605
b. Radioiodine	Indicator Stations:	
	River Intake Structure (ESE-0.8)	II - 0501
	South Perimeter (SSE-1.0)	II - 0701
	Plant Entrance (WSW-0.9)	II - 1101
	North Perimeter (N-0.8)	II - 1601
	Control Stations:	
	Blakely, Ga. (NE-15)	IB - 0215
	Dothan, Ala. (W-18)	IB - 1218
	Community Stations:	
	Great Southern Paper Co. (SSE-3)	IC - 0703

TABLE 6

EXPOSURE PATHWAY AND/OR SAMPLE	SAMPLING LOCATIONS	SAMPLE IDENTIFICATION
2. Direct Radiation	Indicator Stations:	
	Plant Perimeter	
	(NNE-0.9)	RI - 0101
	(NE-1.0)	RI - 0201
	(ENE-0.9)	RI - 0301
	(E-0.8)	RI - 0401
	(ESE-0.8)	RI - 0501
	(SE-1.1)	RI - 0601
	(SSE-1.0)	RI - 0701
	(S-1.0)	RI - 0801
	(SSW-1.0)	RI - 0901
	(SW-0.9)	RI - 1001
	(WSW-0.9)	RI - 1101
	(W-0.8)	RI - 1201
	(WNW-0.8)	RI - 1301
	(NW-1.1)	RI - 1401
	(NNW-0.9)	RI - 1501
	(N-0.8)	RI - 1601
	Control Stations:	
	Blakely, Ga. (NE-15)	RB - 0215
	Neals Landing, Fla. (SSE-18)	RB - 0718
	Dothan, Ala. (W-15)	RB - 1215
	Dothan, Ala. (W-18)	RB - 1218
	Community Stations:	
	(NNE-4)	RC - 0104
	(NE-4)	RC - 0204
	(ENE-4)	RC - 0304
	(E-5)	RC - 0405
	(ESE-5)	RC - 0505
	(SE-5)	RC - 0605
	(SSE-3)	RC - 0703

TABLE 6

EXPOSURE PATHWAY AND/OR SAMPLE	SAMPLING LOCATIONS	SAMPLE IDENTIFICATION
2. Direct Radiation (Cont')		
	Community Stations (Cont'):	
	(S-5)	RC - 0805
	(SSW-4)	RC - 0904
	(SW-1.2)	RC - 1001
	(SW-5)	RC - 1005
	(WSW-4)	RC - 1104
	(WSW-8)	RC - 1108
	(W-4)	RC - 1204
	(WNW-4)	RC - 1304
	(NW-4)	RC - 1404
	(NNW-4)	RC - 1504
	(N-5)	RC - 1605
3. WATERBORNE		
a. Surface	Indicator Station:	
	Great Southern Paper	WRI
	Intake Structure (River Mile-40)	
	Control Station:	
	Andrews Lock & Dam	
	Upper Pier (River Mile-47)	WRB
b. Ground	Indicator Station:	
	Great Southern Paper	
	Co. Well (SSE-4)	WGI - 07
	Control Station:	
	Mr. Whatley (SW-1.2)	WGB - 10
c. Sediment	Indicator Station:	
	Smith's Bend	
	(River Mile-41)	RSI

TABLE 6

EXPOSURE PATHWAY AND/OR SAMPLE	SAMPLING LOCATIONS	SAMPLE IDENTIFICATION
4. INGESTION		
a. Milk	[+]Indicator Station:	
	Mr. Mills	
	Cedar Springs, Ga. (SE-4)	MI - 0604
	Control Station:	
	Brooks-Silcox Dairy,	
	Ashford, Ala. (WSW-10)	MB - 1110
b. Fish	Indicator Station:	
	Smith Bend (River Mile-41)	
	Game Fish	FGI
	Bottom Feeding Fish	FBI
	Control Station:	
	Andrews Lock & Dam	
	Reservior (River Mile-47)	
	Game Fish	FGB
	Bottom Feeding Fish	FBB
c. Forage	Indicator Stations:	
	South Perimeter (SSE-1.0)	FI - 0701
	North Perimeter (N-0.8)	FI - 1601
	Control Station:	
	Dothan, Alabama (W-18)	FB - 1218

[+] Sampled from Jan. 1 until March 12 when milking was discontinued.

TABLE FOB-1

AIRBORNE: PARTICULATES AND IODINE - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8, HOUSTON COUNTY, ALABAMA
January - December, 1984 (a)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	NOMINAL MDC (b)	ALL INDICATOR LOCATIONS MEAN (f) (c) RANGE (c)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (f)(c) RANGE (c)	COMMUNITY LOCATIONS MEAN (f)(c) RANGE (c)	CONTROL LOCATIONS MEAN (f)(c) RANGE(c)
Air Particulates (pCi/m^3)	Gross Beta 413	0.0012	0.0102 (158/158) (0.0010 - 0.0220)	South Perimeter 1.0 Miles - SSE	0.0111 (16/16) (0.0050 - 0.0160)	0.0105 (152/152) (0.0010 - 0.0420)	0.0126 (103/103) (0.0030 - 0.0280)
	Gamma Spec 32						
	Be-7	0.0095	0.0338 (12/13) (0.0190 - 0.0440)	Plant Entrance 0.9 Miles - WSW	0.0367 (4/4) (0.0270 - 0.0440)	0.0384 (12/12) (0.0200 - 0.0510)	0.0390 (7/7) (0.0140 - 0.0490)
	Cs-134	0.0	0.0010 (2/13) (0.0010 - 0.0010)	North Perimeter 0.8 Miles - N	0.0010 (1/4) ----	----	----
	Cs-137	0.0005	----	----	----	----	0.0015 (2/7) (0.0010 - 0.0020)
	Tl-208	0.0010	----	----	----	0.0010 (1/12) ----	----
	Bi-212	0.0080	0.170 (1/13) ----	South Perimeter 1.0 Miles - SSE	0.170 (1/2) ----	0.0130 (1/12) ----	0.0140 (1/7) ----
	Ac-228	0.0	0.0020 (1/13) ----	Plant Entrance 0.9 Miles - WSW	0.0020 (1/4) ----	----	----
	Radioiodine 283						
	I-131	0.0515	< MDC	----	----	< MDC	< MDC

(a) No Nonroutine Anomalous Measurements Reported During This Period.
(b) Mean Minimum Detectable Concentrations Calculated Per Equation I of This Report. The MDC's for Gross B and Iodine were Obtained Using Blank Background (A Priori), whereas, for Gamma-Ray Spectroscopy Actual Sample Backgrounds Were Used (A Posteriori).
(c) Mean and Range Based Upon Detectable Measurements Only. Fraction of Detectable Measurements at Specified Locations in Parenthesis (f).

TABLE FOR-2

EXTERNAL RADIATION - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8, HOUSTON COUNTY, ALABAMA
January - December, 1984 (a)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	NOMINAL MDC (b)	ALL INDICATOR LOCATIONS MEAN (f) (c) RANGE (c)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN MEAN (f) (c) RANGE (c)	COMMUNITY LOCATIONS MEAN (f) (c) RANGE (c)	CONTROL LOCATIONS MEAN (f)(c) RANGE(c)
TLD - Quarterly (MRAD)	Gross Gamma 147	10.0	18.3 (62/62) (12.6 - 37.3)	East Perimeter 0.8 Miles - E	25.3 (3/3) (24.1 - 26.0)	15.3 (72/72) (8.30 - 21.6)	16.9 (13/13) (11.3 - 21.4)
TLD - Annual (MRAD)	Gross Gamma 34	10.0	55.1 (14/14) (35.5 - 78.2)	East Perimeter 0.8 Miles - E	78.2 (1/1) ----	44.1 (17/17) (28.1 - 52.2)	55.9 (3/3) (45.3 - 61.5)
TLD - Annual[d] (MRAD)	Gross Gamma 35	10.0	70.9 (14/14) (57.9 - 101.)	East Perimeter 1.0 Miles - NE	101. (1/1) ----	61.2 (18/18) (52.1 - 77.2)	68.4 (3/3) (56.5 - 76.0)

(a) No Nonroutine Anomalous Measurements Reported During This Period.
(b) Lower Limit of Detection as Defined in HASL-300, for LiF TLDs as Achieveable in Practice.
(c) Mean and Range Based on Detectable Measurements Only. Fraction of Detectable Measurements at Specified Location in Parenthesis (f).
(d) Sum of Four Quarters for Comparative Purposes.

TABLE 10B-3

MILK - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8, HOUSTON COUNTY, ALABAMA
January - December, 1984(a)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	NOMINAL MDC(b)	ALL INDICATOR LOCATIONS MEAN (f) (c) RANGE(c)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (f) (c) RANGE (c)	COMMUNITY LOCATIONS MEAN (f)(c) RANGE(c)	CONTROL LOCATIONS MEAN (f)(c) RANGE(c)
Milk (pCi/l)	Gamma Spec 31						
	K-40	91.6	949. (5/5) (799. - 1070.)	Cedar Springs,Ga. 4.0 Miles - SE	949. (5/5) (799. - 1070.)	----	767. (26/26) (441 - 1210.)
	Cs-137	9.00	----	----	----	----	< MDC
	Radioiodine 31						
	I-131	0.233	< MDC	----	----	----	< MDC

(a) No Nonroutine Anomalous Measurements Reported During This Period.
(b) Mean Minimum Detectable Concentrations Calculated Per Equation 1 of This Report Using Blank Backgrounds (A Priori) for Radioiodine. For Gamma-Ray Spectroscopy Actual Sample Backgrounds Were Used (A Posteriori).
(c) Mean and Range Based on Detectable Measurements Only. Fraction of Detectable Measurements at Specified Locations in Parenthesis (f).

TABLE F08-4

VEGETATION: FORAGE, VEGETABLES AND FRUITS - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8, HOUSTON COUNTY, ALABAMA
January - December, 1984(a)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	NOMINAL MDC (b)	ALL INDICATOR LOCATIONS MEAN (f) (c) RANGE (c)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (f) (c) RANGE (c)	COMMUNITY LOCATIONS MEAN (f) (c) RANGE (c)	CONTROL LOCATIONS MEAN (f) (c) RANGE (c)
Forage (d) (pCi/kg - Dry)	Gamma Spec 36						
	Be-7	660.	4260. (24/24) (1450. - 11700.)	North Perimeter 0.9 Miles - NNW	9900. (3/3) (7510. - 11700.)	----	2690. (12/12) (1290. - 6020.)
	K-40	626.	13100. (24/24) (3400. - 27500.)	North Perimeter 0.9 Miles - NNW	20200. (3/3) (11200. - 27500.)	----	10400. (12/12) (5280. - 43400.)
	Cs-134	43.0	----	----	----	----	93.0 (1/12) ----
	Cs-137	63.8	75.6 (7/24) (53.0 - 112.)	North Perimeter 0.9 Miles - NNW	104. (2/3) (95.0 - 112.)	----	86.3 (4/12) (44.0 - 165.)
	Tl-208	69.0	94.0 (1/24) ----	North Perimeter 0.9 Miles - NNW	94.0 (1/3) ----	----	----
	Bi-212	835.	1100. (1/24) ----	Plant Entrance 0.9 Miles - WSW	1100. (1/4) ----	----	779. (1/12) ----
	Pb-212	183.	----	----	----	----	205. (1/12) ----
	Bi-214	163.	266. (6/24) (87.0 - 496.)	Plant Entrance 0.9 Miles - WSW	496. (1/4) ----	----	332. (2/12) (120. - 543.)
	Pb-214	159.	236. (2/24) (152. - 320.)	Plant Entrance 0.9 Miles - WSW	320. (1/4) ----	----	----
	Ac-228	370.	481. (2/24) (446. - 516.)	South Perimeter 1.0 Miles - SSE	516. (1/9) ----	----	----

(a) No Nonroutine Measurements Reported During This Period.
(b) Mean Minimum Detectable Concentrations Calculated Per Equation 1 of This Report Using Actual Sample Backgrounds. (A Posteriori)
(c) Mean and Range Based on Detectable Measurements Only. Fraction of Detectable Measurements at Specified Locations in Parenthesis(f).
(d) Mean Wet/Dry Ratio for 1984 was 3.79
(e) Substitute Location Due to Unavailability of Forage at Forage Plot on South Perimeter During Some Sampling Periods.

TABLE FOR-5

SOIL - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8, HOUSTON COUNTY, ALABAMA
January - December, 1984 (a)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	NOMINAL MDC (b)	ALL INDICATOR LOCATIONS MEAN (f) (c) RANGE (c)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN		COMMUNITY LOCATIONS MEAN (f)(c) RANGE(c)	CONTROL LOCATIONS MEAN (f)(c) RANGE (c)
				NAME DISTANCE AND DIRECTION	MEAN (f)(c) RANGE(c)		
Soil (In Situ) (pCi/kg - Dry)	Gamma Spec 12						
	Be-7	538.	----	----	----	< MDC	----
	K-40	529.	6090. (7/7) (922. - 18400.)	East Perimeter 0.8 Miles - E	18400. (1/1) ----	1530. (3/3) (1270. - 1970.)	2600. (2/2) (1320. - 3870.)
	Cs-137	46.8	291. (7/7) (166. - 462.)	West Perimeter 0.8 Miles - WNW	462. (1/1) ----	210. (3/3) (132. - 343.)	308. (2/2) (265. - 351.)
	Tl-208	124.	765. (7/7) (404. - 1540.)	East Perimeter 1.0 Miles - NE	1540. (1/1) ----	465. (3/3) (364. - 563.)	675. (2/2) (515. - 835.)
	Bi-212	891.	1520. (6/7) (923. - 2770.)	East Perimeter 1.0 Miles - NE	2770. (1/1) ----	1070. (3/3) (741. - 1650.)	1140. (2/2) (949. - 1340.)
	Pb-212	335.	2020. (7/7) (788. - 3930.)	East Perimeter 0.8 Miles - E	3930. (1/1) ----	1060. (3/3) (693. - 1700.)	1650. (2/2) (1530. - 1770.)
	Bi-214	188.	1710. (7/7) (1020. - 2380.)	South Perimeter 1.0 Miles - SSW	2380. (1/1) ----	1010. (3/3) (848. - 1200.)	1310. (2/2) (1100. - 1510.)
	Pb-214	310.	1610. (7/7) (994. - 2260.)	East Perimeter 0.8 Miles - E	2260. (1/1) ----	1190. (3/3) (1060. - 1290.)	1410. (2/2) (1200. - 1620.)
	Ra-226	1060.	1310. (1/7) ----	East Perimeter 1.0 Miles - NE	1310. (1/1) ----	1010. (1/3) ----	1190. (1/2) ----
	Ac-228	339.	2110. (7/7) (1140. - 4020.)	East Perimeter 1.0 Miles - NE	4020. (1/1) ----	1370. (3/3) (1200. - 1710.)	1890. (2/2) (1460. - 2320.)

(a) No Nonroutine Anomalous Measurements Reported During This Period.
(b) Mean Minimum Detectable Concentration Calculated Per Equation 1 of This Report Using Actual Sample Backgrounds (A Posteriori).
(c) Mean and Range Based on Detectable Measurements Only. Fraction of Detectable Measurements at Specified Locations In Parenthesis(f).

TABLE F08-6

WATERBORNE: SURFACE AND GROUND WATER - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8, HOUSTON COUNTY, ALABAMA
January - December, 1984 (a)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	NOMINAL MDC (b)	ALL INDICATOR LOCATIONS MEAN (f) (c) RANGE (c)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN MEAN (f)(c) RANGE (c)	COMMUNITY LOCATIONS MEAN (f)(c) RANGE (c)	CONTROL LOCATIONS MEAN (f)(c) RANGE(c)
Surface Water (River) (pCi/l)	Gamma Spec 8						
	Be-7	27.0	----	----	----	----	38.0 (1/2) ----
	Cs-134	1.00	4.00 (3/6) (3.00 - 5.00)	Great Southern Paper River Mile, 40	4.00 (3/6) (3.00 - 5.00)	----	4.00 (1/2) ----
	Cs-137	3.00	3.00 (1/6) ----	Great Southern Paper River Mile, 40	3.00 (1/6) ----	----	3.00 (1/2) ----
	H-208	3.00	----	----	----	----	4.00 (1/2) ----
	Bi-212	0.6	----	----	----	----	44.0 (1/2) ----
	Ac-228	0.0	7.50 (2/6) (7.00 - 8.00)	Great Southern Paper River Mile, 40	7.50 (2/6) (7.00 - 8.00)	----	----
	Tritium 8						
	H-3	92.0	333. (4/4) (239. - 529.)	Great Southern Paper River Mile, 40	333. (4/4) (239. - 529.)	----	152. (4/4) (85.0 - 181.)
Ground Water (Well) (pCi/l)	Gamma Spec 3						
	Cs-137	1.50	4.00 (2/2) (3.00 - 5.00)	Great Southern Paper Well 4 Miles - SSE	4.00 (2/2) (3.00 - 5.00)	----	----
	Bi-212	41.0	----	----	----	----	46.0 (1/1) ----
	Tritium 8						
	H-3	97.5	ND MDC	----	----	----	ND MDC

(a) No Nonroutine Anomalous Measurements Reported During This Period.
(b) Mean Minimum Detectable Concentrations Calculated Per Equation 1 of This Report. The MDC's for Tritium was Obtained Using Blank Backgrounds (A Priori), Whereas, for Gamma-Ray Spectroscopy Actual Sample Backgrounds Were Used (A Posteriori).
(c) Mean and Range Based Upon Detectable Measurements Only. Fraction of Detectable Measurements at Specified Location in Parenthesis (f).

TABLE FOR-7

SEDIMENT: RIVER - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8, HOUSTON COUNTY, ALABAMA
January - December, 1984 (a)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	NOMINAL MDC (b)	ALL INDICATOR LOCATIONS MEAN (f) (c) RANGE (c)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN MEAN (f)(c) RANGE (c)	CONTROL LOCATIONS MEAN (f)(c) RANGE (c)	CONTROL LOCATIONS MEAN (f)(c) RANGE(c)
Sediment (River) (pCi/kg - Dry)	Gamma Spec 7						
	K-40	236.	5480. (7/7) (1590. - 9360.)	Smith's Bend River Mile, 41-42	5480. (7/7) (1590. - 9360.)	----	----
	Tl-208	40.5	461. (7/7) (416. - 505.)	Smith's Bend River Mile, 41-42	461. (7/7) (416. - 505.)	----	----
	Bi-212	577.	1450. (7/7) (1350. - 1540.)	Smith's Bend River Mile, 41-42	1450. (7/7) (1350. - 1540.)	----	----
	Pb-212	73.5	1010. (7/7) (943. - 1070.)	Smith's Bend River Mile, 41-42	1010. (7/7) (943. - 1070.)	----	----
	Bi-214	75.5	804. (7/7) (518. - 1090.)	Smith's Bend River Mile, 41-42	804. (7/7) (518. - 1090.)	----	----
	Pb-214	84.5	735. (7/7) (535. - 935.)	Smith's Bend River Mile, 41-42	735. (7/7) (535. - 935.)	----	----
	Ra-226	587.	968. (7/7) (705. - 1230.)	Smith's Bend River Mile, 41-42	968. (7/7) (705. - 1230.)	----	----
	Ac-228	131.	1280. (7/7) (1160. - 1400.)	Smith's Bend River Mile, 41-42	1280. (7/7) (1160. - 1400.)	----	----

(a) No Nonroutine Anomalous Measurements Were Reported During This Period.
(b) Mean Minimum Detectable Concentrations Calculated Per Equation 1 of This Report Using Actual Sample Backgrounds (A Posteriori) for Gamma-Ray Spectroscopy.
(c) Mean and Range Based Upon Detectable Measurements Only. Fraction of Detectable Measurements at Specified Locations In Parenthesis(f).

TABLE FOR-A

FISH: RIVER - OPERATIONAL RADIOACTIVITY SUMMARY

JOSEPH M. FARLEY NUCLEAR PLANT
LICENSE NOS. NPF-2 AND NPF-8, HOUSTON COUNTY, ALABAMA
January - December, 1984(a)

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	NOMINAL MDC (b)	ALL INDICATOR LOCATIONS MEAN (f) (c) RANGE (c)	INDICATOR LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (f) (c) RANGE (c)	COMMODITY LOCATIONS MEAN (f)(c) RANGE(c)	CONTROL LOCATIONS MEAN (f)(c) RANGE (c)
Fish (Game) (pCi/kg - Wet Tissue)	Gamma Spec 4						
	K-40	99.0	2320. (2/2) (1820. - 2810.)	Smith's Bend River Mile, 41-42	2320. (2/2) (1820. - 2810.)	----	1960. (2/2) (1540. - 2370.)
	Cs-137	15.3	42.0 (2/2) (22.0 - 62.0)	Smith's Bend River Mile, 41-42	42.0 (2/2) (22.0 - 62.0)	----	26.0 (2/2) (25.0 - 27.0)
Fish (Bottom feeding) (pCi/kg - Wet Tissue)	Gamma Spec 4						
	K-40	131.	1890. (2/2) (1290. - 2490.)	Smith's Bend River Mile, 41-42	1890. (2/2) (1290. - 2490.)	----	2220. (2/2) (1820. - 2620.)
	Cs-137	13.0	< MDC	----	----	----	19.0 (2/2) (17.0 - 21.0)

(a) No Nonroutine Anomalous Measurements Were Reported During This Period.
(b) Mean Minimum Detectable Concentrations Calculated Per Equation 1 of This Report Using Actual Sample Backgrounds (A Posteriori).
(c) Mean and Range Based Upon Detectable Measurements Only. Fraction of Detectable Measurements at Specified Locations in Parenthesis (f).

ATTACHMENT
1984
LAND USE SURVEY
FOR
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
JOSEPH M. FARLEY NUCLEAR PLANT

This Land Use Survey was performed June 29 to July 9, 1984 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

Mr. A. M. Mathews, Houston County Extension Agent, was contacted for the purpose of reviewing known locations of milk animals in the county. Mr. Mathews stated he was not aware of any changes since the last milk animal survey (August 1983).

A house-to-house canvas of residents along Alabama 95 for a distance of about three miles from the plant entrance and for about a mile west on Houston County 42 revealed no milk animals. Individuals contacted along this canvas were Walter Whatley and Lula Mae McGriff.

Simultaneous with the milk animal canvas, the nearest residence in each of the meteorological sectors was identified.

B. Early County, Georgia

Mr. Wayne Tankersley, Early County Extension Agent, was contacted to determine if any milk animals were currently present in the county. He knew of only one person. This lead was checked out and Mr. Bush did not have any milk animals.

A house-to-house canvas of residents in the area across the Chattahoochee River west of the plant was negative with respect to the presence of milk animals. Individuals at the following residences were questioned: Jim Donaldson and Mrs. Walter Mills.

Simultaneous with the house-to-house milk animal canvas, the nearest residence in each meteorological sector was identified.

C. Results and Conclusions

The results of the Land Use Survey are shown in Table 1. Based on the survey results, no change in the present milk sampling program is required.

1984
JOSEPH M. FARLEY NUCLEAR PLANT
RADIOLOGICAL ENVIRONMENTAL MONITORING SURVEY

RADIAL SECTORS (22½ DEGREES)	(DISTANCE MILES TO NEAREST) RESIDENT	MILK ANIMAL
North Northeast (01)	2.5	> 5
Northeast (02)	2.4	> 5
East Northeast (03)	2.3	> 5
East (04)	2.8	> 5
East Southeast (05)	2.9	> 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)	2.6	> 5
West (12)	1.3	> 5
West Northwest (13)	2.1	> 5
Northwest (14)	2.4	> 5
North Northwest (15)	2.0	> 5
North (16)	2.6	> 5

Mailing Address
Alabama Power Company
600 North 18th Street
Post Office Box 2641
Birmingham, Alabama 35291
Telephone 205 783-6090

R. P. McDonald
Senior Vice President
Flintridge Building

Alabama Power

April 29, 1985

Docket Nos. 50-348
50-364

U.S. Nuclear Regulatory Commission
Region II
Suite 2900
101 Marietta Street, N.W.
Atlanta, GA 30323

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

Gentlemen:

The attached "Annual Environmental Operating Report, Part B: Radiological" for the period ending December 31, 1984, 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,

R. P. McDonald

RPM/KWM:sam

Attachment

cc: Mr. W. H. Bradford (W/Attachment)
Document Control Desk, (18 copies, W/Attachment)
U.S. Nuclear Regulatory Commission
Director, Bureau of Radiological Health (W/Attachment)
State of Alabama
Director, Environmental Protection Division (W/Attachment)
State of Georgia

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