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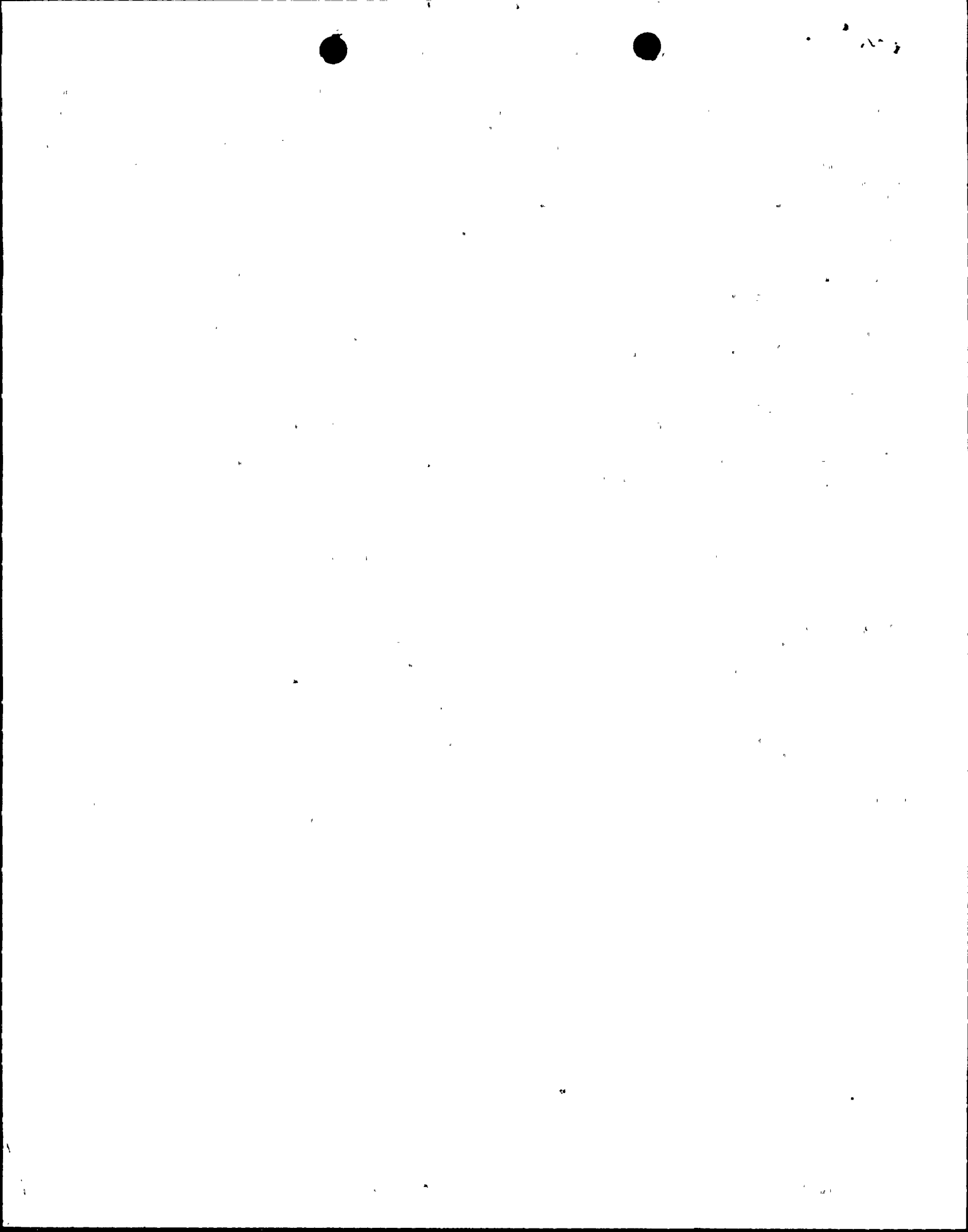
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TENNESSEE VALLEY AUTHORITY

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April 22, 1986

U.S. Nuclear Regulatory Commission
Region II
ATTN: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323


Dear Dr. Grace:

BROWNS FERRY NUCLEAR PLANT UNITS 1, 2, AND 3 - ENVIRONMENTAL RADIOACTIVITY
LEVELS - ANNUAL REPORT - 1985

Enclosed is a copy of the subject report prepared by the Tennessee Valley Authority pertaining to environmental monitoring at the Browns Ferry Nuclear Plant. This monitoring program is specifically responsive to the recommendations and requests of the U.S. Fish and Wildlife Service. We understand that NRC-NRR will transmit five copies of the report to the Secretary of the Interior.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

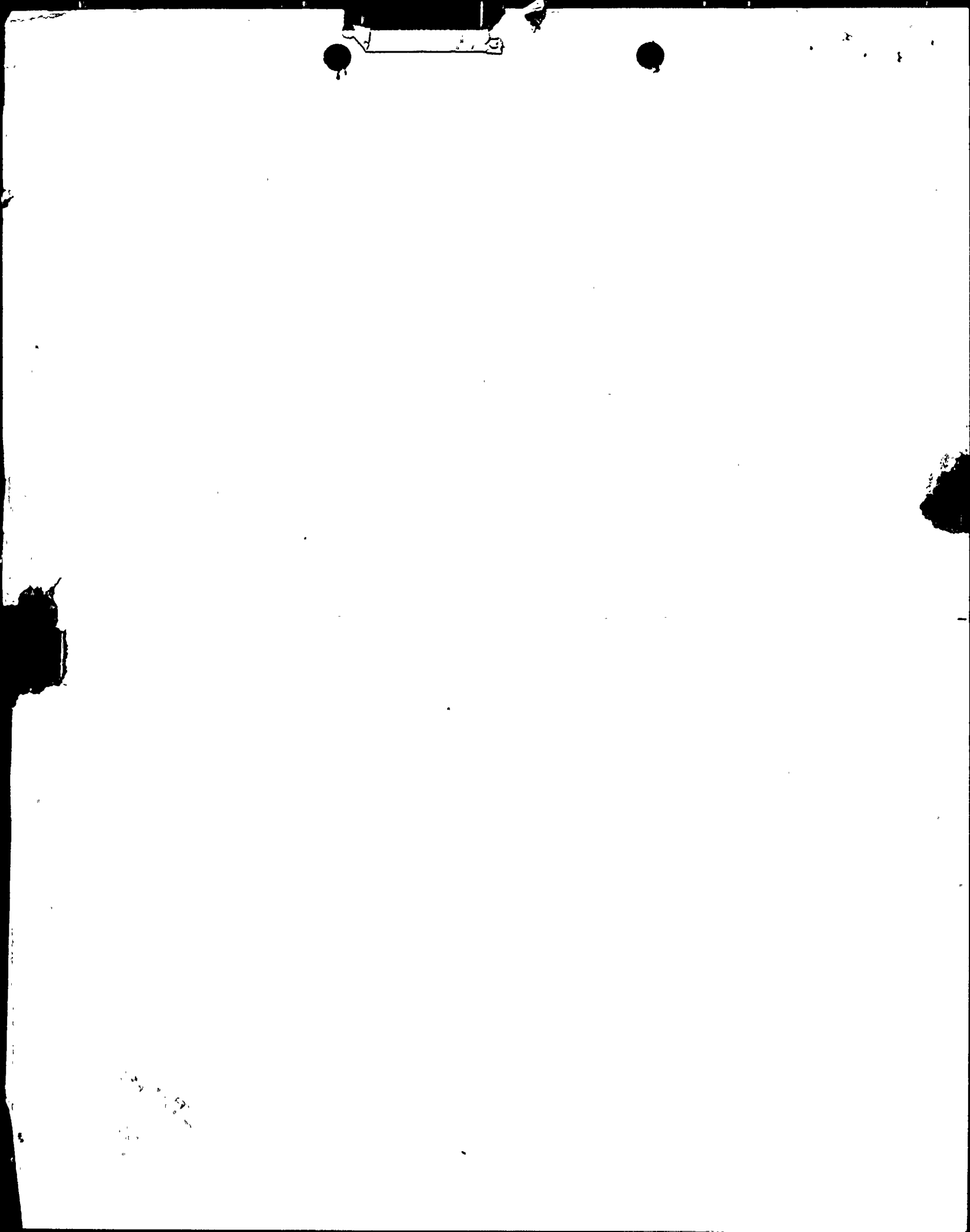

R. L. Gridley, Director
Nuclear Safety and Licensing

Enclosure

cc: Director of Nuclear Reactor Regulation (Enclosure: 20)
Attn: Mr. R. M. Bernero, Director
Division of BWR Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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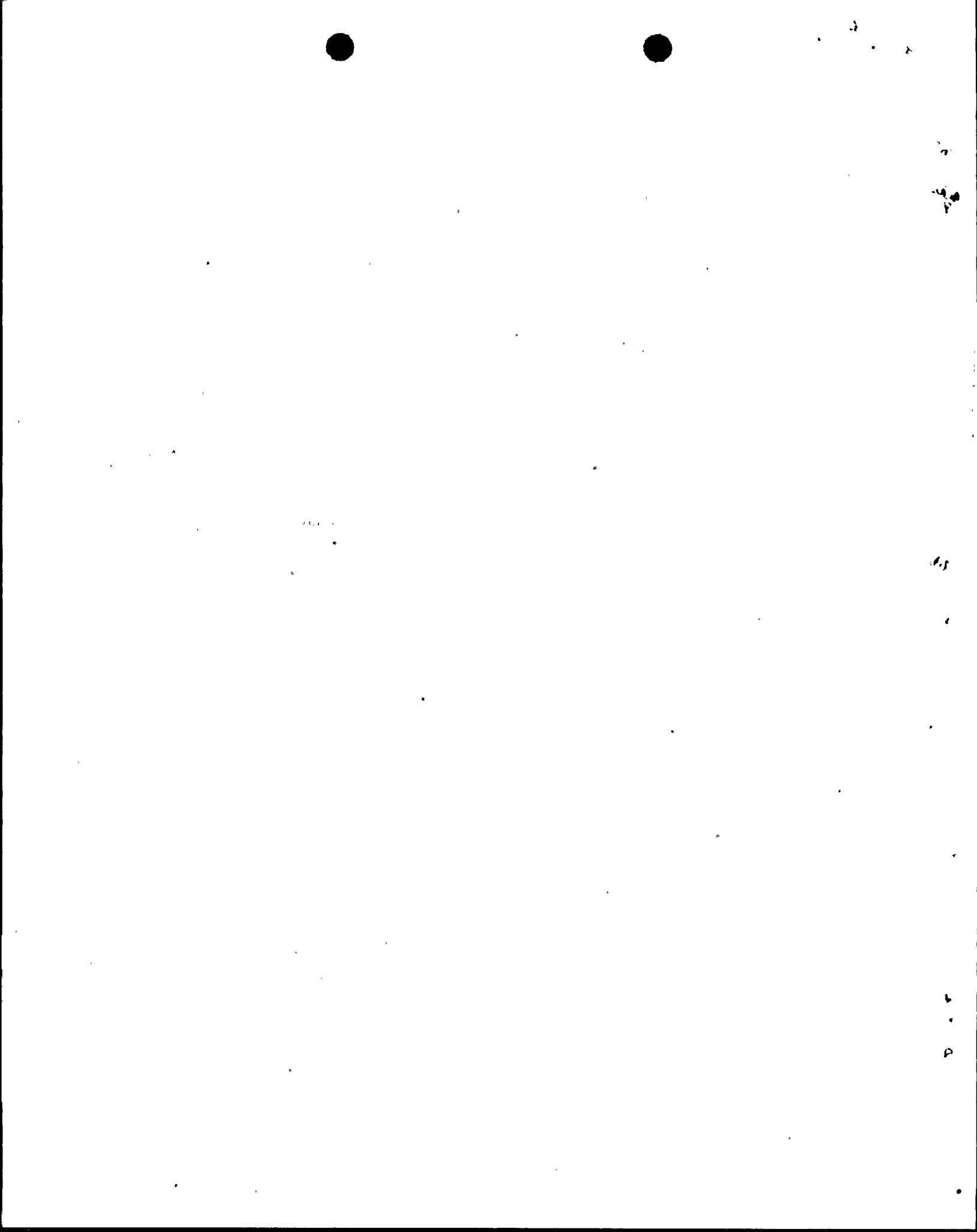


ENVIRONMENTAL RADIOACTIVITY LEVELS
BROWNS FERRY NUCLEAR PLANT
ANNUAL REPORT - 1985
TVA/NUC SVS/RH

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April 1986



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ENVIRONMENTAL RADIOACTIVITY LEVELS

BROWNS FERRY NUCLEAR PLANT

ANNUAL REPORT

1985

Introduction

The Browns Ferry Nuclear Plant (BFN), operated by the Tennessee Valley Authority, is located on a site owned by TVA containing 840 acres of land in Limestone County, Alabama, bounded on the west and south by Wheeler Reservoir (see figure 1). The site is 10 miles southwest of Athens, Alabama, and 10 miles northwest of Decatur, Alabama. The plant consists of three boiling water reactors; each unit is rated at 3,293 MWt and 1,098 MWe. Unit 1 achieved criticality on August 17, 1973, and began commercial operation on August 1, 1974. Unit 2 began commercial operation on March 1, 1975. However, a fire in the cable trays on March 22, 1975, forced the shutdown of both reactors. Units 1 and 2 resumed operation and Unit 3 began testing in August 1976. Unit 3 began commercial operation in January 1977. The plant has been shutdown since March 1985.

The preoperational environmental radiological monitoring program established a baseline of data on the distribution of natural and manmade radioactivity in the environment near the plant site. However, seasonal, yearly, and random variations in the data were observed. In order to determine the potential increases in environmental radioactivity levels caused by the plant, comparisons were made between data for indicator stations (those near the plant) and control stations (those remote from the plant) in conjunction with comparisons with preoperational data.

Radiological Health (Office of Nuclear Power) and the Office of Natural Resources and Economic Development carried out the sampling program outlined in tables 1 and 23. Sampling locations are shown in figures 2, 3, 4, and 11, and table 2 describes the locations of the atmospheric and terrestrial monitoring stations. All the radiochemical and instrumental analyses were conducted in TVA's Western Area Radiological Laboratory (WARL) located in Muscle Shoals, Alabama. Alpha and beta analyses were performed on Beckman Low Beta II, low background proportional counter or a Tenelec LB-5100. Nuclear Data (ND) Model 6700 system, in conjunction with germanium detection systems, were used to analyze the samples for specific gamma-emitting radionuclides. Specific analysis for iodine-131 in charcoal filters was performed using NaI(Tl) well detector systems attached to single channel analyzers. A TVA fabricated beta-gamma coincidence counting system was utilized for the determination of iodine-131 concentrations in milk. Analysis for low-energy beta emitters such as tritium was performed using Packard Tri-Carb Model 3255 and 4000 series liquid scintillation systems.

Data were entered in computer storage for processing specific to the analysis conducted. The data obtained by germanium detectors were resolved by the appropriate analyzer software and the software program routine HYPERMET.

The detection capabilities for environmental sample analyses given as the nominal lower limits of detection (LLD) are listed in table 3. All photopeaks found in germanium spectra were identified and quantified. Many of the isotopes identified by germanium spectral analysis are naturally occurring or naturally produced radioisotopes, such as ^7Be , ^{40}K , ^{212}Bi , ^{214}Bi , ^{212}Pb , ^{214}Pb , ^{226}Ra , etc. LLDs for radionuclides identified by Ge(Li) analysis were calculated for each analysis and nominal values are listed in table 3B. In the instance where an LLD has not been established, an LLD value of zero was assumed. A notation in a table of " values <LLD" for an isotope with no established LLD does not imply a value less than 0; rather it indicates that the isotope was not identified in that specific group of samples. For each sample type, only the radionuclides for which values greater than the LLD were reported are listed in the data tables.

TVA's WARL participates in the Environmental Radioactivity Laboratory Intercomparison Studies Program conducted by EPA-Las Vegas. This program provides periodic cross-checks on samples of the type and radionuclide composition normally analyzed in an environmental radiological monitoring program. Routine sample handling and analysis procedures were employed in the evaluation of these samples. The results received during calendar year 1985 are shown in table 4. The $\pm 3\sigma$ limits based on one measurement were divided by the square root of 3 to correct for triplicate determinations.

Table 1

ENVIRONMENTAL RADIOACTIVITY SAMPLING SCHEDULE

<u>Station Location</u>	<u>Air Filter</u>	<u>Charcoal Filter</u>	<u>Rain-water</u>	<u>Heavy Particle Fallout</u>	<u>Soil</u>	<u>Vegetation</u>	<u>Milk</u>	<u>River Water</u>	<u>Well Water</u>	<u>Public Water</u>	<u>Aquatic Life and Sediment</u>	<u>Foods</u>
Muscle Shoals	W	W	M	M	A	M					M	
Lawrenceburg	W	W	M	M	A	M						
Rogersville	W	W	M	M	A	M						
Athens	W	W	M	M	A	M						
Decatur	W	W	M	M	A	M					M	
Courtland	W	W	M	M	A	M						
Site 1 (N)	W	W	M	M	A	M						
Site 2 (NNE)	W	W	M	M	A	M						
Site 3 (ENE)	W	W	M	M	A	M						
Site 4 (NNW)	W	W	M	M	A	M						
Site 5 (WSW)	W	W	M	M	A	M						
Farm B						M	W					
Farm Bn*						M	W					
Farm P**						M	W					
Farm L						M	W		M			
Farm E						M						
Farm W						M						
Control Farms						M	W					A
Onsite Well									M			
Wheeler Dam										M		
Elk River								M				
Tennessee River								M			S	
Champion Paper Co.										M		
Various Local Farms												A

W - Weekly M - Monthly (every 4 weeks) Q - Quarterly S - Semiannually A - Annually

* Sampling commenced November 1985

**Discontinued operation October 1985

Table 2

Atmospheric and Terrestrial Monitoring Station Locations
Browns Ferry Nuclear Plant

<u>Sample Station</u>	<u>Approximate Distance and Direction from Plant</u>		
LM-1 BF, North	1.0 Mile	(1.6 kilometers)	N
LM-2 BF, North-Northeast	0.9 Mile	(1.4 kilometers)	NNE
LM-3 BF, East-Northeast	1.0 Mile	(1.4 kilometers)	ENE
LM-4 BF, North-Northwest	1.7 Miles	(2.7 kilometers)	NNW
LM-5 BF, West-Southwest	2.5 Miles	(4.0 kilometers)	WSW
PM-1 BF, Rogersville, AL	13.8 Miles	(22.2 kilometers)	NW
PM-2 BF, Athens, AL	10.9 Miles	(17.5 kilometers)	NE
PM-3 BF, Decatur (Trinity), AL	8.2 Miles	(13.2 kilometers)	SSE
PM-4 BF, Couriland, AL	10.5 Miles	(16.9 kilometers)	WSW
RM-1 BF, Muscle Shoals, AL (Control)	32.0 Miles	(51.5 kilometers)	W
RM-2 BF, Lawrenceburg, TN (Control)	40.5 Miles	(65.2 kilometers)	NNW
Farm Bn*	4.75 Miles	(7.6 kilometers)	N
Farm B	7.0 Miles	(11.3 kilometers)	NW
Farm L	5.0 Miles	(7.0 kilometers)	NE
Farm P**	8.8 Miles	(14.1 kilometers)	E
Farm E	6.1 Miles	(9.8 kilometers)	NE
Farm W	6.9 Miles	(11.0 kilometers)	NE
Farm N (Control)	27.0 Miles	(43.4 kilometers)	NW
Farm J (Control)	40.0 Miles	(64.4 kilometers)	NNW
Farm C (Control)	32.0 Miles	(51.5 kilometers)	N
Farm Ca (Control)	32.0 Miles	(51.5 kilometers)	W
Farm Cb (Control)	22.5 Miles	(36.2 kilometers)	E
Farm M (Control)	22.5 Miles	(36.2 kilometers)	ENE

* Sampling commenced November 1985

**Discontinued operations October 1985

Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSISA. Specific AnalysesNOMINAL LOWER LIMIT OF DETECTION (LLD)*

	<u>Air Particulates pCi/m³</u>	<u>Charcoal pCi/m³</u>	<u>Fallout mCi/Km²</u>	<u>Water pCi/l</u>	<u>Vegetation and Grain pCi/g, Dry</u>	<u>Soil and Sediment pCi/g, Dry</u>	<u>Fish, Clam Flesh, Plankton, pCi/g, Dry</u>	<u>Clam Shells pCi/g, Dry</u>	<u>Foods, Meat, Poultry, pCi/Kgm, Wet</u>	<u>Milk pCi/l</u>
Gross α	0.005			2	0.05	0.35	0.1	0.7		
Gross β	0.01		0.05	2	0.20	0.70	0.1	0.7	25	
H-3				330						0.5
I-131		0.01								
Sr-89	0.005			10	0.25	1.5	0.5	5.0	40	10
Sr-90	0.001			2	0.05	0.15	0.1	1.0	8	2

* All LLD values for isotopic separations are calculated by the method developed by Pasternack and Harley as described in HASL-300. Factors such as sample size, decay time, chemical yield, and counting efficiency may vary for a given sample; these variations may change the LLD value for the given sample. The assumption is made that all samples are analyzed within one week of the collection date. Conversion factors: 1 pCi = 3.7×10^{-2} Bq; 1 mCi = 3.7×10^7 Bq.

Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSISB. Gamma AnalysesNOMINAL LOWER LIMIT OF DETECTION (LLD)

	<u>Air particulates pCi/m³ Ge(Li)*</u>	<u>Water and milk pCi/l Ge(Li)</u>	<u>Vegetation and grain pCi/g, dry Ge(Li)</u>	<u>Soil and sediment pCi/g, dry Ge(Li)</u>	<u>Fish pCi/g, dry Ge(Li)</u>	<u>Clam flesh and plankton pCi/g, dry Ge(Li)</u>	<u>Clam shells pCi/g, dry Ge(Li)</u>	<u>Foods, (tomatoes 'potatoes, etc.) pCi/Kg, wet Ge(Li)</u>	<u>Meat and poultry pCi/Kg, wet Ge(Li)</u>
Ce-144	0.02	33	0.22	0.06	0.06	0.35	0.06	33	40
Cr-51	0.03	44	0.47	0.10	0.10	0.56	0.10	44	90
I-131	0.01	8	0.09	0.02	0.02	0.07	0.02	8	20
Ru-106	0.03	30	0.51	0.11	0.11	0.74	0.11	40	90
Cs-134	0.01	5	0.33	0.08	0.07	0.48	0.08	26	40
Cs-137	0.01	5	0.06	0.02	0.02	0.08	0.02	5	15
Zr-95	0.01	10	0.11	0.03	0.03	0.15	0.03	10	20
Nb-95	0.01	5	0.05	0.01	0.01	0.07	0.01	5	15
Co-58	0.01	5	0.05	0.01	0.01	0.07	0.01	5	15
Mn-54	0.01	5	0.05	0.01	0.01	0.08	0.01	5	15
Zn-65	0.01	9	0.11	0.02	0.02	0.17	0.02	9	20
Co-60	0.01	5	0.06	0.01	0.01	0.08	0.01	5	15
Fe-59		5			0.10				
Ba-140	0.02	25	0.34	0.07	0.07	0.30	0.07	25	50
La-140	0.01	7	0.08	0.02	0.02	0.10	0.02	7	15

* The Ge(Li) LLD values are calculated by the method developed by Pasternack and Harley as described in HASL-300. These LLD values are expected to vary depending on the activities of the components in the samples. These figures do not represent the LLD values achievable on given samples. Water is counted in either a 0.5-L or 3.5-L Marinelli beaker. Solid samples, such as soil, sediment, and clam shells, are counted in a 0.5-L Marinelli beaker as dry weight. The average dry weight is 400-500 grams. Air filters and very small volume samples are counted in petri dishes centered on the detector endcap. The counting system consists of a ND-6700 multichannel analyzer and germanium detector having an efficiency of 20 percent. The counting time is normally 4-15 hours. All spectral analyses are performed using the software program HYPERMET. The assumption is made that all samples are analyzed within one week of the collection date. Conversion factor: 1 pCi = 3.7×10^{-2} Bq.

Table 4

RESULTS OBTAINED IN INTERLABORATORY COMPARISON PROGRAM

A. Air Filter (pCi/Filter)

Date	Gross Alpha		Gross Beta		Strontium-90		Cesium-137	
	EPA value ($\pm 3\sigma$)	TVA Avg.	EPA value ($\pm 3\sigma$)	TVA Avg.	EPA value ($\pm 3\sigma$)	TVA Avg.	EPA value ($\pm 3\sigma$)	TVA Avg.
11/84	15 \pm 9	15	52 \pm 9	61	21 \pm 3	21	10 \pm 9	10
3/85	10 \pm 9	11	36 \pm 9	40	15 \pm 3	16	6 \pm 9	6
8/85	13 \pm 9	12	44 \pm 9	45	18 \pm 3	16	8 \pm 9	9

B. Tritium in Urine (pCi/l)

Date	EPA value ($\pm 3\sigma$)	TVA Avg.
4/85	3056 \pm 622	2687
7/85	2444 \pm 610	2280

C. Radiochemical Analysis of Water (pCi/l)

Date	Gross Alpha		Gross Beta		Strontium-89		Strontium-90		Tritium		Iodine-131	
	EPA value ($\pm 3\sigma$)	TVA Avg.	EPA value ($\pm 3\sigma$)	TVA Avg.	EPA value ($\pm 3\sigma$)	TVA Avg.	EPA value ($\pm 3\sigma$)	TVA Avg.	EPA value ($\pm 3\sigma$)	TVA Avg.	EPA value ($\pm 3\sigma$)	TVA Avg.
4/84 ^a					23 \pm 9	22 _b	26 \pm 3	26				
1/85	5 \pm 9	4	15 \pm 9	19	3 \pm 9	10 _b	30 \pm 3	29				
2/85									3796 \pm 634	3817		
3/85	6 \pm 9	6	15 \pm 9	17								
4/85									3559 \pm 630	3347	7.5 \pm 1.4	7.3
4/85 ^c			72 \pm 9	69	10 \pm 9	9 _d	15 \pm 3	16				
5/85	12 \pm 9	9	11 \pm 9	14	39 \pm 9	49 _d	15 \pm 3	13				
6/85									2416 \pm 608	2257		
7/85	11 \pm 9	12	8 \pm 9	11								
8/85									4480 \pm 776	4127	33 \pm 10	29
9/85	8 \pm 9	8	8 \pm 9	12	20 \pm 9	26	7 \pm 3	5				
10/85									1974 \pm 598	1880		

Table 4 (Continued)

RESULTS OBTAINED IN INTERLABORATORY COMPARISON PROGRAM (Continued)

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D. Gamma-Spectral Analysis of Water (pCi/ℓ)

Date	Chromium-51		Cobalt-60		Zinc-65		Ruthenium-106		Cesium-134		Cesium-137	
	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
4/84 ^a			30±9	30					30±9	27	26±9	27
2/85	48±9	45	20±9	20	55±5	53	25±9	40 ^b	35±9	32	25±9	25
4/85 ^c			15±9	16					15±9	15	12±9	13
6/85	44±9	40 ^b	14±9	14	47±9	48	62±9	53	35±9	34	20±9	19
10/85	21±9	40 ^b	20±9	21	19±9	20	20±9	25	20±9	18	20±9	20

E. Food (pCi/Kg, Wet Weight)

Date	Strontium-89		Strontium-90		Iodine-131		Cesium-137		Potassium-40 ^e	
	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
1/85	34±9	37	26±3	37 ^f	35±10	33	29±9	28	1362±208	1270
7/85	33±9	34	26±3	34 ^f	35±10	36	29±9	31	1514±132	1567

F. Milk (pCi/ℓ)

Date	Strontium-89		Strontium-90		Iodine-131		Cesium-137		Potassium-40 ^g	
	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
3/85					9±1.6	11 ^h				
6/85	11±9	13	11±3	11	11±10	11	11±9	12	1525±132	1680 ⁱ

a. Laboratory performance evaluation study. Results received from EPA in April 1985.

b. Below LLD.

c. Laboratory performance evaluation study.

d. The analysis was reviewed. Cause for high results could not be identified.

e. Values reported as mg K/kg.

f. Possible error due to nonhomogeneity of sample. EPA used dog food containing bone meal in the preparation of the food cross-check.

g. Values reported as mg K/ℓ.

h. Results were investigated. No source of error was determined.

i. High bias on result due to broadening of the peak used for identifying K-40. The low abundance and low counting efficiency for the 1460 Kev line inflated the small positive bias caused by temperature variations.

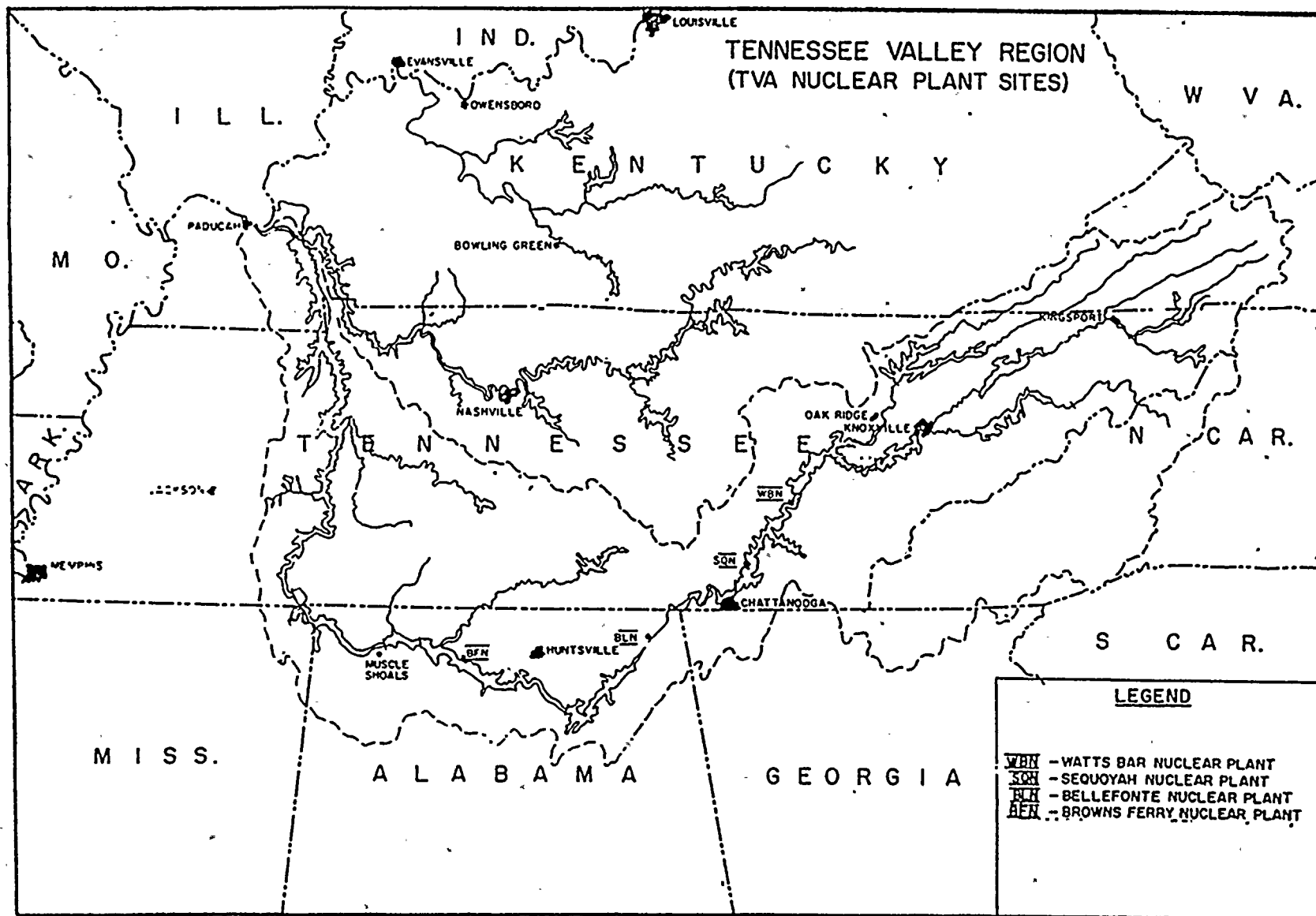


Figure 1



Atmospheric Monitoring

The atmospheric monitoring network is divided into three groups. Four local air monitors are located on or adjacent to the plant site in the general areas of greatest wind frequency. One additional station is located at the point of maximum predicted off-site concentration of radionuclides based on preoperational meteorological data (see figures 3 and 4). Four perimeter air monitors are located in communities out to about 13 miles from the plant, and two remote air monitors are located at distances out to 45 miles. These monitoring stations are shown in figure 2. The remote monitors are used as control or baseline stations. At each local monitor, air is continuously pulled through a Hollingsworth and Voss LB5211 glass fiber particulate filter at a flow rate of about 3 ft³/min. At perimeter and remote monitors the system has been modified so that air is continuously pulled through a 1-7/8 diameter glass fiber particulate filter at a flow rate of about 2 ft³/min. In series with, but downstream of, the particulate filter is a charcoal filter used to collect iodine. Each monitor has a collection tray and storage container to obtain rainwater on a continuous basis and a horizontal platform that is covered with gummed acetate to catch and hold heavy particle fallout. Thermoluminescent dosimeters are used to record gamma radiation levels at each remote and perimeter station.

Each of the local air monitors is fitted with a GM tube that continuously scans the particulate filter. The disintegration rate of the atmospheric radioactivity is continuously recorded at each station and radiotelemetered into the plant.

Air Filters

Air filters are collected weekly and analyzed for gross beta activity. Adequate time is allowed for decay of radon daughters between collection and analysis of samples. This time is typically three days. The samples are composited monthly for analysis of specific gamma-emitting radionuclides and quarterly for ⁸⁹Sr and ⁹⁰Sr analysis. The results are combined for each station to obtain an annual average. These data are presented in table 6. During this reporting period, two samples were not obtained because of equipment malfunction, two samples were damaged beyond use, one sample was destroyed during analysis, and one sample was lost during sample change.

The annual averages of the gross beta activity in the air particulate filters at the indicator stations (local and perimeter monitors) and at the control stations (remote monitors) for the years 1968-1985 are presented in figure 5. Increased levels due to fallout from atmospheric nuclear weapons testing are evident, especially in 1969, 1970, 1971, 1977, 1978, and 1981. These patterns are consistent with data from monitoring programs conducted by TVA at nonoperating nuclear power plant construction sites. Table 5 presents the maximum permissible concentrations (MPC) specified in 10 CFR 20 for nonoccupational exposure.

Rainwater

Rainwater is collected monthly and a 3.5-liter sample analyzed for specific gamma-emitting radioisotopes and tritium. The results are shown in table 7. During this reporting period, four samples were not available due to insufficient rainfall and three samples were not collected due to human error.

Fallout

The gummed acetate that is used to collect heavy particle fallout is changed monthly. The samples are ashed and counted for gross beta activity. The results are given in table 8.

Charcoal Filters

Charcoal filters are collected and analyzed for radioiodine. The filter is counted in a single channel analyzer system. The results are shown in table 9. During this reporting period, five samples were not taken because of equipment malfunction or filter damage and one sample was destroyed during analysis.

Table 5

MAXIMUM PERMISSIBLE CONCENTRATIONS
FOR NONOCCUPATIONAL EXPOSURE

	MPC	
	<u>In Water</u> pCi/l*	<u>In Air</u> pCi/m ³ *
Alpha	30	
Nonvolatile beta	3,000	100
Tritium	3,000,000	200,000
¹³⁷ Cs	20,000	500
^{103,106} Ru	10,000	200
¹⁴⁴ Ce	10,000	200
⁹⁵ Zr- ⁹⁵ Nb	60,000	1,000
¹⁴⁰ Ba- ¹⁴⁰ La	20,000	1,000
¹³¹ I	300	100
⁶⁵ Zn	100,000	2,000
⁵⁴ Mn	100,000	1,000
⁶⁰ Co	30,000	300
⁸⁹ Sr	3,000	300
⁹⁰ Sr	300	30
⁵¹ Cr	2,000,000	80,000
¹³⁴ Cs	9,000	400
⁵⁸ Co	90,000	2,000

*1 pCi = 3.7×10^{-2} Bq.

TABLE 6
 RADIOACTIVITY IN AIR FILTER
 PCI/M(3) - 0.037 BQ/M(3)

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-2522260226
 LOCATION OF FACILITY LIMESTONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS	LOCATION WITH HIGHEST ANNUAL MEAN	CONTROL LOCATIONS	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE	NAME DISTANCE AND DIRECTION RANGE	MEAN (F) RANGE	
	SEE NOTE 1	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	
ROSS ALPHA 52	5.00E-03				
ROSS BETA 566	1.00E-02	1.94E-02(449/ 462)	DECATUR, AL 8.2 MILES SSE	2.13E-02(50/ 52)	6.73E-03(1/ 52) 6.73E-03 - 6.73E-03 2.09E-02(103/ 104)
AMMA (GELI) 143					1.10E-02 - 3.64E-02
40	NOT ESTAB	1.51E-02(43/ 117)	LM1 BF NORTHWEST 1.0 MILE N	2.42E-02(7/ 13)	8.12E-03(11/ 26)
SI-214	2.00E-02	4.40E-03 - 3.53E-02		9.90E-03 - 3.26E-02	1.70E-03 - 1.43E-02
		2.42E-02(2/ 117)	LM3 BF NORTHEAST 1.0 MILE ENE	2.68E-02(1/ 13)	26 VALUES <LLD
		2.16E-02 - 2.68E-02		2.68E-02 - 2.68E-02	
SI-212	NOT ESTAB	1.47E-02(1/ 117)	LM3 BF NORTHEAST 1.0 MILE ENE	1.47E-02(1/ 13)	26 VALUES <LLD
		1.47E-02 - 1.47E-02		1.47E-02 - 1.47E-02	
8B-214	2.00E-02	2.72E-02(2/ 117)	LM3 BF NORTHEAST 1.0 MILE ENE	3.08E-02(1/ 13)	26 VALUES <LLD
		2.36E-02 - 3.08E-02		3.08E-02 - 3.08E-02	
8B-212	NOT ESTAB	3.16E-04(19/ 117)	LM3 BF NORTHEAST 1.0 MILE ENE	5.00E-04(1/ 13)	3.00E-04(3/ 26)
		1.00E-04 - 1.00E-03		5.00E-04 - 5.00E-04	2.00E-04 - 5.00E-04
3E-7	5.00E-02	8.59E-02(94/ 117)	DECATUR, AL 8.2 MILES SSE	1.02E-01(11/ 13)	1.01E-01(22/ 26)
		5.60E-02 - 1.65E-01		5.76E-02 - 1.34E-01	6.31E-02 - 1.43E-01
TL-203	NOT ESTAB	1.80E-04(5/ 117)	ROGERSVILLE, AL 13.8 MILES NW	2.00E-04(1/ 13)	4.00E-04(2/ 26)
		1.00E-04 - 2.00E-04		2.00E-04 - 2.00E-04	1.00E-04 - 7.00E-04
AC-228	NOT ESTAB	2.72E-03(12/ 117)	ATHENS, AL 10.9 MILES NE	5.00E-03(1/ 13)	9.50E-04(2/ 26)
		7.00E-04 - 7.50E-03		5.00E-03 - 5.00E-03	9.00E-04 - 1.00E-03
R 89	5.00E-03	36 VALUES <LLD			8 VALUES <LLD
	44	ANALYSIS PERFORMED			
R 90	1.00E-03	36 VALUES <LLD			8 VALUES <LLD
	44	ANALYSIS PERFORMED			

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.
 NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 7

RADIOACTIVITY IN RAINWATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY BROWNS EBBY----- DOCKET NO. 50-2522260226-----
 LOCATION OF FACILITY LIMESTONE----- ALABAMA----- REPORTING PERIOD 1985-----

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			NAME	RANGE		

GAMMA (GELI)						
136	SEE NOTE 1	SEE NOTE 2	SEE NOTE 2		SEE NOTE 2	
K-40	NOT ESTAB	20.64(16/ 112) 4.02 - 65.94	ATHENS, AL 10.9 MILES NE	35.62(2/ 12) 5.30 - 65.94	2.18(2/ 24) 0.69 - 3.67	
SI-214	NOT ESTAB	5.92(59/ 112) 0.36 - 29.38	LM5 BF DAVIS F 2.5 MILES WSW	9.13(6/ 13) 0.95 - 29.38	6.60(12/ 24) 0.04 - 20.32	
PB-214	NOT ESTAB	5.24(35/ 112) 0.33 - 21.05	LM5 BF DAVIS F 2.5 MILES WSW	9.10(3/ 13) 1.68 - 21.05	5.58(4/ 24) 0.61 - 7.94	
PB-212	NOT ESTAB	1.70(29/ 112) 0.01 - 6.05	LM5 BF DAVIS F 2.5 MILES WSW	2.83(4/ 13) 0.43 - 6.05	2.39(7/ 24) 0.05 - 5.97	
BE-7	NOT ESTAB	58.12(24/ 112) 24.09 - 197.76	LM1 BF NORTHWEST 1.0 MILE N	78.56(6/ 13) 37.82 - 197.76	54.56(8/ 24) 31.22 - 106.66	
TRITIUM	530.00	112 VALUES <LLD ANALYSIS PERFORMED			24 VALUES <LLD	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 8

RADIOACTIVITY IN HEAVY PARTICLE FALLOUT

MCI/KM(2) - 37000000.00 BQ/KM(2)

16

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252,260,226
 LOCATION OF FACILITY LIMESTONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE	DISTANCE AND DIRECTION	NAME RANGE	MEAN (F) RANGE		
ROSS BETA 143	SEE NOTE 1 0.05	SEE NOTE 2 0.16 (108/ 117) 0.06 - 0.88	LM4 BF TRAILER P 1.7 MILES NNW	SEE NOTE 2 0.31 (13/ 13) 0.06 - 0.88	SEE NOTE 2	SEE NOTE 2 0.11 (25/ 26) 0.05 - 0.20	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 9

RADIOACTIVITY IN CHARCOAL FILTERS

PCI/M(3) - 0.037 BQ/M(3)

NAME OF FACILITY <u>BROWNS FERRY</u>		DOCKET NO. <u>50-259,260,226</u>			
LOCATION OF FACILITY <u>LIMESTONE</u>		REPORTING PERIOD <u>1985</u>			
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL	LOCATION WITH HIGHEST ANNUAL MEAN	CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		INDICATOR LOCATIONS MEAN (F) RANGE	NAME MEAN (F) RANGE DISTANCE AND DIRECTION		
	<u>SEE NOTE 1</u>	<u>SEE NOTE 2</u>	<u>SEE NOTE 2</u>	<u>SEE NOTE 2</u>	
IODINE-131 566	0.01	0.02 (63/ 462) 0.01 - 0.13*	LN1 BF NORTHWEST 0.02 (12/ 52) 0.01 - 0.13*	0.01 (15/ 104) 0.01 - 0.02	

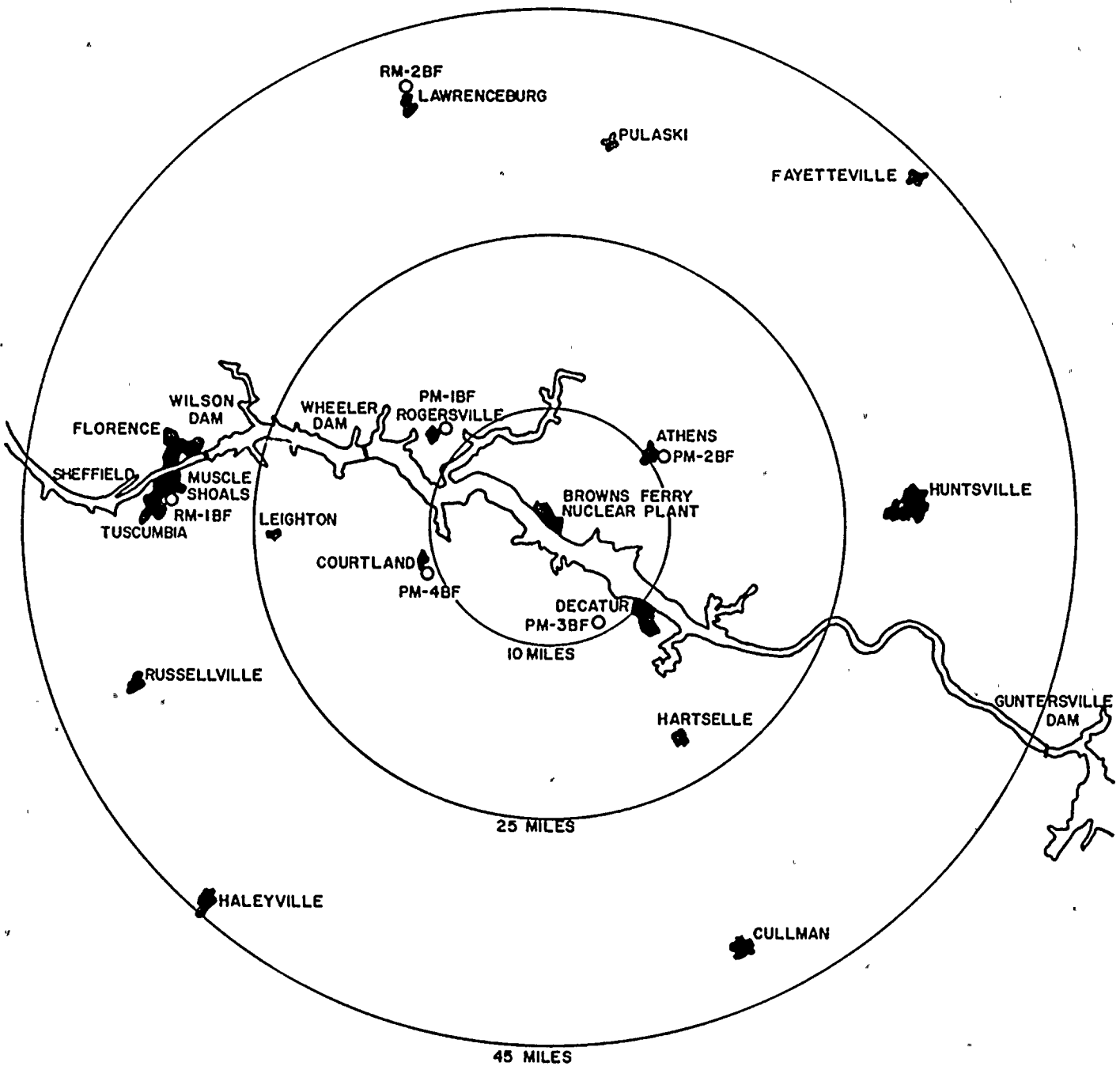
NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

* This value is inflated because of radon interference.

Figure 2

ATMOSPHERIC AND TERRESTRIAL MONITORING NETWORK



○—ENVIRONMENTAL MONITORING STATION

NOTE: THE FOLLOWING SAMPLES ARE COLLECTED FROM EACH STATION:

AIR PARTICULATES

RADIOIODINE

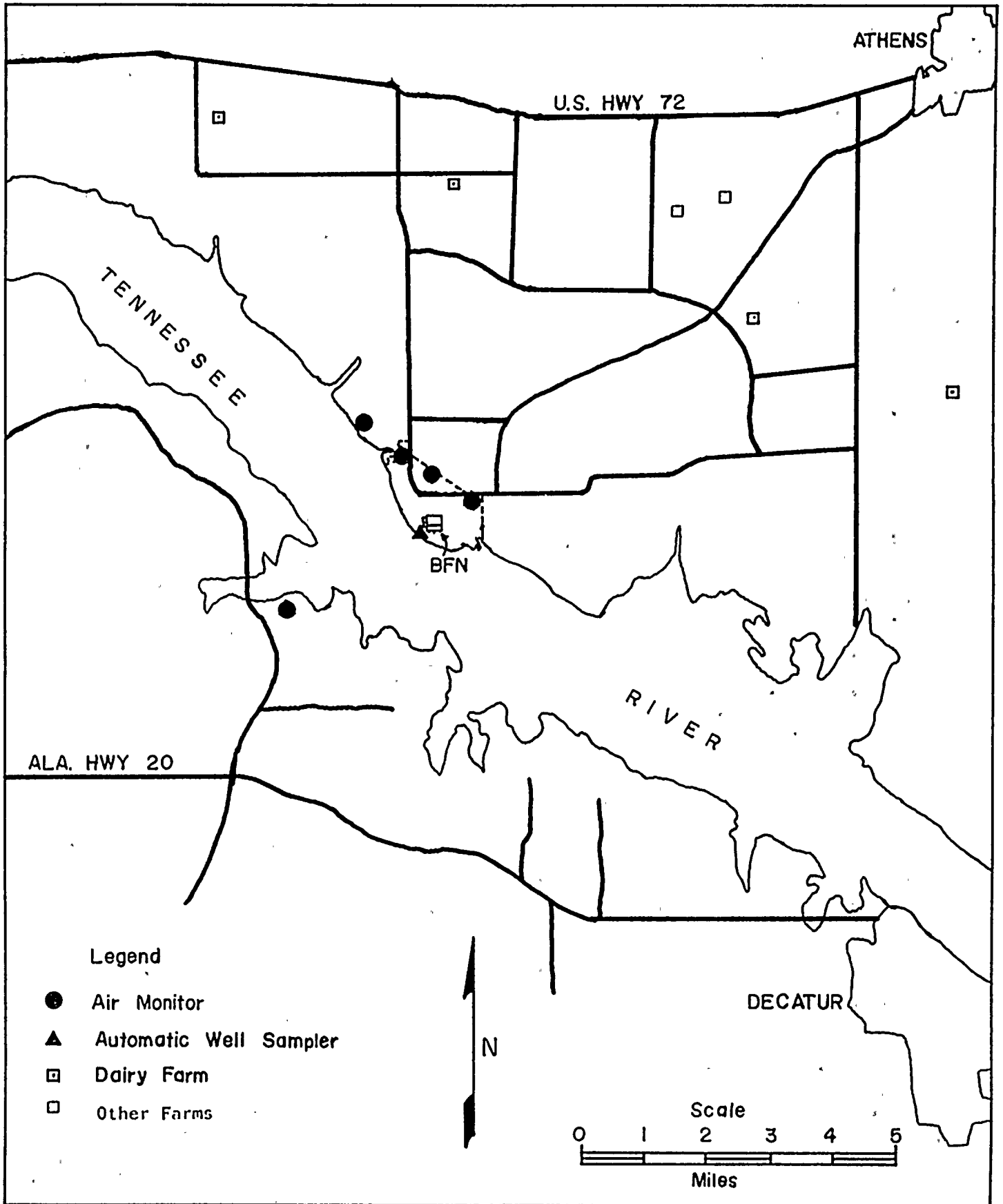
HEAVY PARTICLE FALLOUT

RAINWATER

SOIL

LOCAL MONITORING STATIONS

BROWNS FERRY NUCLEAR PLANT



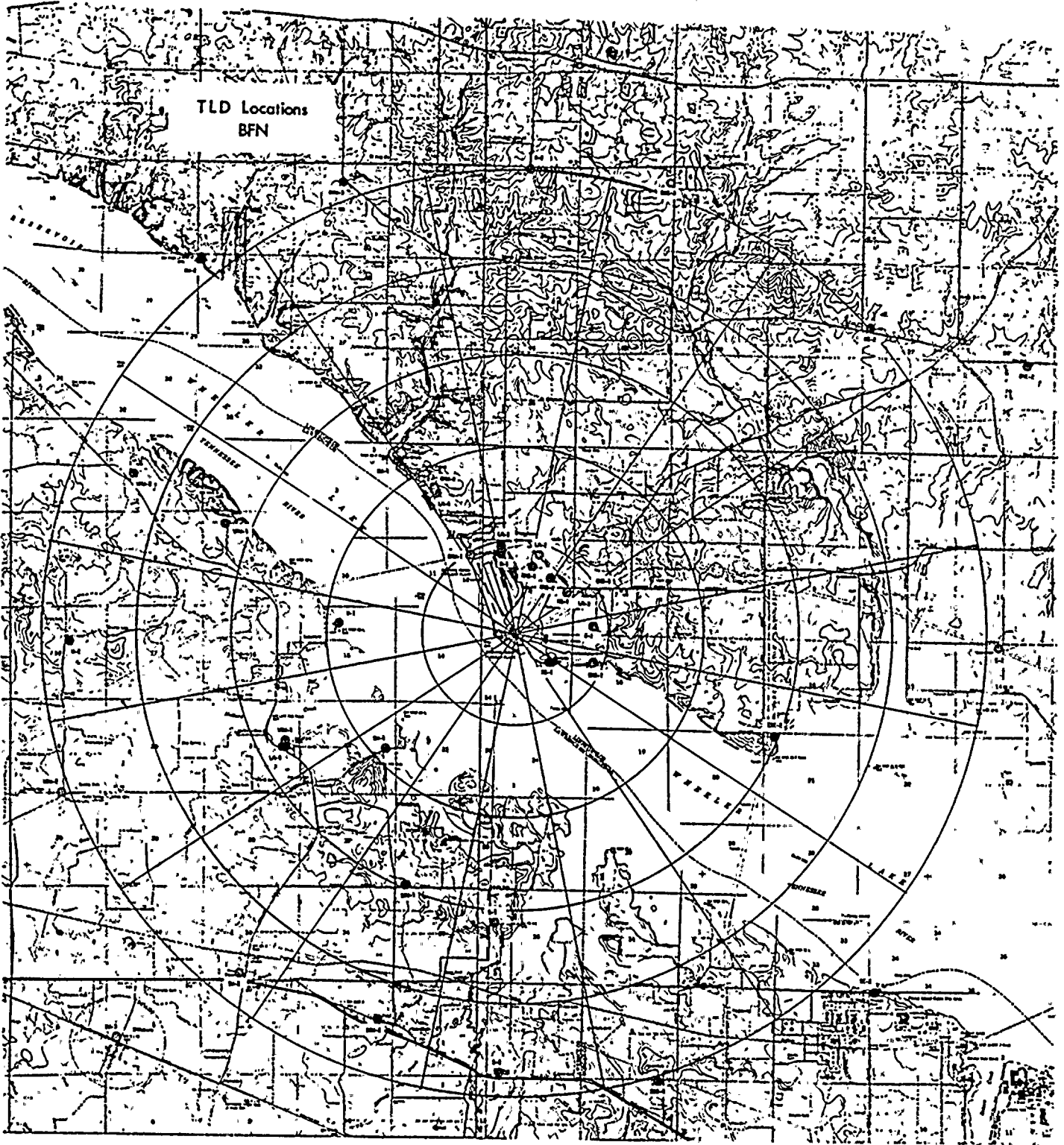
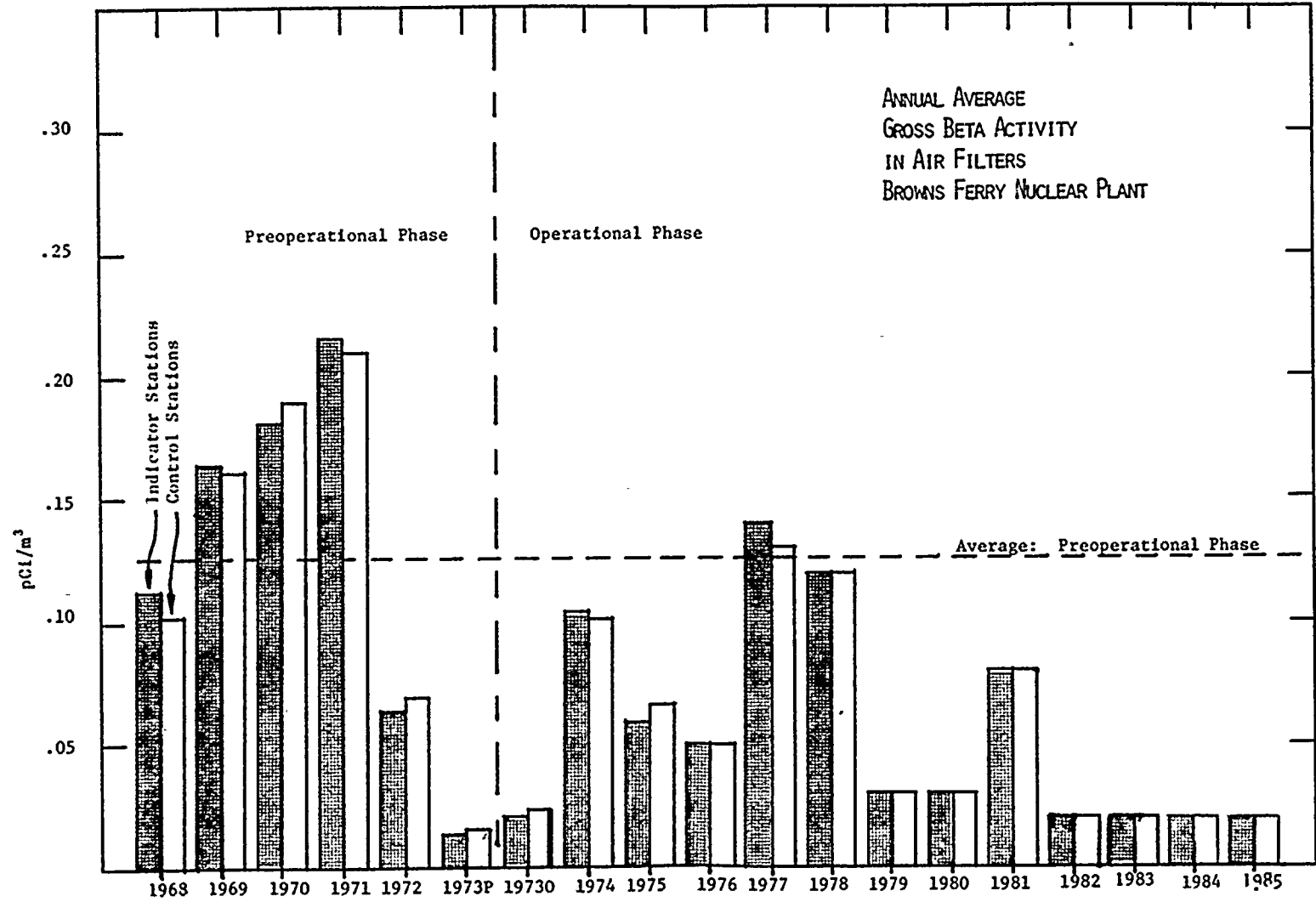


Figure 5





Terrestrial Monitoring

Terrestrial monitoring is accomplished by collecting environmental media within the general area of the plant for indicator locations, and at remote locations for controls. These media sampled include milk, vegetation, soil, ground water, drinking water, and food crops. In addition, environmental gamma radiation levels are determined by strategic placement of thermoluminescent dosimeters. Twice each year a land use survey is conducted to determine milk producing animal census and location.

Land Use Survey

The land use surveys were conducted in June and September of 1985. The fall survey revealed that a dairy operation had resumed at a location previously used as a milk sampling point. This location was added to the environmental sampling program.

After the land use survey was completed and during routine sample collection run, a dairy operation from which samples had routinely been collected ceased operation. This location was removed from the sampling schedule. In compliance with plant technical specifications, a Special Report was submitted to the Nuclear Regulatory Commission on November 26, 1985.

Milk

Milk was collected from three farms within a 10-mile radius of the plant (see figure 3), and from at least one of six control farms. During this report period, one indicator dairy farm ceased operation with the last sample being collected October 28, 1985. At about the same time, operations were resumed at a dairy formerly used as an indicator location. This location was added to the milk sampling program with the first sample collected on November 4, 1985.

Raw milk samples are collected from indicator and control farms, and are analyzed weekly for iodine-131 and monthly for gamma-emitting isotopes and radiostrontium. Analytical results are summarized in table 10. During the 1985 reporting period, 7 samples were not available for collection, and one sample was inadvertently destroyed prior to analysis for radiostrontium.

Vegetation

Vegetation is sampled monthly at five indicator farms (three dairies and two farms with one milk-producing animal), and at each air monitoring station. Quarterly vegetation samples are collected at four control farms (one control farm ceased operation in August). The monthly samples are analyzed for iodine-131 and gamma-emitting isotopes with analysis for radiostrontium performed on the last monthly sample of each quarter. Samples collected quarterly are analyzed for gamma-emitting isotopes. Table 11 summarizes analytical results. During this reporting period, three samples were inadvertently destroyed before iodine analysis was done.

Soil

Soil samples are collected annually near each monitoring station to provide an indication of long-term buildup of radioactivity in the environment. An auger or a "cookie cutter" type sampler is used to obtain samples of the top two inches (5 cm) of soil. These samples are analyzed for gamma-emitting radionuclides, strontium-89, and strontium-90. The results are given in table 12.

Ground Water

An automatic sequential-type sampling device collects groundwater from a well downgradient from BFN. A composite sample from this well is analyzed for gamma-emitting radionuclides monthly and composited quarterly for determination of tritium. A grab sample is also taken monthly from a control well upgradient from the plant. The results of the analysis of well water are shown in table 13. During this report period one sample was not available for gamma analysis.

Drinking Water

Potable water supplies taken from the Tennessee River in the vicinity of BFN are sampled and analyzed for gross beta and gamma-emitting radionuclides, and composited quarterly for tritium, ^{89}Sr , and ^{90}Sr analyses. The first potable water supply downstream from the plant is equipped with an automatic sampler with samples collected and analyzed weekly. The sampler is located on the water intake structure and takes the sample from the river as the raw water is drawn into the water treatment facility. Two additional supplies downstream and one public water supply upstream are sampled by taking monthly grab samples of treated water at user points. In addition, the surface water sample collected by an automatic water sampler upstream from the plant is included as a control for drinking water. Table 14 indicates the results from the analysis of drinking water samples. During this reporting period, two weekly samples were not collected because of automatic sampling equipment malfunction.

Figure 6 shows the trends in gross beta activity in drinking water from 1968 through 1985. The annual average level from the raw water samples tends to run slightly higher than the average for treated water samples; however, the levels are consistent with the activities reported in surface water samples taken upstream from BFN (figure 12) and in samples taken from the Tennessee River in preoperational monitoring programs conducted by TVA at other sites.

Environmental Gamma Radiation Levels

Bulb-type Victoreen manganese-activated calcium fluoride ($\text{Ca}_2\text{F:Mn}$) thermoluminescent dosimeters (TLDs) are placed at sixteen stations around the plant near the site boundary, at the perimeter and remote air monitors, and at nineteen additional stations out to approximately five miles from the site to determine the gamma exposure rates at these locations. The dosimeters, located inside energy compensating shields to correct for energy dependence, are placed at approximately one meter above the ground, with three TLDs at each station. They are

annealed and read with a Victoreen model 2810 TLD reader. The values are corrected for gamma response, self-irradiation, and fading, with individual gamma response calibrations and self-irradiation factors determined for each TLD. The TLDs are exchanged every three months. The quarterly gamma radiation levels determined from these TLDs are given in table 15, which indicates that average levels at onsite stations are approximately 2-5 mR/quarter higher than levels at offsite stations. This is consistent with levels reported at TVA's nonoperating nuclear power plant construction sites where the average radiation levels onsite are generally 2-6 mR/quarter higher than levels offsite. The causes of these differences have not been completely isolated; however, it is postulated that the differences are probably attributable to combinations of influences, such as natural variations in environmental radiation levels, earth moving activities onsite, the mass of concrete employed in the construction of the plant, and other undetermined influences.

Figure 7 compares plots of the data from the onsite or site boundary stations with those from the offsite stations over the period from 1976 through 1985. To reduce the variations present in the data sets, a four-quarter moving average was constructed for each set. Figure 8 presents a trend plot of the direct radiation levels as defined by the moving averages. The data follow the same general trend as the raw data, but the curves are smoothed considerably.

Prior to 1976 measurements were made with less sensitive dosimeters, and consequently the levels reported in the preoperational phase of the monitoring program are up to 2 times the levels reported herein. Those data are not included in this report. Therefore, for comparison purposes, figures 9 and 10 depict the environmental gamma radiation levels measured during the construction of TVA's Watts Bar Nuclear Plant to the present. Note that the data follow a similar pattern to the BFN data and that, as discussed above, the levels reported at onsite stations are similarly higher than the levels at offsite stations.

Food Products

Food products raised in the vicinity of BFN and at control locations are sampled as they become available during the growing season, and analyzed for gross beta activity and for gamma-emitting radionuclides. During this sampling period, samples of apples, cabbage, corn, green beans, potatoes, beef, and tomatoes were collected and analyzed for specific gamma-emitting radionuclides. The results are given in tables 16 through 22.

TABLE 10
RADIOACTIVITY IN MILK

PCI/L - 0.037 BQ/L

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252,260,226
LOCATION OF FACILITY LINESBORO ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE		LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE	MEAN (F) RANGE	NAME DISTANCE AND DIRECTION	MEAN (F) RANGE		
ODINE-131 434 AHMA (GELI) 108	SEE NOTE 1 0.50	SEE NOTE 2 156 VALUES <LLD ANALYSIS PERFORMED		SEE NOTE 2		SEE NOTE 2 278 VALUES <LLD	
CS-137	5.00	8.41(6/ 39) 6.29 - 9.98	8.41(6/ 11) 6.29 - 9.98	PAGE FARM 8.75 MILES E	8.41(6/ 11) 6.29 - 9.98	8.59(2/ 69) 5.84 - 11.34	
K-40	NOT ESTAB	1193.09(39/ 39) 768.95 - 1686.67	1264.53(13/ 13) 1058.34 - 1435.68	LOONEY FARM 5.75 MILES ENE	1264.53(13/ 13) 1058.34 - 1435.68	1297.44(69/ 69) 781.33 - 1925.94	
BI-214	NOT ESTAB	7.41(31/ 39) 0.59 - 35.98	9.98(2/ 2) 8.41 - 11.55	SMITH/BENNETT FA 4.75 MILES N	9.98(2/ 2) 8.41 - 11.55	6.93(38/ 69) 0.22 - 21.87	
PB-214	NOT ESTAB	7.85(13/ 39) 1.36 - 26.95	10.02(4/ 13) 1.36 - 26.95	LOONEY FARM 5.75 MILES ENE	10.02(4/ 13) 1.36 - 26.95	7.38(27/ 69) 0.04 - 29.05	
PB-212	NOT ESTAB	2.00(8/ 39) 0.39 - 3.30	3.00(1/ 13) 3.00 - 3.00	LOONEY FARM 5.75 MILES ENE	3.00(1/ 13) 3.00 - 3.00	1.98(12/ 69) 0.56 - 6.27	
TL-208	NOT ESTAB	1.35(6/ 39) 0.12 - 3.63	2.25(2/ 11) 0.87 - 3.63	PAGE FARM 8.75 MILES E	2.25(2/ 11) 0.87 - 3.63	0.97(13/ 69) 0.01 - 2.78	
AC-228	NOT ESTAB	8.52(3/ 39) 5.08 - 13.26	10.23(2/ 11) 7.21 - 13.26	PAGE FARM 8.75 MILES E	10.23(2/ 11) 7.21 - 13.26	5.20(9/ 69) 0.72 - 11.66	
R 89 107	10.00	39 VALUES <LLD ANALYSIS PERFORMED				68 VALUES <LLD	
R 90 107	2.00	3.40(38/ 39) 2.05 - 5.44	4.12(2/ 2) 3.77 - 4.48	SMITH/BENNETT FA 4.75 MILES N	4.12(2/ 2) 3.77 - 4.48	3.70(56/ 68) 2.00 - 6.51	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 11

RADIOACTIVITY IN VEGETATION
PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252,260,226
LOCATION OF FACILITY LINESIONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE		LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION		CONTROL LOCATIONS MEAN (F) RANGE		NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
		SEE NOTE 1	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2			
IODINE-131 208 GAMMA (GELI) 226	NOT ESTAB	0.00(85/ 183)	0.00 - 0.02	DECATUR, AL 8.2 MILES SSE	0.01(6/ 12)	0.00 - 0.02	0.00(10/ 25)	0.00 - 0.01	
CO-60	0.06	0.49(1/ 185)	0.49 - 0.49	LM1 BF NORTHWEST 1.0 MILE N	0.49(1/ 13)	0.49 - 0.49	41 VALUES <LLD	1 (Note 3)	
CS-137	0.96	0.13(14/ 185)	0.07 - 0.27	PAGE FARM 8.75 MILES E	0.27(1/ 11)	0.27 - 0.27	0.12(3/ 41)	0.06 - 0.15	
K-40	NOT ESTAB	15.56(182/ 185)	1.04 - 43.21	PAGE FARM 8.75 MILES E	25.86(11/ 11)	5.66 - 43.21	15.87(40/ 41)	1.43 - 40.34	
BI-214	0.10	0.22(93/ 185)	0.10 - 0.60	PAGE FARM 8.75 MILES E	0.39(4/ 11)	0.13 - 0.60	0.20(14/ 41)	0.11 - 0.46	
BI-212	NOT ESTAB	0.38(2/ 185)	0.27 - 0.50	PAGE FARM 8.75 MILES E	0.50(1/ 11)	0.50 - 0.50	41 VALUES <LLD		
PB-214	NOT ESTAB	0.16(167/ 185)	0.00 - 0.66	EVANS FARM 6.1 MILES NE	0.21(12/ 13)	0.06 - 0.42	0.12(33/ 41)	0.01 - 0.40	
PB-212	NOT ESTAB	0.07(126/ 185)	0.00 - 0.43	EVANS FARM 6.1 MILES NE	0.13(9/ 13)	0.01 - 0.30	0.04(18/ 41)	0.01 - 0.11	
BE-7	NOT ESTAB	7.13(184/ 185)	0.61 - 25.22	SMITH/BENNETT FA 4.75 MILES N	10.28(5/ 5)	6.47 - 15.56	7.44(41/ 41)	0.97 - 18.75	
TL-208	NOT ESTAB	0.04(78/ 185)	0.00 - 0.14	EVANS FARM 6.1 MILES NE	0.07(6/ 13)	0.01 - 0.11	0.02(11/ 41)	0.00 - 0.05	
AC-228	NOT ESTAB	0.20(73/ 185)	0.02 - 0.79	PAGE FARM 8.75 MILES E	0.29(2/ 11)	0.13 - 0.45	0.16(12/ 41)	0.05 - 0.30	
SR 89	0.25	57 VALUES <LLD ANALYSIS PERFORMED					8 VALUES <LLD		
SR 90	0.05	0.20(53/ 57)	0.06 - 0.56	ROGERSVILLE, AL 13.8 MILES NW	0.35(4/ 4)	0.16 - 0.56	0.21(8/ 8)	0.09 - 0.41	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

Note: 3. A report was submitted to the Nuclear Regulatory Commission on June 14, 1985, outlining the high value. The single, isolated occurrence of cobalt-60 in vegetation, the absence of other fission and activation products in the sample, and the lack of an increase in cobalt-60 releases from the plant prevented an identification of the causes for the presence of the isotope in the sample. Subsequent samples showed no indication of the presence of cobalt-60.

TABLE 12

RADIOACTIVITY IN SOIL

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252,260,226
 LOCATION OF FACILITY LIMESTONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD) SEE NOTE 1	ALL INDICATOR LOCATIONS MEAN (F) RANGE SEE NOTE 2		LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION RANGE SEE NOTE 2		CONTROL LOCATIONS MEAN (F) RANGE SEE NOTE 2		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AMMA (GELI)								
11								
CS-137	0.02	0.46(9/ 9)		LMS BF DAVIS F	1.43(1/ 1)	0.38(2/ 2)		
		0.02 - 1.43		2.5 MILES WSW	1.43 - 1.43	0.20 - 0.57		
K-40	0.25	5.28(9/ 9)		LM1 BF NORTHWEST	7.24(1/ 1)	4.03(2/ 2)		
		2.89 - 7.24		1.0 MILE N	7.24 - 7.24	3.17 - 4.89		
BI-214	0.05	1.08(9/ 9)		LM2 BF NORTH	1.43(1/ 1)	0.90(2/ 2)		
		0.63 - 1.43		0.9 MILE NNE	1.43 - 1.43	0.87 - 0.94		
BI-212	0.10	1.21(9/ 9)		LM2 BF NORTH	1.55(1/ 1)	0.91(2/ 2)		
		0.62 - 1.55		0.9 MILE NNE	1.55 - 1.55	0.89 - 0.94		
PB-214	0.05	1.17(9/ 9)		LM1 BF NORTHWEST	1.48(1/ 1)	0.96(2/ 2)		
		0.67 - 1.48		1.0 MILE N	1.48 - 1.48	0.88 - 1.04		
PB-212	NOT ESTAB	1.04(9/ 9)		DECATUR, AL	1.35(1/ 1)	0.85(2/ 2)		
		0.52 - 1.35		8.2 MILES SSE	1.35 - 1.35	0.83 - 0.87		
RA-226	0.05	1.08(9/ 9)		LM2 BF NORTH	1.43(1/ 1)	0.90(2/ 2)		
		0.63 - 1.43		0.9 MILE NNE	1.43 - 1.43	0.87 - 0.94		
RA-224	NOT ESTAB	1.11(7/ 9)		LM3 BF NORTHEAST	1.47(1/ 1)	0.87(2/ 2)		
		0.62 - 1.47		1.0 MILE ENE	1.47 - 1.47	0.80 - 0.93		
BE-7	0.16	0.21(2/ 9)		DECATUR, AL	0.24(1/ 1)	0.22(1/ 2)		
		0.18 - 0.24		8.2 MILES SSE	0.24 - 0.24	0.22 - 0.22		
TH-227	NOT ESTAB	9 VALUES <LLD				0.11(1/ 2)		
						0.11 - 0.11		
TL-208	0.02	0.36(9/ 9)		DECATUR, AL	0.47(1/ 1)	0.28(2/ 2)		
		0.19 - 0.47		8.2 MILES SSE	0.47 - 0.47	0.27 - 0.29		
AC-228	0.06	1.06(9/ 9)		DECATUR, AL	1.38(1/ 1)	0.85(2/ 2)		
		0.55 - 1.38		8.2 MILES SSE	1.38 - 1.38	0.83 - 0.87		
PA-234M	NOT ESTAB	2.18(4/ 9)		ROGERSVILLE, AL	2.74(1/ 1)	2.59(2/ 2)		
		1.73 - 2.74		13.8 MILES NW	2.74 - 2.74	1.44 - 3.33		
R 89	1.50	9 VALUES <LLD				2 VALUES <LLD		
		ANALYSIS PERFORMED						
R 90	0.15	0.24(4/ 9)		LMS BF DAVIS F	0.28(1/ 1)	2 VALUES <LLD		
		0.20 - 0.28		2.5 MILES WSW	0.28 - 0.28			

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 13

RADIOACTIVITY IN WELL WATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY BROWNS FERRY----- DOCKET NO. 50-252,260,226-----
 LOCATION OF FACILITY LINESBORO-----ALABAMA----- REPORTING PERIOD 1985-----

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE		NAME DISTANCE AND DIRECTION	MEAN (F) RANGE		
SEE NOTE 1		SEE NOTE 2		SEE NOTE 2		SEE NOTE 2	
GAMMA (GELI)							
	25						
K-40	NOT ESTAB	8.92(1/ 13)	BFN WELL #6	8.92(1/ 13)	4.57(2/ 12)		
		8.92 - 8.92	0.02 MILES W	8.92 - 8.92	1.06 - 8.09		
BI-214	NOT ESTAB	9.36(12/ 15)	BFN WELL #6	9.36(12/ 13)	175.22(12/ 12)		
		1.43 - 17.22	0.02 MILES W	1.43 - 17.22	40.97 - 580.25		
PB-214	NOT ESTAB	12.08(9/ 13)	BFN WELL #6	12.08(9/ 13)	177.10(12/ 12)		
		2.97 - 18.27	0.02 MILES W	2.97 - 18.27	43.74 - 682.22		
PS-212	NOT ESTAB	2.80(4/ 15)	BFN WELL #6	2.80(4/ 13)	3.77(3/ 12)		
		0.71 - 4.54	0.02 MILES W	0.71 - 4.54	1.63 - 6.16		
TL-208	NOT ESTAB	13 VALUES <LLD			0.33(2/ 12)		
					0.28 - 0.38		
AC-228	NOT ESTAB	7.09(1/ 15)	BFN WELL #6	7.09(1/ 13)	12 VALUES <LLD		
		7.09 - 7.09	0.02 MILES W	7.09 - 7.09			
TRITIUM	330.00	4 VALUES <LLD			4 VALUES <LLD		
	8	ANALYSIS PERFORMED					

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 14

RADIOACTIVITY IN PUBLIC WATER SUPPLY

PCI/L - 0.037 BQ/L

30

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252,260,226
 LOCATION OF FACILITY LINESBORO ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE		LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION		CONTROL LOCATIONS MEAN (F) RANGE		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		SEE NOTE 2		SEE NOTE 2		SEE NOTE 2		
ROSS BETA 102	2.00	3.23 (55/ 76)	2.05 - 6.58	CHAMPION PAPER TRM 282.6	3.38 (40/ 50)	2.93 (22/ 26)	2.04 - 5.62	
AMMA (GELI) 102								
K-40	NOT ESTAB	14.82 (12/ 76)		WHEELER DAM, AL TRM 274.9	23.86 (3/ 13)	0.47 (1/ 26)		
BI-214	NOT ESTAB	2.22 - 42.16		WHEELER DAM, AL TRM 274.9	11.40 - 42.16	0.47 - 0.47		
PB-214	NOT ESTAB	5.45 (39/ 76)		WHEELER DAM, AL TRM 274.9	7.39 (7/ 13)	9.22 (12/ 26)		
PB-212	NOT ESTAB	0.37 - 19.73		SHEFFIELD, AL ROB TRM 254.3	1.51 - 14.32	0.13 - 47.47		
TL-208	NOT ESTAB	4.86 (24/ 76)		WHEELER DAM, AL TRM 274.9	7.29 (3/ 13)	5.62 (7/ 26)		
AC-228	NOT ESTAB	0.38 - 17.79		CHAMPION PAPER TRM 282.6	0.56 - 17.79	0.47 - 18.90		
R 89	10.00	1.76 (15/ 76)		SHEFFIELD, AL ROB TRM 254.3	4.10 (1/ 13)	1.49 (6/ 26)		
R 90	2.00	0.01 - 8.28			4.10 - 4.10	0.29 - 2.72		
TRITIUM	330.00	1.02 (12/ 76)			1.05 (8/ 50)	26 VALUES <LLD		
		0.00 - 2.38			0.00 - 2.38	8.78 (4/ 26)		
		5.46 (9/ 76)			9.49 (1/ 13)	0.93 - 27.49		
		0.13 - 11.59			9.49 - 9.49	8 VALUES <LLD		
		12 VALUES <LLD				8 VALUES <LLD		
		ANALYSIS PERFORMED				333.48 (1/ 8)		
		12 VALUES <LLD				333.48 - 333.48		
		ANALYSIS PERFORMED						
		12 VALUES <LLD						

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

Table 15

ENVIRONMENTAL GAMMA RADIATION LEVELS

Average External Gamma Radiation Levels at Various Distances from Browns Ferry Nuclear Plant for Each Quarter - 1985
mR/Quarter^a

Distance miles	Average External Gamma Radiation Levels ^b			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
0-1	18.0 ± 2.5	19.4 ± 0.8	21.8 ± 3.7	21.0 ± 2.1
1-2	16.2 ± 2.6	17.7 ± 1.8	17.9 ± 3.8	18.1 ± 2.4
2-4	15.1 ± 1.4	15.9 ± 1.5	16.1 ± 3.0	18.2 ± 2.7
4-6	14.8 ± 1.3	16.1 ± 1.7	16.5 ± 3.2	17.6 ± 2.2
>6	14.4 ± 1.3	15.8 ± 1.5	15.2 ± 2.4	17.4 ± 1.9
Average, 0-2 miles (Onsite)	17.6 ± 2.5	18.9 ± 1.3	20.8 ± 4.0	20.3 ± 2.4
Average, >2 miles (Offsite)	14.8 ± 1.3	15.9 ± 1.5	16.0 ± 2.9	17.6 ± 2.2

a. Data normalized to one quarter (2190 hours).

b. All averages reported $\pm 1\sigma$ (68 percent confidence level).

TABLE 16

RADIOACTIVITY IN CABBAGE

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY BROWNS EBERRY DOCKET NO. 50-252,260,226
 LOCATION OF FACILITY LIMESTONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE		NAME	MEAN (F) RANGE		
ROSS BETA	25.00	3764.15 (1/ 1)		PAGE FARM	3764.15 (1/ 1)	3440.65 (1/ 1)	
		3764.15 - 3764.15		8.75 MILES E	3764.15 - 3764.15	3440.65 - 3440.65	
AMMA (GELI)							
1-40	NOT ESTAB	1652.64 (1/ 1)		PAGE FARM	1652.64 (1/ 1)	1569.45 (1/ 1)	
		1652.64 - 1652.64		8.75 MILES E	1652.64 - 1652.64	1569.45 - 1569.45	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 17

RADIOACTIVITY IN CORN

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252260-226
 LOCATION OF FACILITY LIMESIONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE		NAME DISTANCE AND DIRECTION	MEAN (F) RANGE		
	<u>SEE NOTE 1</u>	<u>SEE NOTE 2</u>			<u>SEE NOTE 2</u>	<u>SEE NOTE 2</u>	
GROSS BETA 2	25.00	4152.67 (1/ 1) 4152.67 - 4152.67		7 MILES NNW	4152.67 (1/ 1) 4152.67 - 4152.67	3807.94 (1/ 1) 3807.94 - 3807.94	
GAMMA (GELI) 2							
K-40	NOT ESTAB	2518.86 (1/ 1) 2518.86 - 2518.86		7 MILES NNW	2518.86 (1/ 1) 2518.86 - 2518.86	2163.31 (1/ 1) 2163.31 - 2163.31	
P8-214	NOT ESTAB	10.58 (1/ 1) 10.58 - 10.58		7 MILES NNW	10.58 (1/ 1) 10.58 - 10.58	1 VALUES <LLD	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 18

RADIOACTIVITY IN GREEN BEANS

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

34

NAME OF FACILITY BROWNS FERRY----- DOCKET NO. 50-25922602296-----
 LOCATION OF FACILITY LIMESIONE-----ALABAMA----- REPORTING PERIOD 1283-----

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			NAME	DISTANCE AND DIRECTION		
ROSS BETA	25.00	3823.47 (1/ 1) 3823.47 - 3823.47	7 MILES NNW	3823.47 (1/ 1) 3823.47 - 3823.47	5150.78 (1/ 1) 5150.78 - 5150.78	
GMMA (GELI)						
12-40	NOT ESTAB	1659.47 (1/ 1) 1659.47 - 1659.47	7 MILES NNW	1659.47 (1/ 1) 1659.47 - 1659.47	2003.71 (1/ 1) 2003.71 - 2003.71	
11-214	NOT ESTAB	1 VALUES <LLD			3.70 (1/ 1) 3.70 - 3.70	
18-214	NOT ESTAB	1 VALUES <LLD			2.14 (1/ 1) 2.14 - 2.14	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 19 .

RADIOACTIVITY IN APPLES

PCI/KG - 0.057 BQ/KG (WET WT)

NAME OF FACILITY BROWNS FERRY----- DOCKET NO. 50-252,260,296-----
 LOCATION OF FACILITY LIMESIQUE-----ALABAMA----- REPORTING PERIOD 1985-----

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE		NAME DISTANCE AND DIRECTION	MEAN (F) RANGE	MEAN (F) RANGE		
GROSS BETA	25.00	1695.72 (1/ 1)		PAGE FARM	1695.72 (1/ 1)	1618.79 (1/ 1)		
		1695.72 - 1695.72		8.75 MILES E	1695.72 - 1695.72	1618.79 - 1618.79		
GAMMA (GELI)								
K-40	NOT ESTAB	1080.23 (1/ 1)		PAGE FARM	1080.23 (1/ 1)	862.72 (1/ 1)		
		1080.23 - 1080.23		8.75 MILES E	1080.23 - 1080.23	862.72 - 862.72		
BI-214	NOT ESTAB	1 VALUES <LLD				8.47 (1/ 1)		
						8.47 - 8.47		
PB-214	NOT ESTAB	1 VALUES <LLD				3.62 (1/ 1)		
						3.62 - 3.62		
AC-228	NOT ESTAB	1 VALUES <LLD				2.70 (1/ 1)		
						2.70 - 2.70		

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 20

RADIOACTIVITY IN POTATOES

PCI/KG - 0.037 BQ/KG. (WET. WEIGHT).

NAME OF FACILITY BROWNS FERRY----- SOCKET NO. 50-259,260,226-----
 LOCATION OF FACILITY LIMESIQUE-----ALABAMA----- REPORTING PERIOD 1985-----

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE		NAME DISTANCE AND DIRECTION	MEAN (F) RANGE	MEAN (F) RANGE		
ROSS BETA	25.00	6048.46 (1/ 1)		PAGE FARM	6048.46 (1/ 1)	6564.38 (1/ 1)		
		6048.46 - 6048.46		8.75 MILES E	6048.46 - 6048.46	6564.38 - 6564.38		
AMMA (GELI)								
2								
2								
2	NOT ESTAB	3408.85 (1/ 1)		PAGE FARM	3408.85 (1/ 1)	3694.61 (1/ 1)		
		3408.85 - 3408.85		8.75 MILES E	3408.85 - 3408.85	3694.61 - 3694.61		

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 21

RADIOACTIVITY IN BEEF

PCI/KG - 0.037 BQ/KG (NET WEIGHT)

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252,260,226
 LOCATION OF FACILITY LIMESIONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F)	RANGE	NAME DISTANCE AND DIRECTION	MEAN (F) RANGE	MEAN (F) RANGE		
	SEE NOTE 1	SEE NOTE 2		SEE NOTE 2		SEE NOTE 2		
GROSS BETA 2	25.00	4397.55 (1/ 1)	4397.55 - 4397.55	LOONEY FARM 5.75 MILES ENE	4397.55 (1/ 1) 4397.55 - 4397.55	3768.67 (1/ 1)	3768.67 - 3768.67	
GAMMA (GELI) 2								
K-40	NOT ESTAB	1838.92 (1/ 1)	1838.92 - 1838.92	LOONEY FARM 5.75 MILES ENE	1838.92 (1/ 1) 1838.92 - 1838.92	1384.55 (1/ 1)	1384.55 - 1384.55	
PB-214	NOT ESTAB	0.10 (1/ 1)	0.10 - 0.10	LOONEY FARM 5.75 MILES ENE	0.10 (1/ 1) 0.10 - 0.10	1.21 (1/ 1)	1.21 - 1.21	
PB-212	NOT ESTAB	0.33 (1/ 1)	0.33 - 0.33	LOONEY FARM 5.75 MILES ENE	0.33 (1/ 1) 0.33 - 0.33	0.77 (1/ 1)	0.77 - 0.77	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 22

RADIOACTIVITY IN TOMATOES

PCI/KG - 0.037 BQ/KG (WET WEIGHT)

NAME OF FACILITY BROWNS FERRY
LOCATION OF FACILITY LIMESTONE ALABAMADOCKET NO. 50-259260-226
REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE		LOCATION WITH HIGHEST ANNUAL MEAN NAME MEAN (F) DISTANCE AND DIRECTION RANGE		CONTROL LOCATIONS MEAN (F) RANGE		NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
		SEE NOTE 1	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2			
ROSS BETA 2	25.00	4228.87 (1/ 1)	4228.87 - 4228.87	7 MILES NNW	4228.87 (1/ 1)	4228.87 - 4228.87	3786.61 (1/ 1)	3786.61 - 3786.61	
AMMA (GELI) 2									
K-40	NOT ESTAB	2103.35 (1/ 1)	2103.35 - 2103.35	7 MILES NNW	2103.35 (1/ 1)	2103.35 - 2103.35	2103.69 (1/ 1)	2103.69 - 2103.69	
9I-214	NOT ESTAB	6.31 (1/ 1)	6.31 - 6.31	7 MILES NNW	6.31 (1/ 1)	6.31 - 6.31	8.97 (1/ 1)	8.97 - 8.97	
PB-214	NOT ESTAB	2.20 (1/ 1)	2.20 - 2.20	7 MILES NNW	2.20 (1/ 1)	2.20 - 2.20	3.10 (1/ 1)	3.10 - 3.10	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

Figure 6

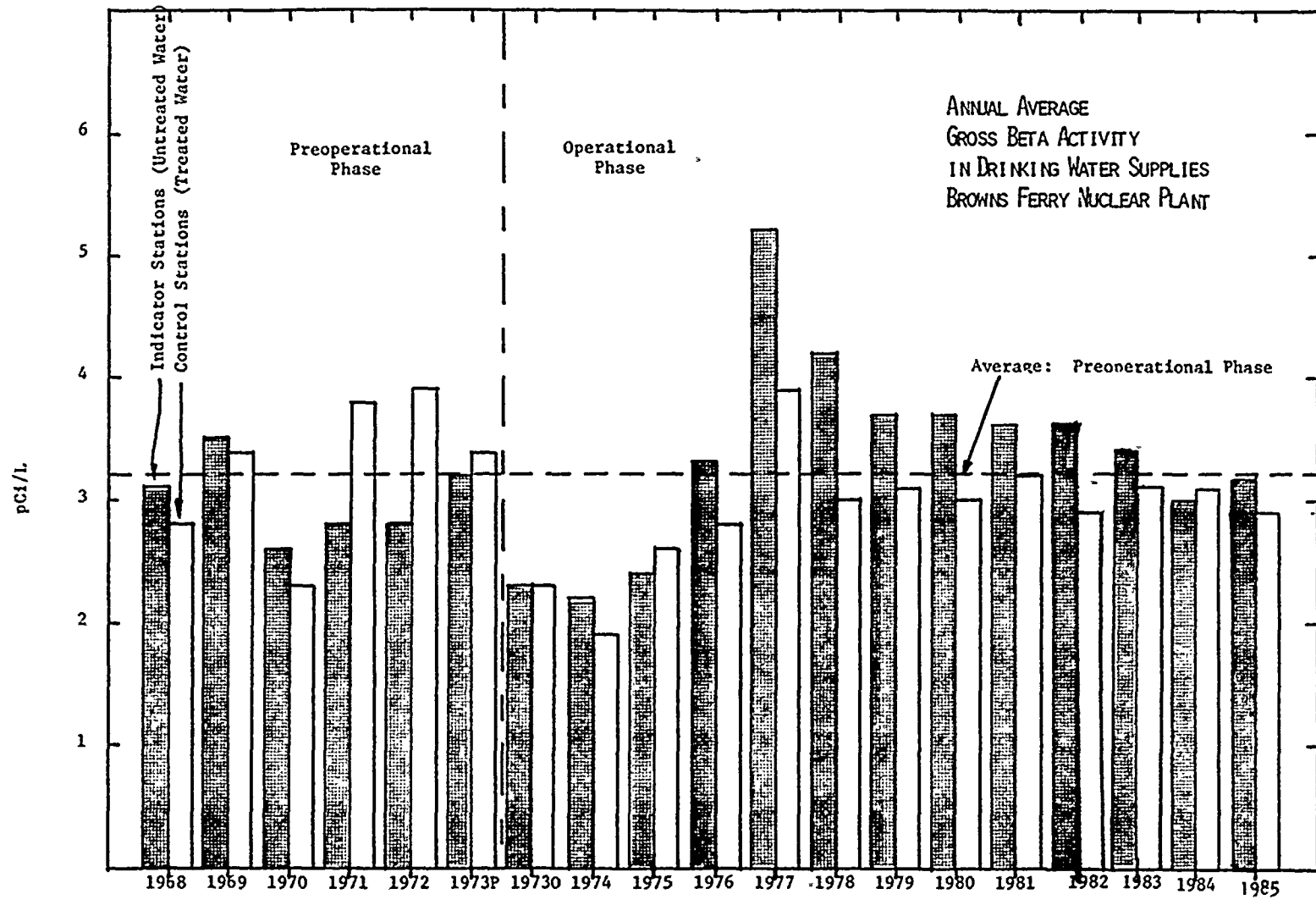


Figure 7

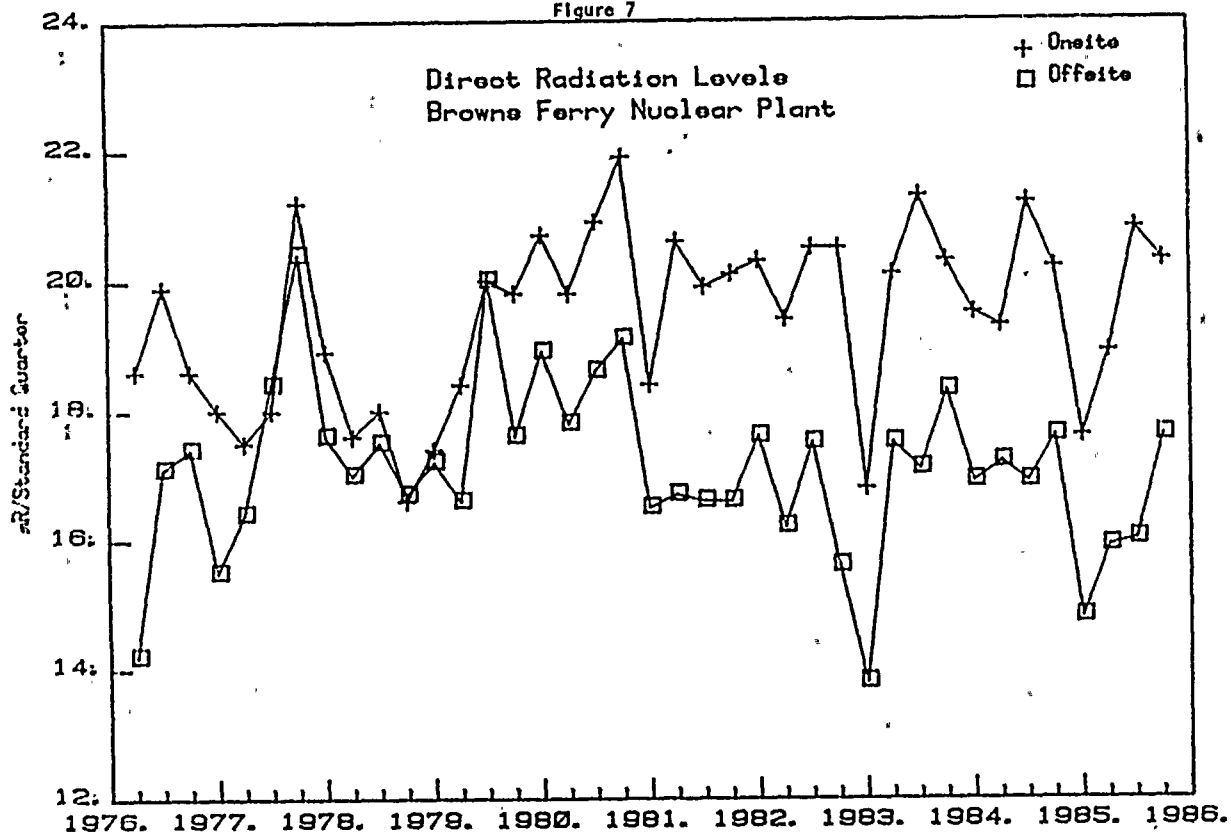


Figure 8

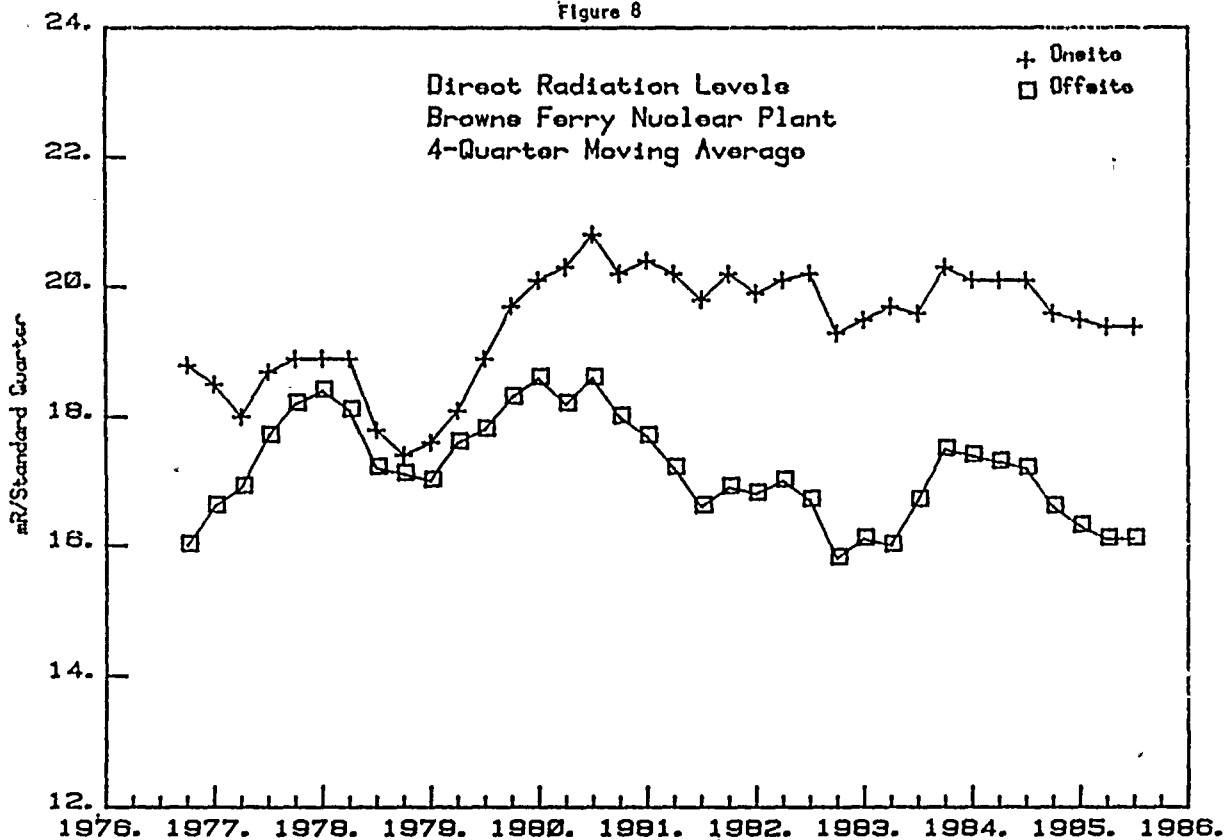


Figure 9

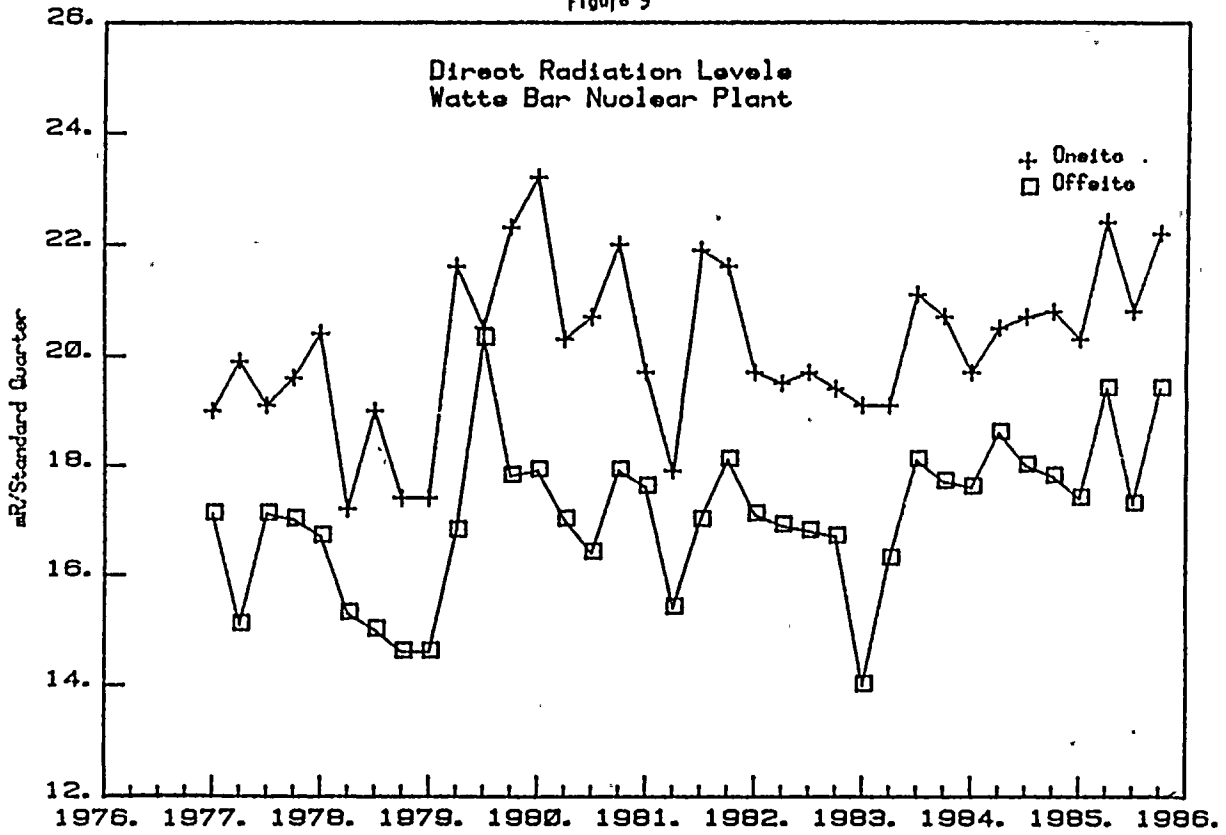
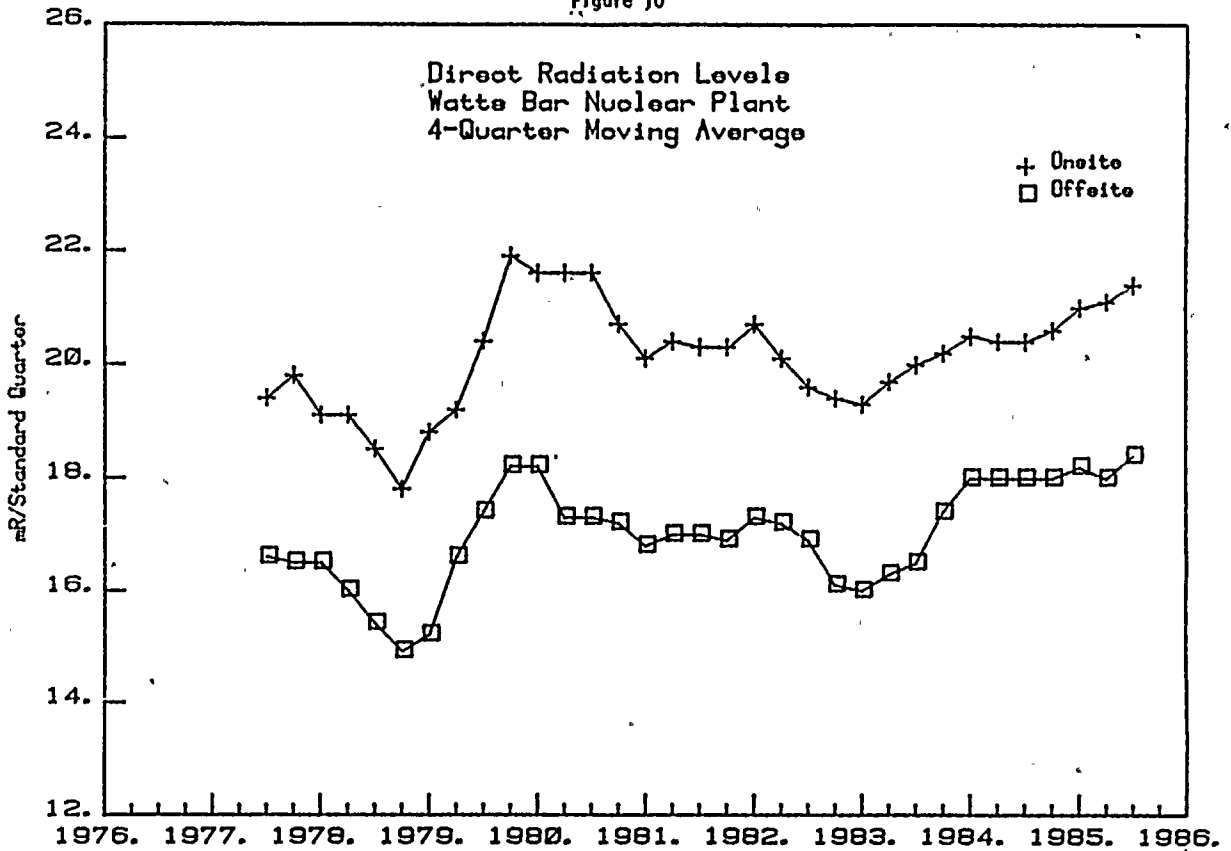


Figure 10



Reservoir Monitoring

Samples are collected from various Tennessee River cross sections as detailed in table 23. Samples collected for radiological analysis include water and plankton from three of these cross sections and bottom fauna and sediment from four cross sections. The locations of these cross sections are shown on the accompanying map (figure 11) and conform to sediment ranges established and surveyed by TVA.

Water

Water samples are collected automatically by sequential type sampling devices at three cross sections and composite samples analyzed monthly for gross beta and gamma-emitting radionuclides. Further composites are made quarterly for strontium and tritium analyses. In addition to these required samples, grab samples were also collected monthly from the vicinity of the plant discharge to the Tennessee River; and at a point on the Elk River, and analyzed for gross beta, gamma-emitting radionuclides, and strontium. Results are displayed in table 24. Figure 12 presents a plot of the gross beta activity in surface water from 1968 through 1985. No gross beta measurements were made in surface water samples in 1978. The levels reported are consistent with gross beta levels measured in surface water samples taken from the Tennessee River in preoperational monitoring programs conducted by TVA at other sites.

Fish

Radiological monitoring for fish is accomplished by analysis of composite samples of adult fish taken from each of three contiguous reservoirs--Wilson, Wheeler, and Gunter'sville. No permanent sampling stations have been established within each reservoir; this reflects the movement of fish species within reservoirs as determined by TVA data from the BFN preoperational monitoring program. Two species, white crappie and smallmouth buffalo, are collected representing both commercial and game species. Sufficient fish are collected in each reservoir to yield 250 to 300 grams oven-dry weight for analytical purposes. All samples are collected semiannually and analyzed for gamma-emitting radionuclides. The composite samples contain approximately the same quantity of flesh from each fish. For each composite a subsample of material is drawn for counting. Results are given in tables 25, 26, and 27.

Sediment

Sediment samples are collected semiannually from Ponar dredge hauls made for bottom fauna. Gamma radioactivity and ^{89}Sr and ^{90}Sr content are determined in composite samples collected from each of four stations. Locations of these stations are shown in table 23. Results are shown in table 28.

Plankton

Net plankton (all phytoplankton and zooplankton caught with a 100 μ mesh net) is collected for radiological analyses at each of three stations by vertical tows with a 1/2-meter net. At least 50 grams (wet weight) of material is necessary for analytical accuracy. Samples are collected semiannually and submitted for gross beta analysis, and when quantities are sufficient, for gamma activity and ^{89}Sr and ^{90}Sr content. During this reporting period, samples collected during the first half of the year contained insufficient volume for any analysis. During the second half of the year, sufficient quantities of plankton were collected for only one gross beta analysis. Results are presented in table 29.

Bottom Fauna

The flesh and shells of Asiatic clams collected semiannually from the cross sections at four stations (table 23) are analyzed for gamma-emitting radionuclides. Levels of ^{89}Sr and ^{90}Sr are determined on the shells; and on the flesh when sufficient amounts were available. A 50-gram (wet weight) sample provides sufficient activity for counting. Results are given in tables 30 and 31. Clams from one location were not available; and from two locations, insufficient quantities were collected to permit analysis of clam flesh.

Table 23

SAMPLING SCHEDULE - RESERVOIR MONITORINGBiological samples (collected semiannually)

<u>River/river mile</u>	<u>Zooplankton, chlorophyll, phytoplankton</u>	<u>Benthic fauna</u>	<u>Sediment</u>	<u>Fish^a</u>	<u>Water Samples (collected monthly)</u>
Tennessee 277.9	X	X	X		
Tennessee 285.2					b
Tennessee 288.7		X	X		
Tennessee 291.7	X				
Tennessee 293.5					b
Tennessee 293.7 (discharge area)		X	X		c
Tennessee 305.0 (Control)					b
Tennessee 307.5 (Control)	X	X	X		
Elk 20.5 (Control)					c

a. Gill net and/or electroshocker will be used for collection. Samples of fish are collected from Guntersville, Wheeler, and Wilson Reservoirs.

b. Automatic sampler.

c. Grab sample.

TABLE 24

RADIOACTIVITY IN SURFACE WATER TOTAL

PCI/L - 0.037 BQ/L

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252260226
 LOCATION OF FACILITY LIMESTONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	ANNUAL MEAN (F) RANGE	CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	SEE NOTE 1	SEE NOTE 2		SEE NOTE 2	SEE NOTE 2	
GROSS ALPHA	1 2.00	0 VALUES <LLD ANALYSIS PERFORMED			1 VALUES <LLD	
GROSS BETA	65 2.00	3.13 (35/ 39) 2.13 - 4.37	TRM 293.5	3.27 (12/ 13) 2.37 - 4.31	3.24 (22/ 26) 2.07 - 5.49	
GAMMA (GELI)	65					
K-40	NOT ESTAB	11.52 (1/ 39) 11.52 - 11.52	TRM 293.7 BFN DISCHARGE	11.52 (1/ 13) 11.52 - 11.52	27.04 (3/ 26) 20.68 - 39.53	
BI-214	NOT ESTAB	7.02 (11/ 39) 0.34 - 23.29	TRM 285.2	9.47 (3/ 13) 0.34 - 22.93	10.36 (17/ 26) 0.13 - 44.09	
PB-214	NOT ESTAB	3.08 (6/ 39) 0.78 - 6.30	TRM 293.7 BFN DISCHARGE	4.66 (3/ 13) 2.07 - 6.30	7.29 (15/ 26) 0.47 - 18.90	
PB-212	NOT ESTAB	1.74 (6/ 39) 0.12 - 3.47	TRM 285.2	3.47 (1/ 13) 3.47 - 3.47	1.57 (10/ 26) 0.29 - 3.11	
AC-228	15.00	39 VALUES <LLD			27.49 (1/ 26) 27.49 - 27.49	
SR 89	10.00	12 VALUES <LLD ANALYSIS PERFORMED			8 VALUES <LLD	
SR 90	20 2.00	12 VALUES <LLD ANALYSIS PERFORMED			8 VALUES <LLD	
TRITIUM	20 330.00	334.51 (1/ 12) 334.51 - 334.51	TRM 285.2	334.51 (1/ 4) 334.51 - 334.51	333.48 (1/ 8) 333.48 - 333.48	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 25

RADIOACTIVITY IN WHITE CRAPPIE (FLESH)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-259-260-296
 LOCATION OF FACILITY LIMESIONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE		LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION		CONTROL LOCATIONS MEAN (F) RANGE		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		SEE NOTE 1	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2		
GROSS BETA 6	0.10	32.66 (4/ 4)	27.58 - 37.75	WILSON RESERVOIR TRM 259-275	32.67 (2/ 2)	27.58 - 37.75	29.20 (2/ 2)	28.67 - 29.75
GAMMA (GELI) 6								
CS-137	0.02	0.08 (4/ 4)	0.06 - 0.11	WILSON RESERVOIR TRM 259-275	0.09 (2/ 2)	0.07 - 0.11	0.09 (2/ 2)	0.09 - 0.10
K-40	NOT ESTAB	14.03 (4/ 4)	10.81 - 16.81	WILSON RESERVOIR TRM 259-275	14.25 (2/ 2)	13.88 - 14.62	15.15 (2/ 2)	14.59 - 15.71
BI-214	0.02	4 VALUES <LLD					0.02 (1/ 2)	0.02 - 0.02
PB-214	NOT ESTAB	0.02 (1/ 4)	0.02 - 0.02	WHEELER RES TRM 275-349	0.02 (1/ 2)	0.02 - 0.02	0.01 (1/ 2)	0.01 - 0.01
PB-212	NOT ESTAB	0.00 (1/ 4)	0.00 - 0.00	WHEELER RES TRM 275-349	0.00 (1/ 2)	0.00 - 0.00	2 VALUES <LLD	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 26

RADIOACTIVITY IN SMALLMOUTH BUFFALO (FLESH)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252260-226
 LOCATION OF FACILITY LIMESIQUE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE		NAME DISTANCE AND DIRECTION	MEAN (F) RANGE	MEAN (F) RANGE		
GROSS BETA	0.10	19.33 (4/ 4)		WHEELER RES	20.16 (2/ 2)	20.06 (2/ 2)		
GAMMA (GELI)		16.62 - 20.38		TRM 275-349	20.07 - 20.25	18.89 - 21.22		
CS-137	0.02	0.03 (2/ 4)		WILSON RESERVOIR	0.03 (1/ 2)	0.03 (1/ 2)		
K-40	NOT ESTAB	0.03 - 0.03		TRM 259-275	0.03 - 0.03	0.03 - 0.03		
BI-214	0.02	9.95 (4/ 4)		WHEELER RES	10.64 (2/ 2)	9.20 (2/ 2)		
PB-214	NOT ESTAB	8.65 - 11.90		TRM 275-349	9.37 - 11.90	7.49 - 10.90		
PB-212	NOT ESTAB	4 VALUES <LLD				0.07 (2/ 2)		
SR 89	0.50	0.04 (1/ 4)		WILSON RESERVOIR	0.04 (1/ 2)	0.04 - 0.10		
SR 90	0.10	0.04 - 0.04		TRM 259-275	0.04 - 0.04	0.06 (2/ 2)		
		0.00 (2/ 4)		WHEELER RES	0.01 (1/ 2)	0.04 - 0.08		
		0.00 - 0.01		TRM 275-349	0.01 - 0.01	0.00 (1/ 2)		
		2 VALUES <LLD				0.00 - 0.00		
		ANALYSIS PERFORMED				0 VALUES <LLD		
		2 VALUES <LLD				0 VALUES <LLD		
		ANALYSIS PERFORMED						

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 27

RADIOACTIVITY IN SMALLMOUTH BUFFALO (WHOLE)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BROWNS FERRY DOCKET NO. 50-252,260,226
 LOCATION OF FACILITY LIMESICONE ALABAMA REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE		NAME DISTANCE AND DIRECTION	MEAN (F) RANGE		
GROSS BETA	SEE NOTE 1 0.10	SEE NOTE 2 17.59 (4/ 4) 14.48 - 20.02		SEE NOTE 2 WHEELER RES TRM 275-349	SEE NOTE 2 17.93 (2/ 2) 17.35 - 18.52	SEE NOTE 2 19.59 (2/ 2) 17.54 - 21.64	
GAMMA (GELI)							
CS-137	0.02	0.03 (2/ 4) 0.02 - 0.03		WILSON RESERVOIR TRM 259-275	0.03 (2/ 2) 0.02 - 0.03	2 VALUES <LLD	
K-40	NOT ESTAB	7.08 (4/ 4) 6.65 - 8.00		WHEELER RES TRM 275-349	7.49 (2/ 2) 6.97 - 8.00	11.04 (2/ 2) 7.37 - 14.70	
BI-214	0.02	0.04 (1/ 4) 0.04 - 0.04		WHEELER RES TRM 275-349	0.04 (1/ 2) 0.04 - 0.04	0.04 (1/ 2) 0.04 - 0.04	
PB-214	NOT ESTAB	0.03 (4/ 4) 0.01 - 0.04		WHEELER RES TRM 275-349	0.03 (2/ 2) 0.03 - 0.04	2 VALUES <LLD	
PB-212	NOT ESTAB	0.01 (3/ 4) 0.00 - 0.01		WILSON RESERVOIR TRM 259-275	0.01 (1/ 2) 0.01 - 0.01	2 VALUES <LLD	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

b h

TABLE 28

RADIOACTIVITY IN SEDIMENT

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BROWNS FERRY
LOCATION OF FACILITY LIMESTONE ALABAMADOCKET NO. 50-252,260,296
REPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD) SEE NOTE 1	ALL INDICATOR LOCATIONS MEAN (F) RANGE SEE NOTE 2		LOCATION WITH HIGHEST ANNUAL MEAN NAME MEAN (F) RANGE SEE NOTE 2		CONTROL LOCATIONS MEAN (F) RANGE SEE NOTE 2	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		DISTANCE AND DIRECTION					
SAHMA (GELI)							
14							
CO-60	0.01	0.15 (9/ 10)	TRM 293.7	0.21 (3/ 3)		0.05 (2/ 4)	
		0.02 - 0.23	BFN DISCHARGE	0.17 - 0.23		0.02 - 0.03	
CS-134	0.08	0.11 (5/ 10)	TRM 293.7	0.12 (3/ 3)		4 VALUES <LLD	
		0.08 - 0.18	BFN DISCHARGE	0.08 - 0.18			
CS-137	0.02	0.79 (10/ 10)	TRM 288.78	1.08 (2/ 2)		0.50 (4/ 4)	
		0.04 - 1.27		0.89 - 1.27		0.17 - 0.51	
K-40	NOT ESTAB	13.05 (10/ 10)	TRM 288.78	16.23 (2/ 2)		13.05 (4/ 4)	
		7.92 - 16.72		15.73 - 16.72		11.76 - 13.69	
ZN-65	0.02	0.04 (2/ 10)	TRM 293.7	0.07 (1/ 3)		4 VALUES <LLD	
		0.02 - 0.07	BFN DISCHARGE	0.07 - 0.07			
BI-214	0.02	1.32 (10/ 10)	TRM 288.78	1.81 (2/ 2)		1.12 (4/ 4)	
		0.36 - 1.91		1.79 - 1.82		0.98 - 1.22	
BI-212	0.10	1.49 (10/ 10)	TRM 288.0	1.89 (1/ 1)		1.35 (4/ 4)	
		0.48 - 1.97		1.29 - 1.39		1.05 - 1.47	
PB-214	NOT ESTAB	1.42 (10/ 10)	TRM 288.78	1.96 (2/ 2)		1.19 (4/ 4)	
		0.40 - 1.99		1.93 - 1.99		1.01 - 1.40	
PB-212	NOT ESTAB	1.44 (10/ 10)	TRM 288.78	1.78 (2/ 2)		1.27 (4/ 4)	
		0.43 - 1.96		1.60 - 1.96		1.17 - 1.36	
RA-226	NOT ESTAB	1.02 (6/ 10)	TRM 288.0	1.34 (1/ 1)		1.09 (3/ 4)	
		0.36 - 1.34		1.34 - 1.34		0.98 - 1.22	
RA-224	NOT ESTAB	1.20 (5/ 10)	TRM 288.0	1.86 (1/ 1)		1.50 (2/ 4)	
		0.35 - 1.86		1.86 - 1.86		1.48 - 1.51	
BE-7	NOT ESTAB	0.18 (2/ 10)	TRM 292.7	0.20 (1/ 1)		0.27 (3/ 4)	
		0.16 - 0.20		0.20 - 0.20		0.17 - 0.46	
TL-208	0.02	0.50 (10/ 10)	TRM 288.78	0.65 (2/ 2)		0.44 (4/ 4)	
		0.15 - 0.68		0.63 - 0.66		0.42 - 0.47	
AC-228	0.06	1.44 (10/ 10)	TRM 288.78	1.79 (2/ 2)		1.32 (4/ 4)	
		0.44 - 2.02		1.67 - 1.91		1.15 - 1.41	
PA-234M	NOT ESTAB	2.54 (2/ 10)	TRM 291.76	2.91 (1/ 1)		4.27 (2/ 4)	
		2.18 - 2.91		2.91 - 2.91		3.66 - 4.87	
SR 89	1.50	6 VALUES <LLD				2 VALUES <LLD	
8		ANALYSIS PERFORMED					
SR 90	0.15	0.35 (4/ 6)	TRM 277.96	0.41 (2/ 2)		0.34 (1/ 2)	
8		0.28 - 0.45		0.36 - 0.45		0.34 - 0.34	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

TABLE 29

RADIOACTIVITY IN PLANKTON (SAMPLE 1)

PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY <u>BROWNS FERRY</u>		DOCKET NO. <u>50-252290226</u>					
LOCATION OF FACILITY <u>LIMESTONE</u>		REPORTING PERIOD <u>1985</u>					
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE	DISTANCE AND DIRECTION	NAME	MEAN (F) RANGE		
GROSS BETA	NOT ESTAB	SEE NOTE 1	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	34.71 (1 / 1) 34.71 - 34.71	
1			SEE NOTE 3				

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

NOTE: 3. Insufficient sample available for analysis.

TABLE 30

RADIOACTIVITY IN CLAM FLESH
PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BROWNS FERRYDOCKET NO. 50-252260229LOCATION OF FACILITY LIMESTONEALABAMAREPORTING PERIOD 1985

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD) SEE NOTE 1	ALL INDICATOR LOCATIONS MEAN (F) RANGE SEE NOTE 2		LOCATION WITH HIGHEST ANNUAL MEAN NAME MEAN (F) DISTANCE AND DIRECTION RANGE SEE NOTE 2		CONTROL LOCATIONS MEAN (F) RANGE SEE NOTE 2	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SARMA (GELT) 12							
CO-60	0.08	0.16 (1/ 8)	0.16 (1/ 3)	TRM 293.7	0.16 (1/ 3)	4 VALUES <LLD	
K-40	NOT ESTAB	0.16 - 0.16 4.00 (5/ 8)	0.16 - 0.16 12.43 (1/ 1)	BFN DISCHARGE TRM 288.78	0.16 - 0.16 12.43 - 12.43	2.82 (4/ 4)	
ZN-65	0.17	0.89 - 12.43 1.09 (4/ 8)	1.24 - 1.81 1.53 (2/ 3)	TRM 293.7 BFN DISCHARGE	1.24 - 1.81 4.90 (1/ 1)	0.90 - 5.49 4 VALUES <LLD	1 (Note 3)
BI-214	NOT ESTAB	0.64 - 1.81 2.40 (8/ 8)	4.90 (1/ 1)	TRM 288.78	4.90 (1/ 1)	1.45 (4/ 4)	
PB-214	NOT ESTAB	0.33 - 7.42 2.11 (8/ 8)	4.90 - 4.90 2.96 (1/ 1)	TRM 277.98	4.90 - 4.90 2.96 - 2.96	0.23 - 4.66 1.40 (4/ 4)	
PB-212	NOT ESTAB	0.30 - 6.96 0.10 (5/ 8)	0.21 (1/ 1)	TRM 277.98	0.21 (1/ 1)	0.12 - 4.98 0.20 (3/ 4)	
TL-208	NOT ESTAB	0.04 - 0.21 0.03 (3/ 8)	0.05 (1/ 1)	TRM 291.76	0.05 (1/ 1)	0.11 - 0.25 0.02 (1/ 4)	
AC-228	NOT ESTAB	0.02 - 0.05 0.16 (2/ 8)	0.05 - 0.05 0.16 (2/ 3)	TRM 293.7 BFN DISCHARGE	0.05 - 0.05 0.16 (2/ 3)	0.02 - 0.02 0.14 (1/ 4)	
		0.15 - 0.17	0.15 - 0.17		0.15 - 0.17	0.14 - 0.14	

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

NOTE: 3. Zinc-65 in clam flesh reported to the Nuclear Regulatory Commission on June 25, 1985. Samples collected in November contained no evidence of fission or activation products.

TABLE 31

RADIOACTIVITY IN CLAM SHELL
PCI/G - 0.037 BQ/G (DRY WEIGHT)

NAME OF FACILITY BROWNS FERRY----- DOCKET NO. 50-252,260,296-----
LOCATION OF FACILITY LIMESTONE-----ALABAMA----- REPORTING PERIOD 1985-----

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) RANGE		NAME DISTANCE AND DIRECTION	MEAN (F) RANGE		
	SEE NOTE 1	SEE NOTE 2		SEE NOTE 2		SEE NOTE 2	
GAMMA (GELI)							
	12						
CO-60	0.01	0.01(1/ 8)	TRM 293.7	0.01(1/ 3)	4 VALUES <LLD		
		0.01 - 0.01	BFN DISCHARGE	0.01 - 0.01			
K-40	NOT ESTAB	0.13(6/ 3)	TRM 277.98	0.22(1/ 1)	0.14(2/ 4)		
		0.01 - 0.29		0.22 - 0.22	0.09 - 0.20		
SI-214	0.05	0.16(6/ 8)	TRM 288.78	0.25(1/ 1)	0.19(3/ 4)		
		0.09 - 0.28		0.25 - 0.25	0.09 - 0.35		
SI-212	0.10	0.12(1/ 8)	TRM 292.7	0.12(1/ 1)	4 VALUES <LLD		
		0.12 - 0.12		0.12 - 0.12			
PB-214	0.05	0.17(7/ 8)	TRM 288.78	0.27(1/ 1)	0.17(3/ 4)		
		0.07 - 0.34		0.27 - 0.27	0.09 - 0.32		
PB-212	NOT ESTAB	0.06(8/ 8)	TRM 288.78	0.16(1/ 1)	0.02(3/ 4)		
		0.01 - 0.16		0.16 - 0.16	0.01 - 0.04		
RA-226	0.05	0.11(2/ 8)	TRM 295.7	0.12(1/ 3)	4 VALUES <LLD		
		0.10 - 0.12	BFN DISCHARGE	0.12 - 0.12			
TL-208	0.02	0.05(3/ 8)	TRM 288.78	0.08(1/ 1)	4 VALUES <LLD		
		0.02 - 0.08		0.08 - 0.08			
AC-228	0.06	0.20(7/ 8)	TRM 288.78	0.40(1/ 1)	0.13(3/ 4)		
		0.07 - 0.40		0.40 - 0.40	0.11 - 0.14		
SR 89	5.00	4 VALUES <LLD			2 VALUES <LLD		
	6	ANALYSIS PERFORMED					
SR 90	1.00	1.09(1/ 4)	TRM 295.7	1.09(1/ 2)	1.02(1/ 2)		
	6	1.09 - 1.09	BFN DISCHARGE	1.09 - 1.09	1.02 - 1.02		

NOTE: 1. NOMINAL LOWER LIMIT OF DETECTION (LLD) AS DESCRIBED IN TABLE 3.

NOTE: 2. MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F).

Figure 11

RESERVOIR MONITORING NETWORK

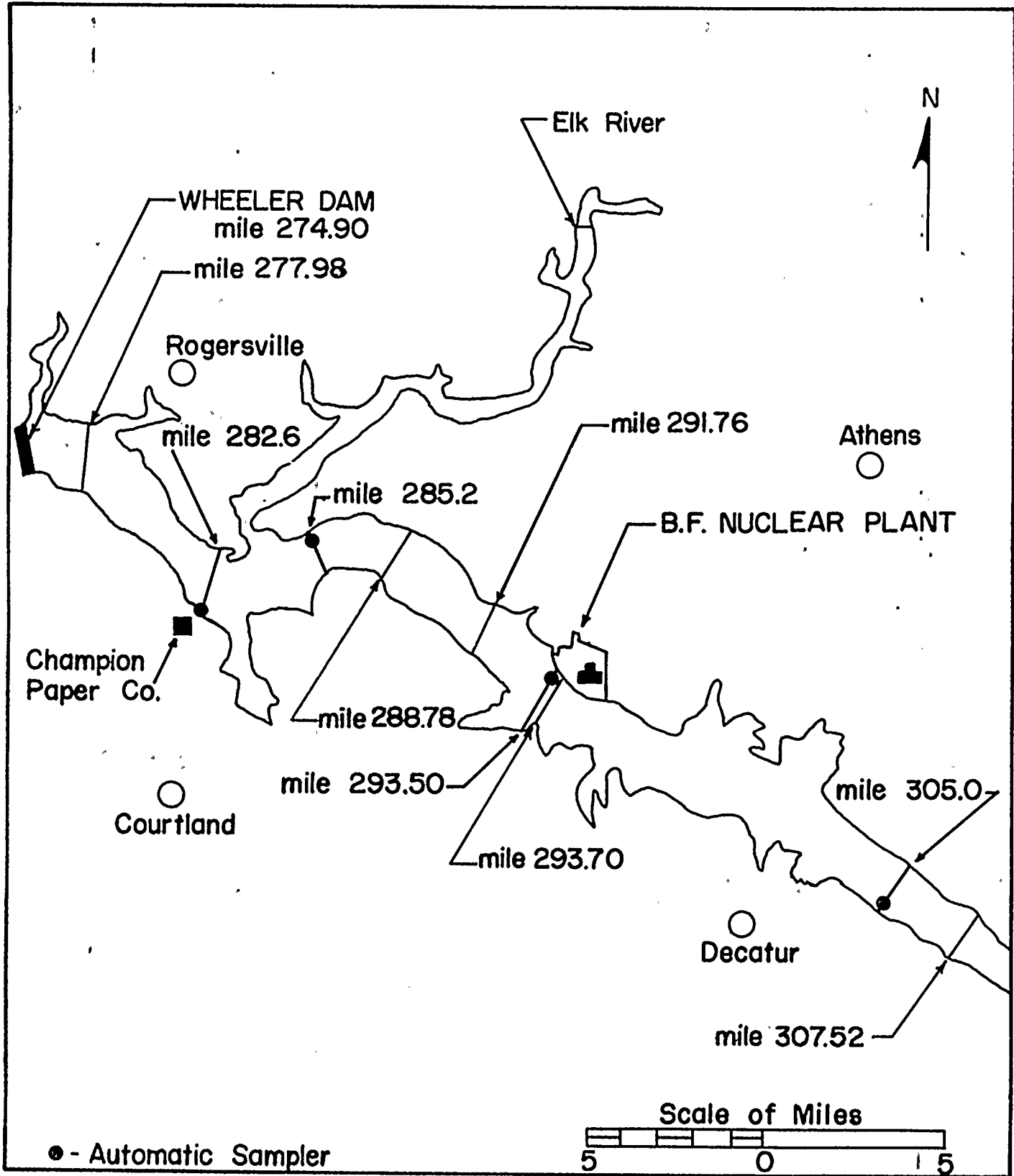
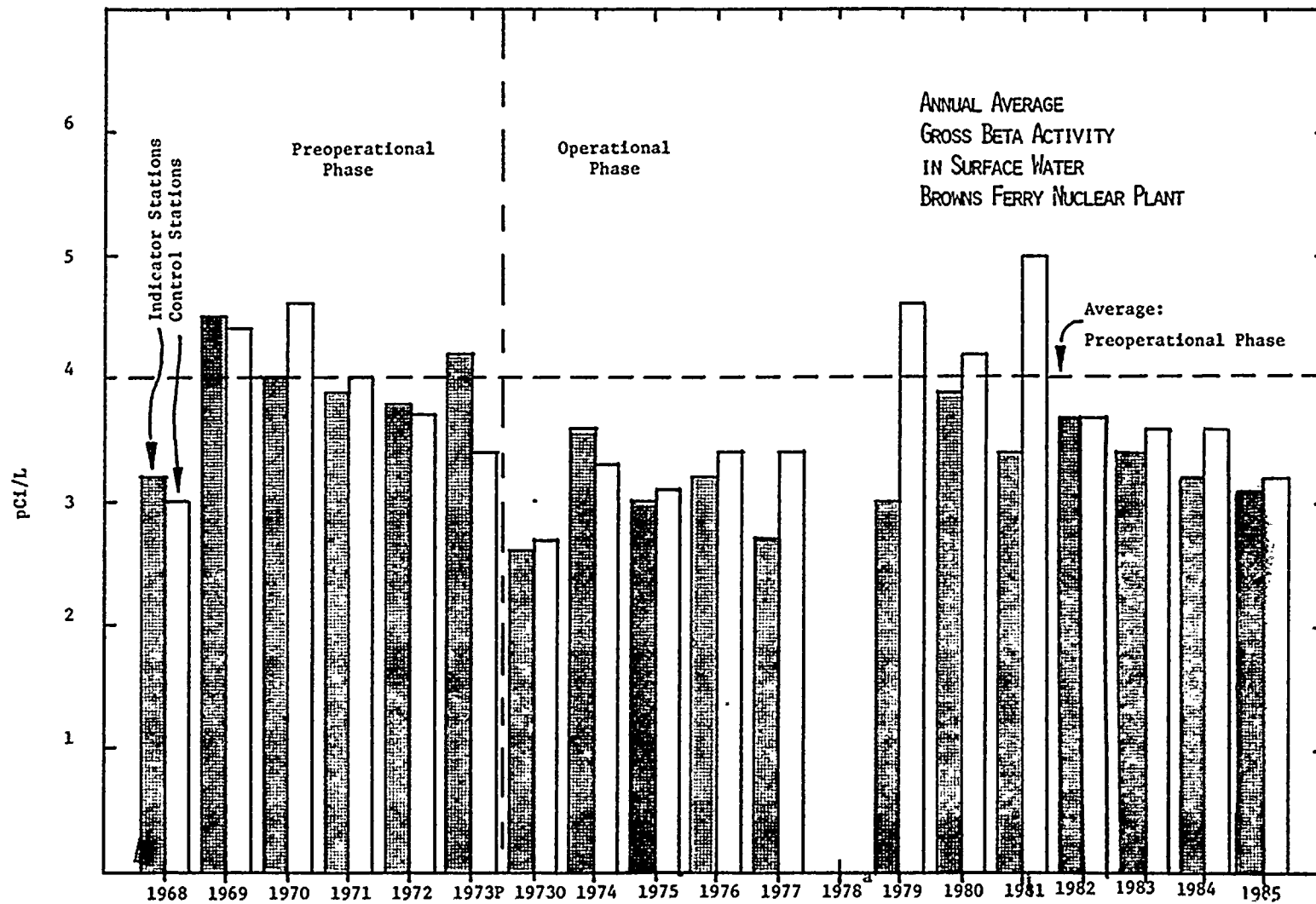
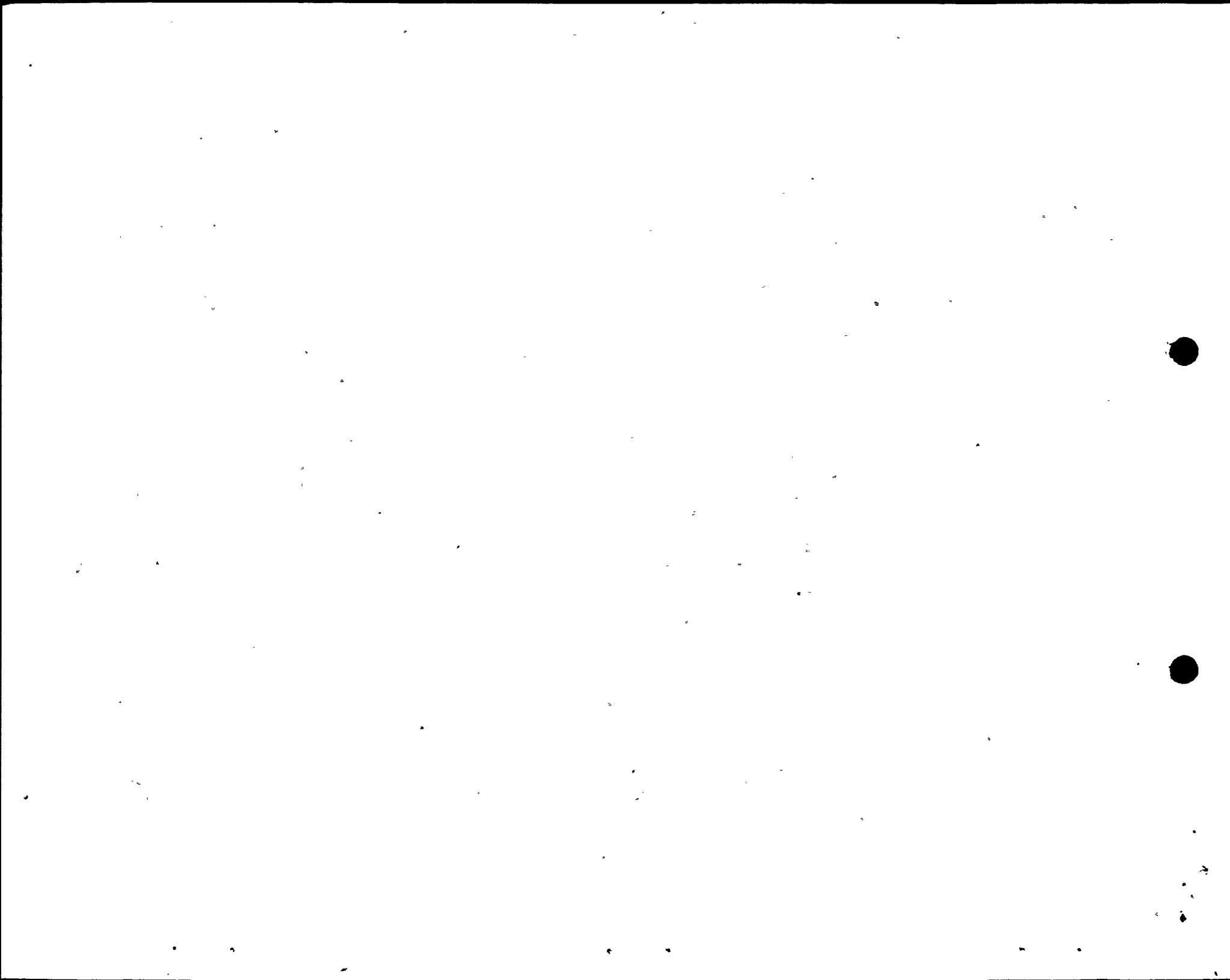


Figure 12



a. No gross beta measurements made in 1978.



Quality Control

A quality control program has been established with the Alabama Department of Public Health Environmental Health Administration Laboratory and the Eastern Environmental Radiation Facility, Environmental Protection Agency, Montgomery, Alabama. Samples of air, water, milk, and vegetation collected around BFN are forwarded to these laboratories for analysis, and results are exchanged for comparison.

Data Analysis

The results from each sample are compared with the concentrations from the corresponding control stations and appropriate preoperational and background data to determine influences from the plant. During this report period, concentrations in two samples were found to exceed the reporting levels as outlined in the plant Environmental Technical Specifications.

Cobalt-60 was identified in one vegetation sample collected near the site boundary in April. No indication of the presence of cobalt-60 was observed either at the control stations or at any of the other stations around the plants. Subsequent samples showed no indication of the presence of cobalt-60. This single, isolated occurrence, the absence of other fission and activation products in the sample, and the lack of an increase in cobalt-60 releases from the plant prevented an identification of the causes for the presence of the isotope in the sample.

In May 1985, zinc-65 was identified in one sample of clam flesh taken from the Tennessee River approximately one-half mile downstream from the plant discharge. No fission or activation products had been identified in this medium during the previous report period. Followup samples collected in June revealed zinc-65 at these downstream stations, with highest value being about two-thirds and the other values about one-third of the concentration reported in May. No fission or activation products were found in clam flesh samples collected in the November sample period. The exposure to an individual consuming clam with the highest activity was calculated to be less than 0.01 mRem/year, or 0.03 percent of the annual exposure limit. However, to the best of our knowledge clams from the Tennessee River are not harvested for human consumption, therefore, even this small exposure is unlikely to take place.

Dose estimates were made from concentrations of radioactivity found in samples of environmental media. Media sampled include, but are not limited to, air, milk, food products, drinking water, and fish. Inhalation and ingestion doses estimated for persons at the indicator locations were essentially identical to those determined for persons at control locations. Greater than 95 percent of those doses were contributed by the naturally occurring radionuclide potassium-40, and by strontium-90 and cesium-137 which are long-lived radioisotopes found in fallout from nuclear weapons testing.

Conclusions

It is concluded from the above analysis of the data and from the trend plots presented earlier that there were no measurable increases in the exposure to members of the general public attributable to the operation of BFN. Indications of the presence of small quantities of fission and activation products have been seen, especially in aquatic media. Although the levels reported sometimes exceed the values reported at the corresponding control stations, they are similar to levels reported in samples collected in conjunction with preoperational monitoring programs being conducted by TVA at nuclear plant construction sites upstream from Browns Ferry. The radioactivity reported herein may be the result of fallout, fluctuations in the existing environment, or computer program artifacts, and may include small contributions from plant operations. Any activity resulting from plant operations which may be present is generally difficult to distinguish from background.