[redacted]

TENNESSEE VALLEY AUTHORITY

[redacted]

DIVISION OF OCCUPAT

— NOTICE —

THE ATTACHED FILES ARE OFFICIAL RECORDS OF THE DIVISION OF DOCUMENT CONTROL. THEY HAVE BEEN CHARGED TO YOU FOR A LIMITED TIME PERIOD AND MUST BE RETURNED TO THE RECORDS FACILITY BRANCH 016. PLEASE DO NOT SEND DOCUMENTS CHARGED OUT THROUGH THE MAIL. REMOVAL OF ANY PAGE(S) FROM DOCUMENT FOR REPRODUCTION MUST BE REFERRED TO FILE PERSONNEL.

DEADLINE RETURN DATE _____

50-390 WATTS BAR

8011190117 _____

12 Nov 80 _____

RECORDS FACILITY BRANCH

8011190/22

RH-80-8-WB1

ENVIRONMENTAL RADIOACTIVITY LEVELS
WATTS BAR NUCLEAR PLANT

Annual Report 1979

October 1980

CONTENTS

ENVIRONMENTAL RADIOACTIVITY LEVELS

WATTS BAR NUCLEAR PLANT

1979

Introduction

The Watts Bar Nuclear Plant (WBN), being constructed by the Tennessee Valley Authority, is located on a site owned by TVA containing 1770 acres of land in Rhea County, Tennessee, bounded on the east by Chickamauga Reservoir. See Figure 1. The site is approximately 50 miles (80 kilometers) northeast of Chattanooga, Tennessee, and 8 miles (13 kilometers) southeast of Spring City, Tennessee. The plant will consist of two pressurized water reactors; each unit is rated at 3,411 MWt and 1,160 MWe. Fuel load in unit 1 is scheduled for May 1981.

A preoperational environmental radiological monitoring program was implemented in December 1976. This program has the objective of establishing a baseline of data on the distribution of natural and manmade radioactivity in the environment near the plant site. This report presents the results obtained from that program during 1979.

Field staffs in the Division of Occupational Health and Safety, the Division of Water Resources, and the Division of Natural Resources Services carried out the sampling program outlined in Tables 1 and 19. Sampling locations are shown in Figures 2, 3, 4, and 5, and Table 2 describes the locations of the atmospheric and terrestrial monitoring stations. All the radiochemical and instrumental analyses were conducted in a central laboratory at Muscle Shoals, Alabama. Alpha and beta analyses were performed on Beckman Low Beta II and Beckman Wide Beta II low-background proportional counters. Two Nuclear Data Model 100 multichannel analyzer systems employing sodium iodide, NaI(Tℓ) detectors and one Nuclear Data Model 4420 in conjunction with Germanium, Ge(Li), detection systems were used to analyze the samples for specific gamma-emitting radionuclides. Samples of water, vegetation, air particulates, food crops, and charcoal (specific analysis for ^{131}I) are routinely counted with NaI(Tℓ) detection systems. If significant concentrations of radioisotopes are identified, or if there is a reasonable expectation of increased radioactivity levels (such as during periods of increased fallout), these samples are counted on the Ge(Li) system. Identification of gamma-emitting radionuclides in all other types of samples is routinely performed by analysis on the Ge(Li) system. A TVA fabricated beta-gamma coincidence counting system is utilized for the determination of ^{131}I concentration in milk.

Data were entered in computer storage for processing specific to the analysis conducted. A computer, employing an ALPHA-M least-squares code, was used to solve multimatrix problems associated with estimating the activities of the gamma-emitting nuclides analyzed by NaI(Tℓ). The data obtained by Ge(Li) detectors were resolved by the ND-4420 software.

The detection capabilities for environmental sample analysis given as the nominal lower limits of detection (LLD) are listed in Table 3. Samples processed by NaI(Tℓ) gamma spectroscopy were analyzed for 13 specific gamma-emitting radionuclides and radionuclide combinations*. For these analyses, radionuclide combinations such as ^{103,106}Ru and ^{95}Zr-Nb are analyzed as one radionuclide. All photopeaks found in Ge(Li) spectra were identified and quantified. Many of the isotopes identified by Ge(Li) spectral analysis are naturally occurring or naturally produced radioisotopes, such as ^{7}Be, ^{40}K, ^{212}Bi, ^{214}Bi, ^{212}Pb, ^{214}Pb, ^{226}Ra, etc. LLD's for the analysis of the radionuclides listed below* are given in Table 3B. LLD's for additional radionuclides identified by Ge(Li) analysis were calculated for each analysis and nominal values are listed in the appropriate data tables. 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 Radioanalytical Laboratory participates in the Environmental Radioactivity Laboratory Intercomparison Studies Program conducted by EPA-Las Vegas. This program provides periodic cross-check samples of the type and radionuclide composition normally analyzed in an environmental monitoring program. Routine sample handling and analysis procedures were employed in the evaluation of these samples. Gamma spectral analyses were performed on NaI detectors. The results received during calendar year 1979 are shown in Table 4. The ±3σ limits are corrected for triplicate determinations.

*The following radionuclides and radionuclide combinations are quantified by the ALPHA-M least-squares computer code: ^{141,144}Ce; ^{51}Cr; ^{131}I; ^{103,106}Ru; ^{134}Cs; ^{137}Cs; ^{95}Zr-Nb; ^{58}Co; ^{54}Mn; ^{65}Zn; ^{60}Co; ^{40}K; and ^{140}Ba-LA.

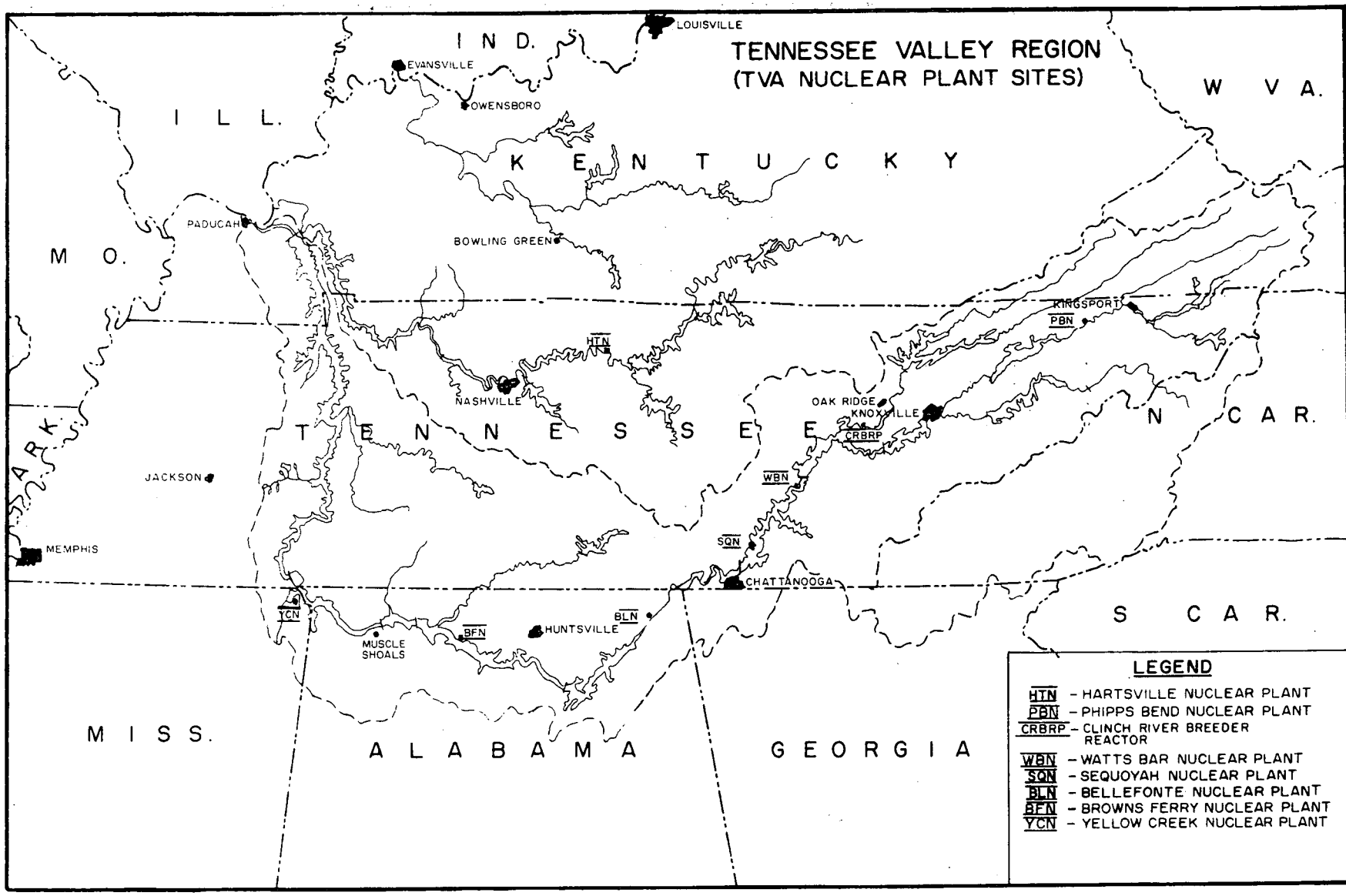

TENNESSEE VALLEY REGION
(TVA NUCLEAR PLANT SITES)
LOUISVILLE
IND.
EVANSVILLE
OWENSBORO
ILL.
W VA.
KENTUCKY
PADUCAH
BOWLING GREEN
MO.
KINGSPORT
PBN
HTN
NASHVILLE
OAK RIDGE
KNOXVILLE
CRBRP
ARK.
TENNESSEE
N CAR.
JACKSON
WBN
SQN
MEMPHIS
CHATTANOOGA
YCN
BLN
BFN
HUNTSVILLE
MUSCLE SHOALS
S CAR.
MISS.
ALABAMA
GEORGIA
LEGEND
HTN - HARTSVILLE NUCLEAR PLANT
PBN - PHIPPS BEND NUCLEAR PLANT
CRBRP - CLINCH RIVER BREEDER REACTOR
WBN - WATTS BAR NUCLEAR PLANT
SQN - SEQUOYAH NUCLEAR PLANT
BLN - BELLEFONTE NUCLEAR PLANT
BFN - BROWNS FERRY NUCLEAR PLANT
YCN - YELLOW CREEK NUCLEAR PLANT

Figure 1

Table 1

ENVIRONMENTAL RADIOACTIVITY SAMPLING SCHEDULE

Station Location	Air Filter	Charcoal Filter	Rain-water	Heavy Particle Fallout	Atmospheric Moisture	Soil	Vegetation	Milk	Well Water	Public Water	Aquatic Life and Sediment
Site SSW	W	W	M	M	BW	S					
Site N	W	W	M	M	BW	S					
Petty Farm	W	W	M	M		S	Q		M		
Spring City	W	W	M	M		S				M	
Cedine	W	W	M	M		S					
Ten Mile	W	W	M	M		S					
Decatur	W	W	M	M		S					
Goodfield	W	W	M	M		S					
Rockwood	W	W	M	M		S					
Dayton	W	W	M	M	BW	S				M	
Farm L							Q	M	M		
Farm M							Q	M	M		
Control Farms							Q	M	M		
Onsite Wells (6)									M		
Watts Bar Reservation										M	
C. F. Industries										M	
Chickamauga/Watts Bar Reservoir											Q

W - Weekly BW - Biweekly M - Monthly (every 4 weeks) Q - Quarterly S - Semiannually

Table 2

Atmospheric and Terrestrial Monitoring Stations Locations
Watts Bar Nuclear Plant

Sample Station	Tentative Location, Approximate Distance and Direction from Plant
LM - 1 WB	1/2 mile N (3/4 kilometers)
LM - 2 WB	1/2 mile SSW (3/4 kilometers)
PM - 1 WB Smith Bend	3-1/2 miles SW (5-1/2 kilometers)
PM - 2 WB Spring City, TN	7 miles NW (11-1/4 kilometers)
PM - 3 WB	11-1/2 miles NNE (18-1/2 kilometers)
PM - 4 WB Ten Mile, TN	7-3/4 miles NE (12-1/2 kilometers)
PM - 5 WB Decatur, TN	6-1/4 miles S (10 kilometers)
PM - 6 WB Goodfield, TN	9 miles SSW (14-1/2 kilometers)
RM - 1 WB Rockwood, TN (Control)	17-1/4 miles NNE (27-3/4 kilometers)
RM - 2 WB Dayton, TN (Control) (Identical with RM - 2S, Sequoyah Nuclear Plant)	15 miles SW (24-1/4 kilometers)
Farm L	1-1/2 miles SSW (2 kilometers)
Farm M	3-3/4 miles ESE (6 kilometers)
Farm S (Control)	19-1/2 miles SW (31-1/3 kilometers)
Farm B (Control)	15 miles E (24-1/4 kilometers)
Farm C (Control)	16 miles SSW (25-3/4 kilometers)

Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

A. Specific Analyses

NOMINAL LOWER LIMIT OF DETECTION (LLD)*

	Air Particulates pCi/m^3	Charcoal pCi/m^3	Fallout mCi/km^2	Water pCi/l	Vegetation and grain pCi/g, dry	Soil and Sediment pCi/g, dry	Fish, clam flesh, plankton, pCi/g, dry	Clam shells pCi/g, dry	Foods, meat, poultry, pCi/kg, wet	Milk pCi/l
Total α				0.4	0.01				1.5	
Gross α	0.005			2.0	0.05	0.35	0.1	0.7		
Gross β	0.01		0.05	2.4	0.20	0.70	0.1	0.7	25	
^{3}H				330						0.5
^{131}I		0.01								
^{89}Sr	0.005			10	0.25	1.5	0.5	5.0	40	10
^{90}Sr	0.001			2	0.05	0.3	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 x 10^{-2} Bq; 1 mCi = 3.7 x 10^7 Bq.

Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

B. Gamma Analyses

NOMINAL LOWER LIMIT OF DETECTION (LLD)

	Air particulates pCi/m³		Water and milk pCi/l		Vegetation and grain pCi/g, dry		Soil and sediment pCi/g, dry		Fish pCi/g, dry		Clam flesh and plankton pCi/g, dry	Clam shells pCi/g, dry		Foods, tomatoes potatoes, etc.) pCi/kg, wet		Meat and poultry pCi/kg, wet	
	NaI*	Ge(Li)**	NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)	NaI Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)	NaI	Ge(Li)
^{141,144}Ce	0.03		38		0.55		0.35		0.35			0.35		38		90	
^{144}Ce		0.02		33		0.22		0.06		0.06	0.35		0.06		33		40
^{51}Cr	0.07	0.03	60	44	1.10	0.47	0.60	0.10	0.60	0.10	0.56	0.60	0.10	60	44	200	90
^{131}I	0.01	0.01	15	8	0.35	0.09	0.20	0.02	0.20	0.02	0.07	0.20	0.02	15	8	50	20
^{103,106}Ru	0.04		40		0.65		0.45		0.45			0.45		40		150	
^{106}Ru		0.03		40		0.51		0.11		0.11	0.74		0.11		40		90
^{134}Cs	0.01	0.02	10	26	0.20	0.33	0.12	0.08	0.12	0.08	0.48	0.12	0.08	10	26	40	50
^{137}Cs	0.01	0.01	10	5	0.20	0.06	0.12	0.02	0.12	0.02	0.08	0.12	0.02	10	5	40	15
^{95}Zr-Nb	0.01		10		0.20		0.12		0.12			0.12		10		40	
^{95}Zr		0.01		10		0.11		0.03		0.03	0.15		0.03		10		20
^{95}Nb		0.01		5		0.05		0.01		0.01	0.07		0.01		5		15
^{58}Co	0.02	0.01	15	5	0.23	0.05	0.20	0.01	0.20	0.01	0.07	0.20	0.01	15	5	55	15
^{54}Mn	0.02	0.01	10	5	0.20	0.05	0.15	0.01	0.15	0.01	0.08	0.15	0.01	10	5	40	15
^{65}Zn	0.02	0.01	15	9	0.25	0.11	0.23	0.02	0.23	0.02	0.17	0.23	0.02	15	9	70	20
^{60}Co	0.01	0.01	10	5	0.17	0.06	0.11	0.01	0.11	0.01	0.08	0.11	0.01	10	5	30	15
^{40}K	0.10		150		2.50		0.90		0.90			0.90		150		400	
^{140}Ba-La	0.02		15		0.68		0.15		0.15			0.15		15		50	
^{140}Ba		0.02		25		0.34		0.07		0.07	0.30		0.07		25		50
^{140}La		0.01		7		0.08		0.02		0.02	0.10		0.02		7		15

*The NaI(Tl) LLD values are calculated by the method developed by Pasternack and Harley as described in HASL-300 and Nucl. Instr. Methods 91, 533-40 (1971). 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 a given sample. Water is counted in a 3.5-L Marinelli beaker. Vegetation, fish, soil, and sediment are counted in a 1-pint container as dry weight. The average dry weight is 120 grams for vegetation and 400-500 grams for soil sediment and fish. Meat and poultry are counted in a 1-pint container as dry weight, then corrected to wet weight using an average moisture content of 70%. Average dry weight is 250 grams. Air particulates are counted in a well crystal. The counting system consists of a multichannel analyzer and either a 4" x 4" solid or 4" x 5" well NaI(Tl) crystal. The counting time is 4000 seconds. All calculations are performed by the least-squares computer program ALPHA-M. The assumption is made that all samples are analyzed within one week of the collection date.

**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 petrie dishes centered on the detector endcap. The counting system consists of a ND-4420 multichannel analyzer and either a 25%, 14%, 16%, or 29% Ge(Li) detector. The counting time is normally 8 hours. All spectral analysis is performed using the software provided with the ND-4420. 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 (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.	EPA value (±3σ)	TVA Avg.
1/79	5 ± 9	4	18 ± 9	20	6 ± 2.7	6	6 ± 9	7
3/79	14 ± 9	14	63 ± 9	64	21 ± 2.7	17	21 ± 9	18
6/79	9 ± 9	9	30 ± 9	31	10 ± 2.7	9	10 ± 9	9
10/79	10 ± 9	10	31 ± 9	33	10 ± 2.7	10	12 ± 9	11

B. Water (pCi/l)

Date	Gross Alpha		Gross Beta		Strontium-89		Strontium-90		Tritium		Iodine-131*	
	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.
11/78	11 ± 9	12	26 ± 9	27								
12/78									2030±400	2100		
1/79	6 ± 9	7	16 ± 9	17	14 ± 9	14	6 ± 2.7	6				
2/79									1280±570	1260		
3/79	10 ± 9	10	16 ± 9	18								
4/79									2270±400	2270	40 ± 7	40
5/79	18 ± 9	15	22 ± 9	22	23 ± 9	24	30 ± 2.7	26				
6/79									1540±580	1590		
7/79	9 ± 9	11	12 ± 9	13								
8/79									1480±580	1300	26 ± 9	26
9/79	5 ± 9	8	40 ± 9	43	3 ± 9	4	28 ± 2.7	25				
10/79									1560±640	1400		

*Specific analysis for ^{131}I to test the procedures used for the analysis of ^{131}I in milk.

Table 4 (Contd)

Results Obtained in Interlaboratory Comparison Program

C. Gamma-Emitting Radionuclides in Water (pCi/l)

Date	^{51}Cr		^{60}Co		^{65}Zn		^{106}Ru		^{134}Cs		^{137}Cs	
	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.
10/78	117 ± 10	150	23 ± 9	24	82 ± 9	78	46 ± 9	42	25 ± 9	29	125 ± 10	120
2/79	0 ± 9	0	9 ± 9	9	21 ± 9	25	0 ± 9	0	6 ± 9	6	12 ± 9	12
6/79	0 ± 9	0	47 ± 9	48	0 ± 9	0	0 ± 9	0	71 ± 9	72	0 ± 9	0
10/79	113 ± 10	108	6 ± 9	7	0 ± 9	0	0 ± 9	0	7 ± 9	9	11 ± 9	11

D. Tritium in Urine (pCi/l)

Date	EPA value (±3σ)	TVA avg.
12/78	2,150 ± 400	2330
3/79	3,300 ± 600	2350
6/79	1,610 ± 580	1590
9/79	13,200 ± 710	13350

Table 4 (Contd)

Results Obtained in Interlaboratory Comparison Program

E. Milk (pCi/l)

Date	^{89}Sr EPA value (±3σ)	^{89}Sr TVA Avg.	^{90}Sr EPA value (±3σ)	^{90}Sr TVA Avg.	^{131}I EPA value (±3σ)	^{131}I TVA Avg.	^{137}Cs EPA value (±3σ)	^{137}Cs TVA Avg.	^{140}Be EPA value (±3σ)	^{140}Be TVA Avg.	^{40}K EPA value (±3σ)	^{40}K TVA Avg.
1/79	33 ± 9	33	19 ± 2.7	21	105 ± 10	110	49 ± 9	48	0 ± 9	2	1560±135	1520
4/79	38 ± 9	38	54 ± 5.2	61	96 ± 9	95	154 ± 14	150	0 ± 9	0	1560±135	1450
7/79	5 ± 9	5	11 ± 2.7	13	17 ± 9	21	12 ± 9	11	0 ± 9	0	1630±145	1570
10/79	25 ± 9	25	17 ± 3.5	22	637 ± 55	636	49 ± 9	45	0 ± 9	0	1470±125	1490

F. Food (pCi/kg wet weight)

3/79	48 ± 9	53	22 ± 2.7	27	90 ± 9	91	74 ± 9	73	0 ± 9	0	2700±235	2810
7/79	8 ± 9	12	3 ± 1.1	7	18 ± 9	16	33 ± 9	35	0 ± 9	0	2650±225	3000
11/79	Results not received at this time											

Atmospheric Monitoring

The atmospheric monitoring network is divided into three subgroups. Two local air monitors are located within the plant boundary. Six perimeter air monitors are located at distances out to 11 miles (18 kilometers) from the plant in the towns of Spring City and Decatur, and four other populated areas. The remote air monitors are located at distances out to 17 miles (27 kilometers) from the plant in the towns of Dayton and Rockwood. See Table 2 and Figures 2, 3, and 4.

At each monitor, air is continuously pulled through a Hollingsworth and Vose HV-70 particulate filter at a regulated flow of 3 ft^3/min (0.085 m^3/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 collect rainwater on a continuous basis, and a horizontal platform covered with gummed acetate to catch and hold heavy particle fallout. Moisture is collected from the atmosphere at each local monitor and at one remote monitor and analyzed for tritium. Thermoluminescent dosimeters are used to record gamma radiation levels at each remote and perimeter station.

Each of the local and perimeter 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.

Air filters are collected weekly and analyzed for gross beta activity. During this period, five samples were not obtained because of equipment malfunction, two samples were not obtained because of severe weather, and two samples were lost during strontium analysis. No analyses are performed until 3 days after sample collection. The samples are composited monthly for analysis of specific gamma-emitting radionuclides and quarterly for ^{89}Sr, ^{90}Sr analysis. The results are presented in Table 6.

With reference to Table 5, which contains the maximum permissible concentrations (MPC) recommended by 10 CFR 20 for nonoccupational exposure, it is seen that the maximum beta concentration is 0.05 percent MPC.

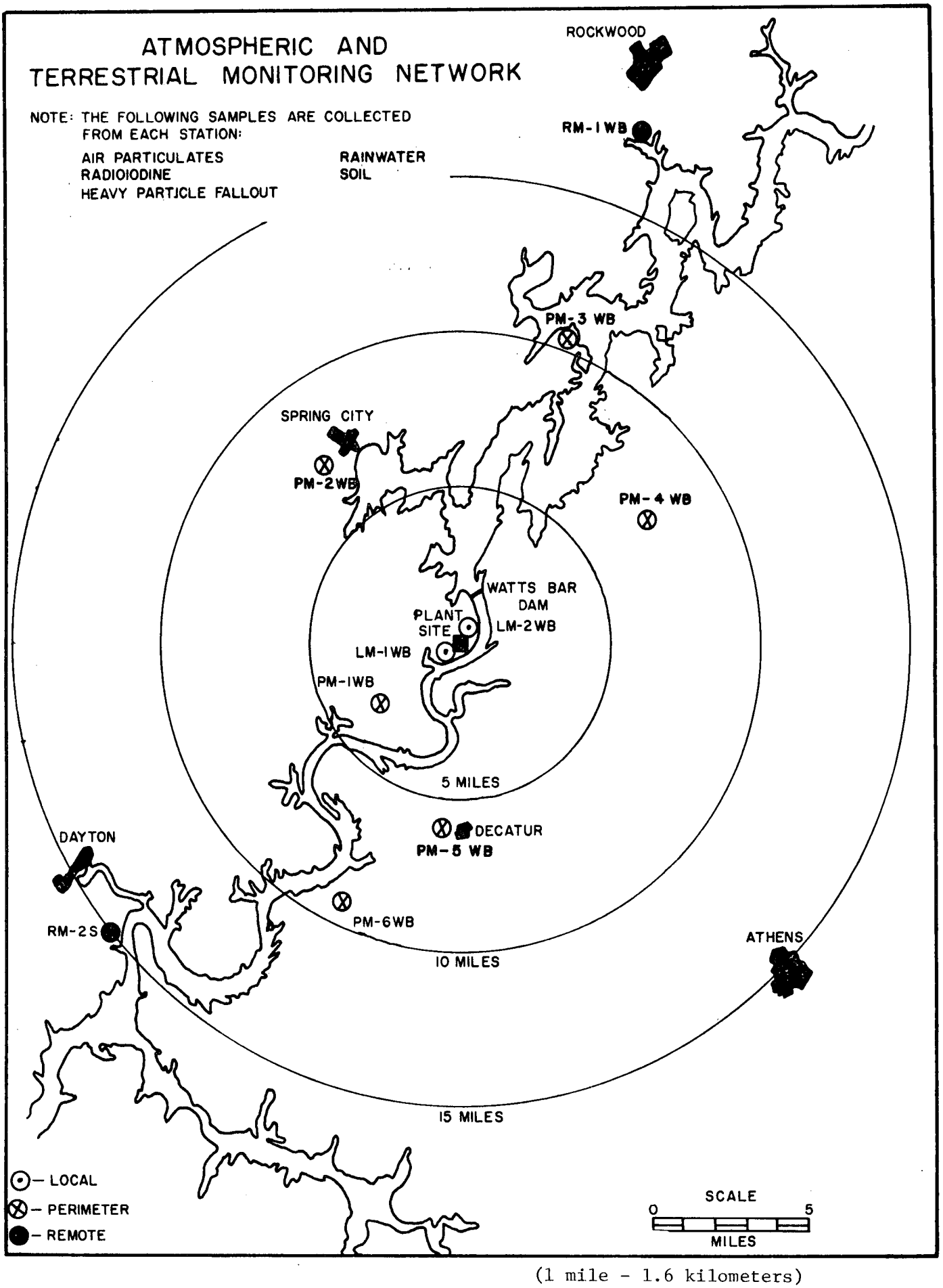
Rainwater is collected and analyzed for specific gamma-emitting isotopes, and radiostrontium. A gamma scan is performed on a 3.5-liter monthly sample. The strontium isotopes are separated chemically and counted in a low background system. The results are shown in Table 7.

The gummed acetate that is used to collect heavy particle fallout is changed monthly. During this period, one sample was damaged to the extent that insufficient material remained for analysis. The sample is ashed and counted for gross beta activity. The results are given in Table 8.

Charcoal filters are collected and analyzed for radioiodine. During this period, two samples were lost, six were not obtained because of equipment malfunction, and two were not obtained because of severe weather. The filter is counted in a single channel analyzer system. The data are shown in Table 9, where the highest value reported is 0.06 percent MPC for ^{131}I.

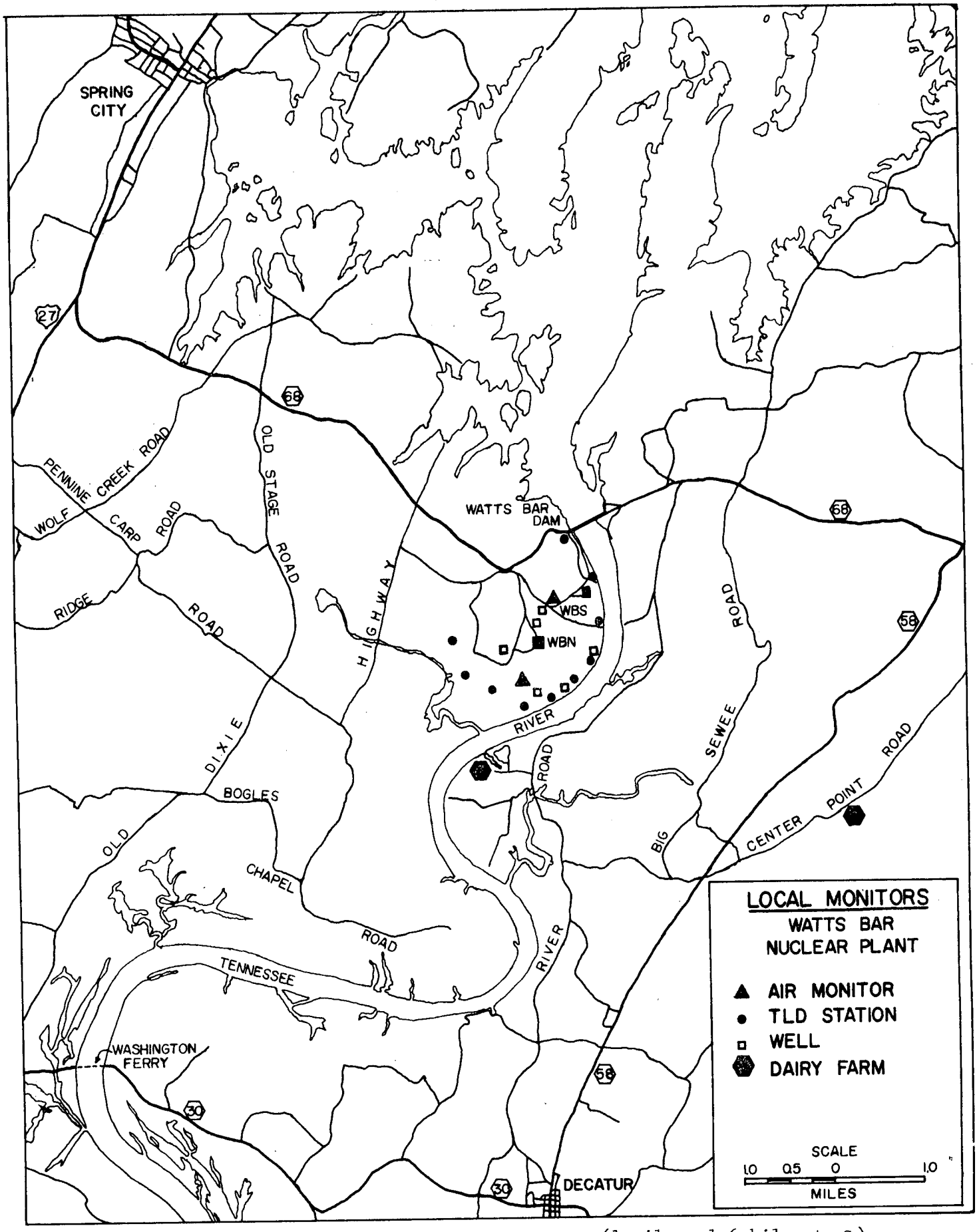
An atmospheric moisture collection device containing molecular sieve is located at each local monitor and at one remote monitor. Samples are taken every other week, the moisture driven off the molecular sieve, collected in a cold trap, distilled, and counted for tritium content. The results are shown in Table 10, where the highest value reported is 0.006 percent MPC for ^{3}H in air. In this reporting period, insufficient material for analysis was available in three samples, flow data was unavailable for two samples, and eleven samples were not collected because of equipment malfunction.

Figure 2



(1 mile - 1.6 kilometers)

Figure 3



(1 mile = 1.6 kilometers)

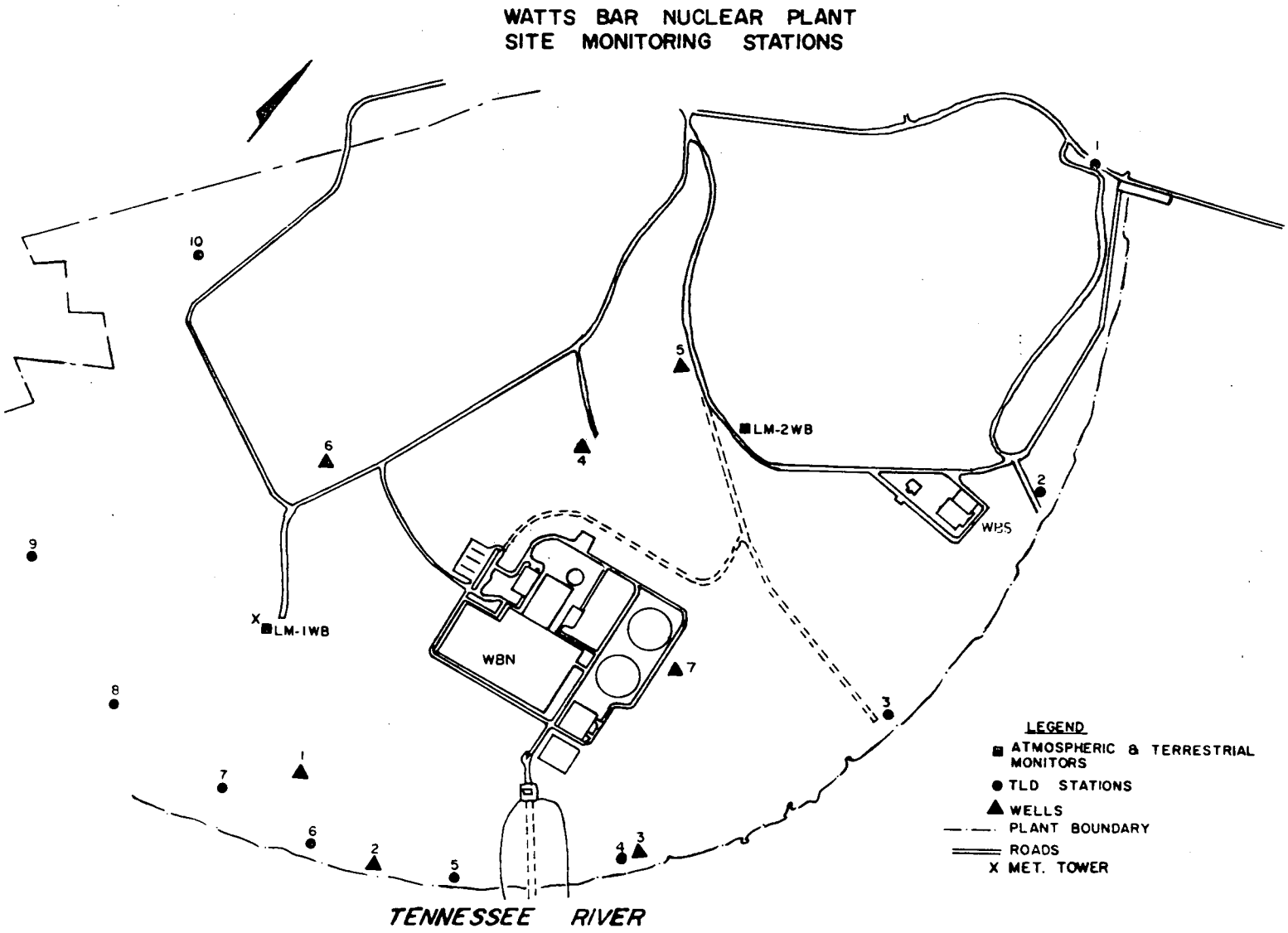

WATTS BAR NUCLEAR PLANT
SITE MONITORING STATIONS
LM-2WB
LM-1WB
WBS
WBN
TENNESSEE RIVER
LEGEND
ATMOSPHERIC & TERRESTRIAL MONITORS
TLD STATIONS
WELLS
PLANT BOUNDARY
ROADS
MET. TOWER

Figure 4

Table 5

MAXIMUM PERMISSABLE CONCENTRATIONS

FOR NONOCCUPATIONAL EXPOSURE

	MPC	
	In Water pCi/l*	In Air 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 WATTS BAR — DOCKET NO. RH-80-8-W81
LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA 513	0.010	0.03(404/ 409) 0.01- 0.05	PM3 CEDINE BIBLE CAMP 11.5 M. NNE	0.03(48/ 49) 0.01- 0.05	0.03(85/ 104) 0.01- 0.05	
GAMMA (NAI) 113						
CE-141,144	0.030	0.03(3/ 88) 0.03- 0.04	PM4 TEN MILE 7.75 MILES NE	0.04(1/ 9) 0.04- 0.04	0.03(1/ 25) 0.03- 0.03	
BA-140,LA-140	0.020	0.02(1/ 88) 0.02- 0.02	PM2 SPRING CITY 7.0 MILES NW	0.02(1/ 10) 0.02- 0.02	25 VALUES <LLD	
I-131	0.010	0.02(10/ 88) 0.01- 0.05	PM1 PETTY FARM 3.75 MILES WSW	0.03(2/ 10) 0.02- 0.05	0.01(3/ 25) 0.01- 0.02	
BE-7	NOT ESTAB	0.09(87/ 88) 0.02- 0.16	PM6 GOODFIELD 9.0 MILES SSW	0.11(11/ 11) 0.07- 0.15	0.09(22/ 25) 0.04- 0.16	
GAMMA (GELI) 17						
K-40	NOT ESTAB	0.14(4/ 16) 0.08- 0.32	PM1 PETTY FARM 3.75 MILES WSW	0.32(1/ 3) 0.32- 0.32	1 VALUES <LLD	
BI-214	0.020	0.03(5/ 16) 0.02- 0.06	PM3 CEDINE BIBLE CAMP 11.5 M. NNE	0.06(1/ 1) 0.06- 0.06	1 VALUES <LLD	
PB-214	0.020	0.03(4/ 16) 0.02- 0.05	PM3 CEDINE BIBLE CAMP 11.5 M. NNE	0.05(1/ 1) 0.05- 0.05	1 VALUES <LLD	
PB-212	NOT ESTAB	0.01(1/ 16) 0.01- 0.01	PM3 CEDINE BIBLE CAMP 11.5 M. NNE	0.01(1/ 1) 0.01- 0.01	1 VALUES <LLD	
BE-7	0.050	0.08(13/ 16) 0.07- 0.10	PM1 PETTY FARM 3.75 MILES WSW	0.08(1/ 3) 0.08- 0.08	1 VALUES <LLD	
TL-208	NOT ESTAB	0.00(1/ 16) 0.00- 0.00	PM4 TEN MILE 7.75 MILES NE	0.00(1/ 4) 0.00- 0.00	1 VALUES <LLD	
AC-228	NOT ESTAB	16 VALUES <LLD			0.02(1/ 1) 0.02- 0.02 8 VALUES <LLD	
SR 89 38	0.005	30 VALUES <LLD ANALYSIS PERFORMED				
SR 90 38	0.001	0.00(1/ 30) 0.00- 0.00	PM3 CEDINE BIBLE CAMP 11.5 M. NNE	0.00(1/ 4) 0.00- 0.00	0.00(2/ 8) 0.00- 0.00	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 7

RADIOACTIVITY IN RAINWATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b]	RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (NAI)							
117							
BA-140,LA-140	15.000	18.60(1/ 95)	PM6 GOODFIELD	18.60(	1/ 12)	22 VALUES <LLD	
		18.60- 18.60	9.0 MILES SSW	18.60-	18.60		
I-131	15.000	33.16(5/ 95)	PM2 SPRING CITY	41.40(	1/ 13)	16.50(1/ 22)	
		19.80- 49.00	7.0 MILES NW	41.40-	41.40	16.50- 16.50	
BE-7	NOT ESTAB	40.69(44/ 95)	PM6 GOODFIELD	53.61(	7/ 12)	37.03(10/ 22)	
		2.70- 72.20	9.0 MILES SSW	26.20-	72.20	14.40- 60.30	
GAMMA (GELI)							
13							
K-40	NOT ESTAB	62.86(4/ 9)	PM5 DECATUR	97.30(	1/ 3)	152.95(2/ 4)	
		40.01- 97.30	6.25 MILES S	97.30-	97.30	149.90- 156.00	
BI-214	NOT ESTAB	20.56(5/ 9)	PM6 GOODFIELD	29.63(	1/ 1)	10.72(1/ 4)	
		8.39- 37.50	9.0 MILES SSW	29.63-	29.63	10.72- 10.72	
PB-214	NOT ESTAB	13.92(4/ 9)	PM6 GOODFIELD	19.68(	1/ 1)	4 VALUES <LLD	
		6.49- 22.74	9.0 MILES SSW	19.68-	19.68		
PB-212	NOT ESTAB	23.69(2/ 9)	PM5 DECATUR	23.69(	2/ 3)	4 VALUES <LLD	
		15.53- 31.84	6.25 MILES S	15.53-	31.84		
BE-7	NOT ESTAB	9 VALUES <LLD				49.01(1/ 4)	
						49.01- 49.01	
SR 89	10.000	104 VALUES <LLD				26 VALUES <LLD	
130		ANALYSIS PERFORMED					
SR 90	2.000	104 VALUES <LLD				26 VALUES <LLD	
130		ANALYSIS PERFORMED					

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 8

RADIOACTIVITY IN HEAVY PARTICLE FALLOUT

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RM-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION [a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F) [b] RANGE [b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F) [b] RANGE [b]	CONTROL LOCATIONS MEAN (F) [b] RANGE [b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	0.050	0.23(99/ 103)	LM2 N. WESP GATE	0.47(13/ 13)	0.17(26/ 26)	
129		0.05- 1.36	0.5 MILES N	0.15- 1.36	0.07- 0.36	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 9

RADIOACTIVITY IN CHARCOAL FILTERS

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-P-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
IODINE IN AIR 510	0.010	0.02(88/ 407) 0.01- 0.05	PM2 SPRING CITY 7.0 MILES NW	0.02(12/ 52) 0.01- 0.05	0.02(22/ 103) 0.01- 0.06	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 10

RADIOACTIVITY IN ATMOSPHERIC MOISTURE

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-E-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
TRITIUM	NOT ESTAB	2.86(35/ 40)	LM1 ENV DATA STA	2.87(21/ 23)	2.00(22/ 22)	
62		0.00- 13.00	0.5 MILES SSW	0.00- 13.00	0.00- 5.00	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

Terrestrial Monitoring

Milk

Milk was collected from two farms within a 10-mile radius of the plant (see Figure 3), and from one control farm. Also, sampling was initiated at two additional control farms in June. Raw milk was analyzed monthly for ^{131}I, gamma-emitting isotopes, and for radiostrontium. Three samples were unavailable during this reporting period. The results are shown in Table 11.

Vegetation

Vegetation samples were collected three times during the reporting period from the farms from which milk was collected and analyzed for gamma-emitting radionuclides and strontium-89,90 content. Approximately 1-2 kilograms of grass was broken or cut at ground level and returned for analysis. Efforts were made to sample vegetation that was representative of the pasturage where cattle graze. Table 12 gives the results obtained from the laboratory analyses.

Soil

Soil samples were collected semiannually near each monitoring station to provide an indication of any long-term buildup of radioactivity in the environment. An auger or "cookie cutter" type sampler was used to obtain samples of the top two inches (5 cm) of soil. These samples were analyzed and gross beta activity, gama-emitting radionuclides, and for strontium-89 and -90. The results are given in Table 13.

Ground Water

Well water was obtained monthly from the dairy farms from which milk was sampled and from six onsite wells. During this period three samples were not taken because the sampling stations were inaccessible. All samples were analyzed for gamma-emitting radionuclide and a quarterly composite was analyzed for tritium. The results are shown in Table 14.

Public Water

Potable water supplies taken from the Tennessee River in the vicinity of Watts Bar Nuclear Plant were sampled and analyzed for gross beta, gamma-emitting radionuclides, $^{89,90}Sr$, and tritium. The results, shown in Table 15, indicate that the maximum beta concentration is 0.26 percent MPC.

Environmental Gamma Radiation Levels

Thermoluminescent dosimeters (TLD's) are placed at ten stations around the plant near the site boundary (see Figures 3 and 4) and at the

perimeter and remote monitors to determine the gamma exposure rates at these locations. The TLD's are changed every 3 months. The quarterly gamma radiation levels determined from these TLD's are given in Table 16. It should be noted that, even though the plant has not achieved criticality, the average radiation levels onsite are generally 0-5 mR/quarter higher than the levels offsite. This may be attributable to natural variations in environmental radiation levels, earth moving activities onsite, the mass of concrete employed in the construction of the plant, or other influences.

Beef, Poultry, and Food Crops

Food crops and poultry raised in the vicinity of Watts Bar Nuclear Plant are sampled annually as they become available during the growing season. During this sampling period, samples of poultry, corn, green beans, potatoes, and tomatoes were collected and analyzed for specific gamma-emitting radionuclides. The results are given in Tables 17 and 18. No sample of corn was taken from a control location.

TABLE II

RADIOACTIVITY IN MILK

PCI/L - 0.037 BQ/L

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-P-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (NAI) 52						
CS-137	10.000	10.70(2/ 25) 10.50- 10.90	MULLINS FARM 3.75 MILES ESE	10.70(2/ 13) 10.50- 10.90	27 VALUES <LLD	
K-40	150.000	1281.13(25/ 25) 1111.50- 1453.30	LAYMAN FARM 1.5 MILES SSW	1313.29(12/ 12) 1112.30- 1428.30	1269.08(27/ 27) 1052.10- 1467.60	
IODINE IN MILK 52	0.500	25 VALUES <LLD			27 VALUES <LLD	
SR 89 52	10.000	ANALYSIS PERFORMED			27 VALUES <LLD	
SR 90 52	2.000	4.19(24/ 25) 2.25- 7.11	MULLINS FARM 3.75 MILES ESE	4.70(13/ 13) 2.26- 6.68	4.45(27/ 27) 2.69- 8.32	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 12

RADIOACTIVITY IN VEGETATION

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-B-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI)						
18						
CE-144	0.220	1.07(2/ 9)	PM1 PETTY FARM	1.07(1/ 3)	9 VALUES <LLD	
		1.06- 1.07	3.75 MILES WSW	1.07- 1.07		
CS-137	0.060	0.27(2/ 9)	MULLINS FARM	0.27(1/ 3)	0.10(1/ 9)	
		0.27- 0.27	3.75 MILES ESE	0.27- 0.27	0.10- 0.10	
K-40	NOT ESTAB	16.02(9/ 9)	LAYMAN FARM	17.55(3/ 3)	25.54(7/ 9)	
		5.19- 26.91	1.5 MILES SSW	8.11- 26.91	6.42- 36.11	
BI-214	0.100	0.27(8/ 9)	LAYMAN FARM	0.53(2/ 3)	0.46(6/ 9)	
		0.12- 0.63	1.5 MILES SSW	0.44- 0.63	0.16- 0.89	
PB-214	NOT ESTAB	0.20(8/ 9)	LAYMAN FARM	0.24(2/ 3)	0.29(6/ 9)	
		0.13- 0.27	1.5 MILES SSW	0.21- 0.27	0.12- 0.50	
PB-212	NOT ESTAB	0.12(6/ 9)	LAYMAN FARM	0.19(2/ 3)	0.14(6/ 9)	
		0.04- 0.24	1.5 MILES SSW	0.14- 0.24	0.02- 0.21	
BE-7	NOT ESTAB	8.65(8/ 9)	PM1 PETTY FARM	10.87(3/ 3)	6.64(7/ 9)	
		3.31- 23.26	3.75 MILES WSW	3.31- 23.26	1.98- 15.31	
TL-208	NOT ESTAB	0.07(3/ 9)	LAYMAN FARM	0.11(1/ 3)	9 VALUES <LLD	
		0.03- 0.11	1.5 MILES SSW	0.11- 0.11		
AC-228	NOT ESTAB	9 VALUES <LLD			0.54(1/ 9)	
					0.54- 0.54	
SR 89	0.250	9 VALUES <LLD			9 VALUES <LLD	
18		ANALYSIS PERFORMED				
SR 90	0.050	0.24(9/ 9)	MULLINS FARM	0.30(3/ 3)	0.19(8/ 9)	
18		0.16- 0.47	3.75 MILES ESE	0.18- 0.47	0.13- 0.27	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 13

RADIOACTIVITY IN SOIL

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS[b] MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA 20	0.700	35.38(16/ 16) 20.37- 59.21	LM1 ENV DATA STA 0.5 MILES SSW	53.26(2/ 2) 47.30- 59.21	22.44(4/ 4) 17.60- 33.09	
GAMMA (GELI) 20						
CE-144	0.060	16 VALUES <LLD			0.10(2/ 4) 0.10- 0.10	
CS-137	0.020	0.62(15/ 16) 0.12- 1.49	PM5 DECATUR 6.25 MILES S	1.15(2/ 2) 0.81- 1.49	0.27(4/ 4) 0.12- 0.36	
K-40	0.250	8.69(16/ 16) 3.55- 18.19	LM1 ENV DATA STA 0.5 MILES SSW	16.80(2/ 2) 15.40- 18.19	3.62(4/ 4) 2.49- 6.32	
BI-214	0.050	0.91(16/ 16) 0.70- 1.12	PM1 PETTY FARM 3.75 MILES WSW	1.07(2/ 2) 1.02- 1.12	0.88(4/ 4) 0.65- 1.30	
BI-212	0.100	0.70(16/ 16) 0.51- 0.93	LM1 ENV DATA STA 0.5 MILES SSW	0.85(2/ 2) 0.79- 0.91	0.46(4/ 4) 0.36- 0.70	
PB-214	0.050	0.94(16/ 16) 0.75- 1.13	PM1 PETTY FARM 3.75 MILES WSW	1.13(2/ 2) 1.13- 1.13	0.89(4/ 4) 0.66- 1.33	
PB-212	NOT ESTAB	1.05(16/ 16) 0.66- 1.50	LM1 ENV DATA STA 0.5 MILES SSW	1.24(2/ 2) 1.18- 1.30	0.66(4/ 4) 0.51- 0.77	
RA-226	0.050	0.91(16/ 16) 0.70- 1.12	PM1 PETTY FARM 3.75 MILES WSW	1.07(2/ 2) 1.02- 1.12	0.88(4/ 4) 0.65- 1.30	
RA-223	NOT ESTAB	0.35(3/ 16) 0.27- 0.41	LM1 ENV DATA STA 0.5 MILES SSW	0.41(1/ 2) 0.41- 0.41	4 VALUES <LLD	
BE-7	0.160	0.24(1/ 16) 0.24- 0.24	PM3 CEDINE BIBLE CAMP 11.5 M. NNE	0.24(1/ 2) 0.24- 0.24	0.21(1/ 4) 0.21- 0.21	
TL-208	0.020	0.38(16/ 16) 0.28- 0.49	LM1 ENV DATA STA 0.5 MILES SSW	0.47(2/ 2) 0.44- 0.49	0.23(4/ 4) 0.18- 0.33	
AC-228	0.060	1.13(16/ 16) 0.80- 1.48	LM1 ENV DATA STA 0.5 MILES SSW	1.42(2/ 2) 1.35- 1.48	0.67(4/ 4) 0.51- 0.91	
PA-234M	NOT ESTAB	16 VALUES <LLD			4.31(1/ 4) 4.31- 4.31	
PA-228	NOT ESTAB	0.04(2/ 16) 0.03- 0.04	LM1 ENV DATA STA 0.5 MILES SSW	0.04(1/ 2) 0.04- 0.04	4 VALUES <LLD	
SR 89 20	1.500	16 VALUES <LLD ANALYSIS PERFORMED			4 VALUES <LLD	
SR 90 20	0.300	0.36(6/ 16) 0.30- 0.42	PM2 SPRING CITY 7.0 MILES NW	0.41(2/ 2) 0.39- 0.42	4 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 14

RADIOACTIVITY IN WELL WATER

PCI/L - 0.037 NG/L

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-B-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]		LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b]	RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (NAI)								
109		71 VALUES <LLD ANALYSIS PERFORMED					38 VALUES <LLD	
GAMMA (GELI)								
5								
K-40	NOT ESTAB	75.02(	2/ 4)	WBN WELL #4	94.67(	1/ 1)	1 VALUES <LLD	
		55.37-	94.67	ONSITE NNW	94.67-	94.67		
BI-214	NOT ESTAB	38.65(	2/ 4)	WBN WELL #4	70.11(	1/ 1)	43.30(	1/ 1)
		7.19-	70.11	ONSITE NNW	70.11-	70.11	43.30-	43.30
PB-214	NOT ESTAB	40.69(	1/ 4)	WBN WELL #4	40.69(	1/ 1)	30.40(	1/ 1)
		40.69-	40.69	ONSITE NNW	40.69-	40.69	30.40-	30.40
PB-212	NOT ESTAB	16.20(	2/ 4)	WBN WELL #4	21.18(	1/ 1)	24.27(	1/ 1)
		11.21-	21.18	ONSITE NNW	21.18-	21.18	24.27-	24.27
TRITIUM	330.000	341.00(	1/ 23)	W2N WELL #3	341.00(	1/ 4)	12 VALUES <LLD	
35		341.00-	341.00	ONSITE SE	341.00-	341.00		

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 15

RADIOACTIVITY IN PUBLIC WATER SUPPLY

PCI/L - 0.037 BQ/L

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS[a]
GROSS BETA	2.400	3.94(18/ 26)	CF INDUSTRIES	4.00(11/ 13)	5.18(5/ 26)	
52		2.42- 6.84	TRM 473.0	2.42- 6.84	3.84- 7.79	
GAMMA (NAI)						
46		24 VALUES <LLD ANALYSIS PERFORMED			22 VALUES <LLD	
GAMMA (GELI)						
6						
K-40	NOT ESTAB	2 VALUES <LLD			74.23(2/ 4)	
					52.88- 95.57	
BI-214	NOT ESTAB	10.96(1/ 2)	CF INDUSTRIES	10.96(1/ 2)	10.30(1/ 4)	
		10.96- 10.96	TRM 473.0	10.96- 10.96	10.30- 10.30	
PB-212	NOT ESTAB	2.07(1/ 2)	CF INDUSTRIES	2.07(1/ 2)	9.28(1/ 4)	
		2.07- 2.07	TRM 473.0	2.07- 2.07	9.28- 9.28	
SR 89	10.000	8 VALUES <LLD			8 VALUES <LLD	
16		ANALYSIS PERFORMED				
SR 90	2.000	8 VALUES <LLD			8 VALUES <LLD	
16		ANALYSIS PERFORMED				
TRITIUM	330.000	476.00(1/ 8)	CF INDUSTRIES	476.00(1/ 4)	8 VALUES <LLD	
16		476.00- 476.00	TRM 473.0	476.00- 476.00		

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

Table 16

ENVIRONMENTAL GAMMA RADIATION LEVELS

Quarter	Location	Environmental Gamma Radiation Levels	
		μR/Hour	mR/Quarter
March-June 1979 -	On-Site (10)*		
	Maximum	11.8	25.9
	Minimum	7.8	17.1
	Average**	9.9 ± 2.4	21.6 ± 5.3
	Off-Site (8)		
	Maximum	10.0	21.8
	Minimum	6.5	14.2
	Average	7.7 ± 2.2	16.8 ± 4.7
July-August 1979	On-Site (10)		
	Maximum	13.3	29.2
	Minimum	5.8	12.7
	Average	9.4 ± 5.6	20.5 ± 12.3
	Off-Site (8)		
	Maximum	11.8	25.9
	Minimum	5.9	13.0
	Average	9.3 ± 3.4	20.3 ± 7.5
September-November 1979	On-Site (10)		
	Maximum	12.1	26.5
	Minimum	8.8	19.2
	Average	10.2 ± 1.9	22.3 ± 4.1
	Off-Site (8)		
	Maximum	10.6	23.3
	Minimum	6.2	13.6
	Average	8.1 ± 2.9	17.8 ± 6.4
December 1979 - February 1980	On-Site (10)		
	Maximum	13.3	29.1
	Minimum	7.8	17.0
	Average	10.6 ± 2.8	23.2 ± 6.2
	Off-Site (8)		
	Maximum	9.8	21.5
	Minimum	5.8	12.8
	Average	8.2 ± 2.4	17.9 ± 5.3

*Number of stations (normally three TLD's at each station)
**All averages reported ±2σ

TABLE 17

RADIOACTIVITY IN FOOD CROPS

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RM-80-B-WB1
LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
RADIOACTIVITY IN CORN						
GROSS BETA 2	25.000	5366.85(2/ 2) 4330.44- 6403.26	PM1 PETTY FARM 3.75 MILES WSW	5366.85(2/ 2) 4330.44- 6403.26		
GAMMA (GELI) 2						
K-40	NOT ESTAB	2416.00(2/ 2) 2013.00- 2819.00	PM1 PETTY FARM 3.75 MILES WSW	2416.00(2/ 2) 2013.00- 2819.00		
RADIOACTIVITY IN GREEN BEANS						
GROSS BETA 2	25.000	4061.94(1/ 1) 4061.94- 4061.94	PM1 PETTY FARM 3.75 MILES WSW	4061.94(1/ 1) 4061.94- 4061.94	4536.39(1/ 1) 4536.39- 4536.39	
GAMMA (GELI) 2						
K-40	NOT ESTAB	1960.00(1/ 1) 1960.00- 1960.00	PM1 PETTY FARM 3.75 MILES WSW	1960.00(1/ 1) 1960.00- 1960.00	2344.00(1/ 1) 2344.00- 2344.00	
PB-212	NOT ESTAB	1 VALUES <LLD			5.76(1/ 1) 5.76- 5.76	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 17 (Cont.)

RADIOACTIVITY IN FOOD CROPS

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-B-081
LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

RADIOACTIVITY IN POTATOES

GROSS BETA	25.000	8348.70(1/ 1)	PM1 PETTY FARM	8348.70(1/ 1)	4295.38(1/ 1)
	2	8348.70- 8348.70	3.75 MILES WSW	8348.70- 8348.70	4295.38- 4295.38
GAMMA (GELI)					
	2				
CS-137	5.000	1 VALUES <LLD			5.57(1/ 1)
					5.57- 5.57
K-40	NOT ESTAB	3804.00(1/ 1)	PM1 PETTY FARM	3804.00(1/ 1)	3711.00(1/ 1)
		3804.00- 3804.00	3.75 MILES WSW	3804.00- 3804.00	3711.00- 3711.00
BI-214	NOT ESTAB	10.70(1/ 1)	PM1 PETTY FARM	10.70(1/ 1)	1 VALUES <LLD
		10.70- 10.70	3.75 MILES WSW	10.70- 10.70	
PB-212	NOT ESTAB	5.90(1/ 1)	PM1 PETTY FARM	5.90(1/ 1)	1 VALUES <LLD
		5.90- 5.90	3.75 MILES WSW	5.90- 5.90	

RADIOACTIVITY IN TOMATOES

GROSS BETA	25.000	4103.91(1/ 1)	2.5 MILES WSW	4103.91(1/ 1)	5814.00(1/ 1)
	2	4103.91- 4103.91		4103.91- 4103.91	5814.00- 5814.00
GAMMA (GELI)					
	2				
K-40	NOT ESTAB	2046.00(1/ 1)	2.5 MILES WSW	2046.00(1/ 1)	2904.00(1/ 1)
		2046.00- 2046.00		2046.00- 2046.00	2904.00- 2904.00

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 18

RADIOACTIVITY IN POULTRY

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RM-80-8-WB1
LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN[b] NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS[b] MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI) 2						
K-40	NOT ESTAB	1635.90(1/ 1) 1635.90- 1635.90	LAYMAN FARM 1.5 MILES SSW	1635.90(1/ 1) 1635.90- 1635.90	1 VALUES <LLD	
BI-214	NOT ESTAB	12.94(1/ 1) 12.94- 12.94	LAYMAN FARM 1.5 MILES SSW	12.94(1/ 1) 12.94- 12.94	1 VALUES <LLD	
PB-214	NOT ESTAB	12.64(1/ 1) 12.64- 12.64 12.64- 12.64	LAYMAN FARM 1.5 MILES SSW 1.5 MILES SSW	12.64(1/ 1) 12.64- 12.64 12.64- 12.64	1 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

Reservoir Monitoring

Samples of water and aquatic media are collected quarterly along five river stations in Chickamauga and Watts Bar Reservoirs--at Tennessee River miles (TRM) 496.5, 518.0, 527.4. 529.9, and 532.1. Samples collected for radiological analyses include sediment, plankton, and Asiatic clams from four stations; water from three of these stations; and fish from Watts Bar, Chickamauga and Nickajack Reservoirs (see Table 19). The locations of these stations are shown on the accompanying map (Figure 5) and conform to sediment ranges established and surveyed by the Data Services Branch, TVA.

Samples of water, net plankton, sediment, and Asiatic clams were collected quarterly and analyzed for radioactivity. In addition, samples of the flesh of two commercial and one game species of fish and the whole body of one commercial fish species were collected and analyzed semiannually.

Water

Grab water samples were collected quarterly from three locations in the Tennessee River; one upstream from the plant discharge area, one immediately downstream from the discharge area, and one approximately 9 miles downstream. The samples were analyzed for gamma-emitting radionuclides, ^{89}Sr, ^{90}Sr, and ^{3}H. Results are displayed in Table 20.

Fish

Radiological monitoring for fish was accomplished by analyses of composite samples of adult fish taken from each of three contiguous reservoirs--Watts Bar, Chickamauga, and Nickajack. 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 Browns Ferry Nuclear Plant preoperational monitoring program. Three species, white crappie, channel catfish, and smallmouth buffalo, were collected representing both commercial and game species. Sufficient fish were collected in each reservoir to yield 250 or 300 grams oven-dry weight for analytical purposes. All samples were analyzed for gamma, gross alpha, and gross beta activity and for ^{89}Sr and ^{90}Sr content. The composite samples contained approximately the same quantity of flesh from each fish. For each composite a subsample of material was drawn for counting. Results are given in Tables 21, 22, 23, and 24.

Plankton

As indicated in Table 19, net plankton was collected for radiological analyses at four stations by vertical tows with a one-half meter, 100 micro-mesh net. For analytical accuracy, at least 50 grams

(wet weight) of material is required; and collection of such amounts will probably be practical only during the period April to September because of seasonal variability in plankton abundance. All samples were analyzed for gross beta activity. Quantities of most samples were not sufficient for the analysis of specific gamma-emitting radionuclides, ^{89}Sr and ^{90}Sr. In addition, four samples yielded insufficient quantities for gross beta analysis. Sample results are given in Table 25.

Sediment

Sediment samples were collected from dredge hauls made for bottom fauna. Gamma activity and ^{89}Sr and ^{90}Sr content were determined in samples collected from points in four cross sections. Three samples contained insufficient quantity for gross beta and strontium analyses and two of these samples did not contain sufficient material for gamma analysis. Each sample was a composite obtained by combining equal volumes of sediment from each of three dredge hauls at a point in the cross section. Results are given in Table 26.

Asiatic Clams

Samples of Asiatic clams were collected with a Ponar dredge from four stations and analyzed for gamma activity. Results are given in Tables 27 and 28.

Table 19

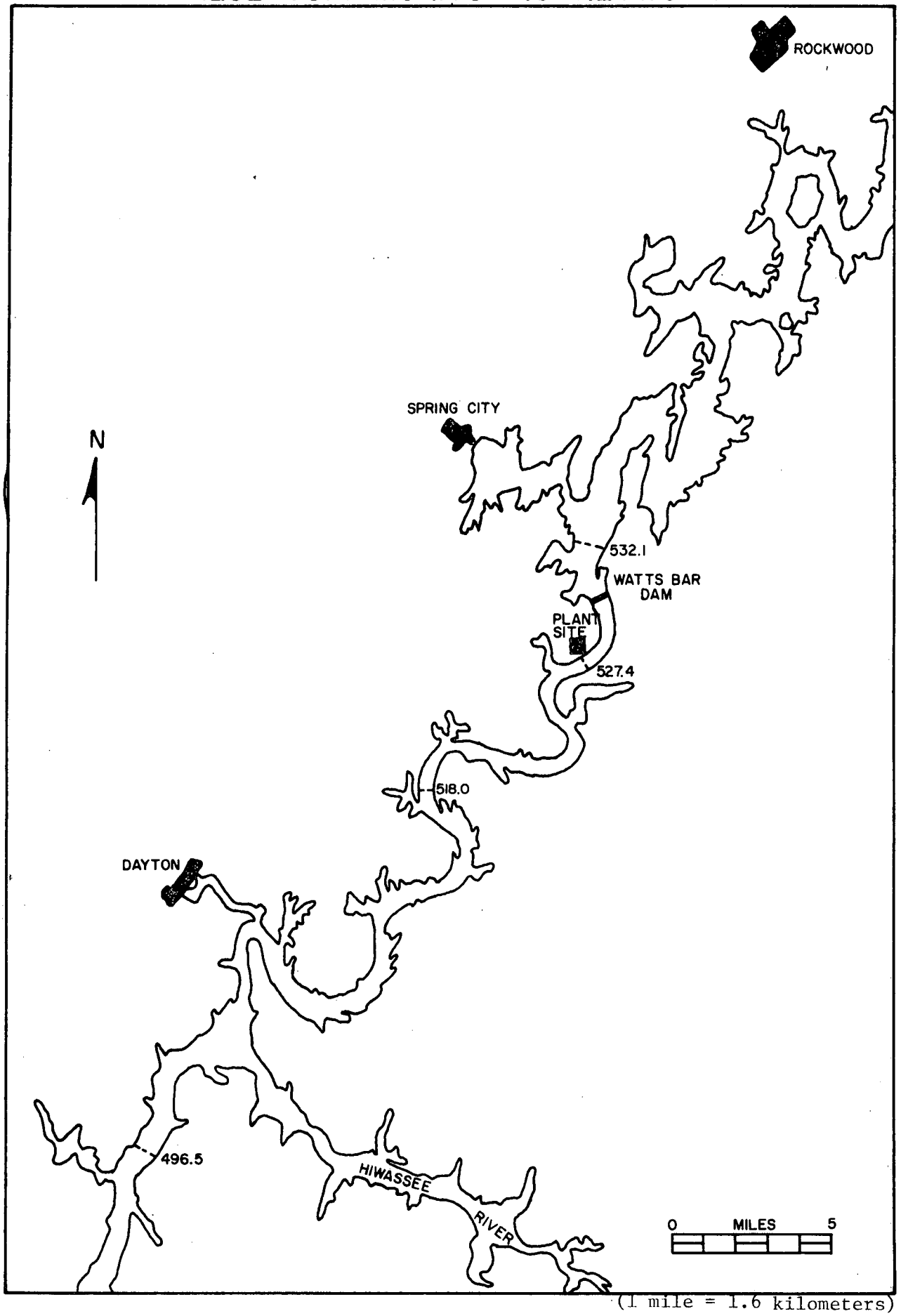
Sampling Schedule - Reservoir Monitoring

Tennessee River (Mile)	Biological Samples				Water Samples	
	Plankton	Benthic Fauna	Sediment	Fish*	Distance from Left Bank, %	Depths (Meters)
532.1	X	X	X			
529.9					90	1
527.4	X	X	X		67	1
518.0	X	X	X		67	0
496.5	X	X	X			

*Fish samples are taken from Watts Bar, Chickamauga, and Nickajack Reservoirs.

Figure 5

RESERVOIR MONITORING NETWORK



(1 mile = 1.6 kilometers)

TABLE 20

RADIOACTIVITY IN SURFACE WATER TOTAL

PCI/L - 0.037 BQ/L

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-B-W81

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD) [a]	ALL INDICATOR LOCATIONS MEAN (F) [b] RANGE [b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F) [b] RANGE [b]	CONTROL LOCATIONS MEAN (F) [b] RANGE [b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA 12	2.400	2.88(3/ 8) 2.55- 3.33	TRM 527.4-67-1	2.94(2/ 4) 2.55- 3.33	2.80(1/ 4) 2.80- 2.80	
GAMMA (NAI) 11		8 VALUES <LLD ANALYSIS PERFORMED			3 VALUES <LLD	
GAMMA (GELI) 1						
BI-214	NOT ESTAB				15.23(1/ 1) 15.23- 15.23	
PB-212	NOT ESTAB				7.23(1/ 1) 7.23- 7.23	
SR 89 12	10.000	8 VALUES <LLD ANALYSIS PERFORMED			4 VALUES <LLD	
SR 90 12	2.000	8 VALUES <LLD ANALYSIS PERFORMED			4 VALUES <LLD	
TRITIUM 12	330.000	491.00(4/ 8) 430.00- 594.00	TRM 518.0-67-0	493.67(3/ 4) 430.00- 594.00	460.67(3/ 4) 406.00- 524.00	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 21

RADIOACTIVITY IN CHANNEL CATFISH (FLESH)

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RM-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD) [a]	ALL INDICATOR LOCATIONS MEAN (F) [b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F) [b] RANGE	CONTROL LOCATIONS MEAN (F) [b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA 6	0.100	4 VALUES <LLD ANALYSIS PERFORMED			2 VALUES <LLD	
GROSS BETA 6	0.100	25.54(4/ 4) 15.72- 33.44	CHICKAMAUGA RES TRM 471-530	30.30(2/ 2) 27.15- 33.44	28.68(2/ 2) 26.46- 30.90	
GAMMA (GELI) 6						
CS-137	0.020	0.09(4/ 4) 0.03- 0.16	CHICKAMAUGA RES TRM 471-530	0.13(2/ 2) 0.09- 0.16	0.16(2/ 2) 0.12- 0.20	
K-40	NOT ESTAB	15.33(4/ 4) 9.68- 22.01	CHICKAMAUGA RES TRM 471-530	19.01(2/ 2) 16.00- 22.01	15.96(2/ 2) 12.87- 19.04	
BI-214	0.020	0.25(4/ 4) 0.06- 0.53	CHICKAMAUGA RES TRM 471-530	0.30(2/ 2) 0.06- 0.53	0.35(2/ 2) 0.32- 0.38	
PB-214	NOT ESTAB	0.17(4/ 4) 0.07- 0.31	CHICKAMAUGA RES TRM 471-530	0.19(2/ 2) 0.07- 0.31	0.16(1/ 2) 0.16- 0.16	
PB-212	NOT ESTAB	0.03(1/ 4) 0.03- 0.03	CHICKAMAUGA RES TRM 471-530	0.03(1/ 2) 0.03- 0.03	0.12(1/ 2) 0.12- 0.12	
SR 89	0.500	4 VALUES <LLD			2 VALUES <LLD	
SR 90 6	0.100	4 VALUES <LLD ANALYSIS PERFORMED			2 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 22

RADIOACTIVITY IN WHITE CRAPPIE (FLESH)

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-B-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD) [a]	ALL INDICATOR LOCATIONS MEAN (F) [b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F) [b] RANGE	CONTROL LOCATIONS MEAN (F) [b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100	4 VALUES <LLD			2 VALUES <LLD	
6		ANALYSIS PERFORMED				
GROSS BETA	0.100	33.91(4/ 4)	CHICKAMAUGA RES	39.86(2/ 2)	34.67(2/ 2)	
6		24.10- 45.91	TRM 471-530	33.80- 45.91	34.39- 34.94	
GAMMA (GELI)						
6						
CS-137	0.020	0.12(4/ 4)	CHICKAMAUGA RES	0.15(2/ 2)	0.25(2/ 2)	
		0.05- 0.15	TRM 471-530	0.14- 0.15	0.22- 0.29	
K-40	NOT ESTAB	17.59(4/ 4)	CHICKAMAUGA RES	19.65(2/ 2)	20.38(2/ 2)	
		12.10- 20.89	TRM 471-530	18.41- 20.89	19.81- 20.94	
BI-214	0.020	0.30(1/ 4)	CHICKAMAUGA RES	0.30(1/ 2)	0.39(2/ 2)	
		0.30- 0.30	TRM 471-530	0.30- 0.30	0.38- 0.40	
PB-214	NOT ESTAB	0.08(2/ 4)	CHICKAMAUGA RES	0.08(2/ 2)	0.29(2/ 2)	
		0.01- 0.16	TRM 471-530	0.01- 0.16	0.25- 0.32	
PB-212	NOT ESTAB	0.05(2/ 4)	NICKAJACK RES	0.06(1/ 2)	0.17(1/ 2)	
		0.04- 0.06	TRM 425-471	0.06- 0.06	0.17- 0.17	
SR 89	0.500	4 VALUES <LLD			0.69(1/ 2)	
6					0.69- 0.69	
SR 90	0.100	4 VALUES <LLD			2 VALUES <LLD	
6		ANALYSIS PERFORMED				

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 23

RADIOACTIVITY IN SMALLMOUTH BUFFALO (FLESH)

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RM-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD) [a]	ALL INDICATOR LOCATIONS MEAN (F) [b] RANGE [b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F) [b] RANGE [b]	CONTROL LOCATIONS MEAN (F) [b] RANGE [b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA 6	0.100	4 VALUES <LLD ANALYSIS PERFORMED			2 VALUES <LLD	
GROSS BETA 6	0.100	24.80 (4/ 4) 12.86- 34.06	CHICKAMAUGA RES TRM 471-530	30.98 (2/ 2) 27.90- 34.06	27.91 (2/ 2) 26.10- 29.72	
GAMMA (GELI) 6						
CS-137	0.020	0.03 (1/ 4) 0.03- 0.03	NICKAJACK RES TRM 425-471	0.03 (1/ 2) 0.03- 0.03	0.12 (2/ 2) 0.11- 0.13	
K-40	NOT ESTAB	12.57 (4/ 4) 8.64- 16.37	CHICKAMAUGA RES TRM 471-530	15.80 (2/ 2) 15.23- 16.37	14.02 (2/ 2) 12.19- 15.84	
BI-214	0.020	0.29 (3/ 4) 0.23- 0.38	NICKAJACK RES TRM 425-471	0.38 (1/ 2) 0.38- 0.38	0.19 (2/ 2) 0.12- 0.26	
PB-214	NOT ESTAB	0.13 (3/ 4) 0.07- 0.17	NICKAJACK RES TRM 425-471	0.17 (1/ 2) 0.17- 0.17	0.17 (1/ 2) 0.17- 0.17	
PB-212	NOT ESTAB	0.11 (3/ 4) 0.02- 0.23	NICKAJACK RES TRM 425-471	0.23 (1/ 2) 0.23- 0.23	0.07 (1/ 2) 0.07- 0.07	
TL-208	0.020	0.07 (1/ 4) 0.07- 0.07	NICKAJACK RES TRM 425-471	0.07 (1/ 2) 0.07- 0.07	2 VALUES <LLD	
SR 89 6	0.500	4 VALUES <LLD ANALYSIS PERFORMED			2 VALUES <LLD	
SR 90 6	0.100	4 VALUES <LLD ANALYSIS PERFORMED			2 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements in specified locations is indicated in parentheses (F).

TABLE 24

RADIOACTIVITY IN SMALLMOUTH BUFFALO (WHOLE)

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

NAME OF FACILITY WATTS BAR
LOCATION OF FACILITY RHEA TENNESSEE

DOCKET NO. RH-80-B-WB1
REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME, DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100	0.13(2/ 4)	CHICKAMAUGA RES	0.14(1/ 2)	2 VALUES <LLD	
6		0.11- 0.14	TRM 471-530	0.14- 0.14		
GROSS BETA	0.100	20.10(4/ 4)	CHICKAMAUGA RES	21.52(2/ 2)	19.54(2/ 2)	
6		17.94- 22.83	TRM 471-530	20.21- 22.83	15.66- 23.42	
GAMMA (GELI)						
6						
CS-137	0.020	0.05(4/ 4)	CHICKAMAUGA RES	0.06(2/ 2)	2 VALUES <LLD	
		0.04- 0.06	TRM 471-530	0.06- 0.06		
K-40	NOT ESTAB	8.51(4/ 4)	CHICKAMAUGA RES	8.93(2/ 2)	8.30(2/ 2)	
		6.78- 9.42	TRM 471-530	8.44- 9.42	6.23- 10.37	
BI-214	0.020	0.36(4/ 4)	CHICKAMAUGA RES	0.52(2/ 2)	0.16(2/ 2)	
		0.07- 0.96	TRM 471-530	0.07- 0.96	0.05- 0.28	
PB-214	NOT ESTAB	0.12(4/ 4)	NICKAJACK RES	0.14(2/ 2)	0.11(2/ 2)	
		0.05- 0.19	TRM 425-471	0.10- 0.19	0.08- 0.15	
PB-212	NOT ESTAB	0.05(2/ 4)	NICKAJACK RES	0.07(1/ 2)	0.02(1/ 2)	
		0.04- 0.07	TRM 425-471	0.07- 0.07	0.02- 0.02	
TL-208	0.020	0.03(2/ 4)	NICKAJACK RES	0.03(2/ 2)	2 VALUES <LLD	
		0.02- 0.03	TRM 425-471	0.02- 0.03		
SR 89	0.500	1.18(2/ 4)	CHICKAMAUGA RES	1.18(2/ 2)	0.52(1/ 2)	
6		0.85- 1.50	TRM 471-530	0.85- 1.50	0.52- 0.52	
SR 90	0.100	0.18(4/ 4)	NICKAJACK RES	0.26(2/ 2)	0.24(2/ 2)	
6		0.11- 0.40	TRM 425-471	0.11- 0.40	0.14- 0.33	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 25

RADIOACTIVITY IN PLANKTON

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-B-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD) [a]	ALL INDICATOR LOCATIONS MEAN (F) [b] RANGE [b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F) [b] RANGE [b]	CONTROL LOCATIONS MEAN (F) [b] RANGE [b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	0.100	38.31(9/ 9)	TRM 496.50	45.58(3/ 3)	13.87(3/ 3)	
12		10.64- 50.09		36.68- 50.09	7.38- 20.76	
GAMMA (GELI)						
2						
K-40	NOT ESTAB	80.70(2/ 2)	TRM 527.4	93.25(1/ 1)		
		68.15- 93.25		93.25- 93.25		
PB-212	NOT ESTAB	4.64(1/ 2)	TRM 518.0	4.64(1/ 1)		
		4.64- 4.64		4.64- 4.64		
AC-228	NOT ESTAB	7.90(1/ 2)	TRM 527.4	7.90(1/ 1)		
		7.90- 7.90		7.90- 7.90		

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 26

RADIOACTIVITY IN SEDIMENT

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RM-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA 13	0.700	43.06(9/ 9) 29.11- 55.28	TRM 496.50	44.88(4/ 4) 36.08- 55.28	38.02(4/ 4) 5.20- 70.75	
GAMMA (GELI) 14						
CE-144	0.060	0.40(1/ 10) 0.40- 0.40	TRM 496.50	0.40(1/ 4) 0.40- 0.40	4 VALUES <LLD	
CO-60	0.010	0.11(3/ 10) 0.02- 0.16	TRM 496.50	0.15(2/ 4) 0.14- 0.16	0.24(4/ 4) 0.06- 0.54	
CS-137	0.020	0.56(9/ 10) 0.05- 1.69	TRM 496.50	1.43(3/ 4) 1.17- 1.69	3.23(4/ 4) 0.51- 7.69	
K-40	NOT ESTAB	13.05(10/ 10) 8.89- 16.67	TRM 496.50	13.94(4/ 4) 11.22- 15.91	14.93(4/ 4) 10.64- 18.79	
BI-214	0.020	0.95(9/ 10) 0.42- 1.47	TRM 527.4	1.07(4/ 4) 0.91- 1.47	1.01(4/ 4) 0.72- 1.42	
BI-212	0.100	0.75(9/ 10) 0.27- 1.34	TRM 527.4	0.90(4/ 4) 0.56- 1.34	0.91(4/ 4) 0.63- 1.17	
PB-214	NOT ESTAB	0.99(9/ 10) 0.49- 1.46	TRM 527.4	1.12(4/ 4) 0.92- 1.46	1.10(4/ 4) 0.80- 1.54	
PB-212	NOT ESTAB	1.12(9/ 10) 0.59- 1.69	TRM 527.4	1.30(4/ 4) 0.77- 1.69	1.29(4/ 4) 0.95- 1.92	
RA-226	NOT ESTAB	0.95(9/ 10) 0.42- 1.47	TRM 527.4	1.07(4/ 4) 0.91- 1.47	1.01(4/ 4) 0.72- 1.42	
RA-223	NOT ESTAB	10 VALUES <LLD			0.31(1/ 4) 0.31- 0.31	
BE-7	NOT ESTAB	0.94(1/ 10) 0.94- 0.94	TRM 496.50	0.94(1/ 4) 0.94- 0.94	4 VALUES <LLD	
TL-208	0.020	0.39(9/ 10) 0.19- 0.65	TRM 527.4	0.45(4/ 4) 0.26- 0.65	0.46(4/ 4) 0.36- 0.65	
AC-228	0.060	1.22(9/ 10) 0.72- 1.97	TRM 527.4	1.39(4/ 4) 0.81- 1.97	1.39(4/ 4) 1.03- 1.99	
SR 89 13	1.500	9 VALUES <LLD			4 VALUES <LLD	
SR 90 13	0.300	ANALYSIS PERFORMED 0.46(2/ 9) 0.45- 0.47	TRM 527.4	0.46(2/ 4) 0.45- 0.47	4 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE 27

RADIOACTIVITY IN CLAM FLESH

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RM-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI) 16						
CS-137	0.080	0.17(2/ 12) 0.14- 0.21	TRM 518.0	0.21(1/ 4) 0.21- 0.21	4 VALUES <LLD	
K-40	NOT ESTAB	10.41(10/ 12) 5.47- 20.51	TRM 518.0	11.51(3/ 4) 5.47- 20.51	7.14(3/ 4) 5.18- 9.35	
BI-214	NOT ESTAB	1.43(5/ 12) 0.57- 2.88	TRM 496.50	2.05(1/ 4) 2.05- 2.05	1.78(3/ 4) 0.45- 2.83	
PB-214	NOT ESTAB	1.04(8/ 12) 0.32- 2.75	TRM 527.4	1.22(3/ 4) 0.32- 2.75	1.90(2/ 4) 1.81- 1.98	
PB-212	NOT ESTAB	0.64(6/ 12) 0.32- 1.25	TRM 496.50	1.25(1/ 4) 1.25- 1.25	1.06(2/ 4) 1.05- 1.06	
TL-208	NOT ESTAB	0.41(2/ 12) 0.32- 0.50	TRM 496.50	0.41(2/ 4) 0.32- 0.50	4 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.
b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

TABLE

RADIOACTIVITY IN CLAM SHELL

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

NAME OF FACILITY WATTS BAR — DOCKET NO. RH-80-8-WB1

LOCATION OF FACILITY RHEA TENNESSEE — REPORTING PERIOD 1979

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F)[b] RANGE	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE	CONTROL LOCATIONS MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GAMMA (GELI) 16						
CO-60	0.010	0.02(2/ 12) 0.02- 0.02	TRM 496.50	0.02(1/ 4) 0.02- 0.02	0.03(1/ 4) 0.03- 0.03	
CS-137	0.020	0.04(5/ 12) 0.03- 0.06	TRM 527.4	0.05(1/ 4) 0.05- 0.05	0.05(2/ 4) 0.04- 0.06	
K-40	NOT ESTAB	0.65(11/ 12) 0.30- 1.24	TRM 527.4	0.82(4/ 4) 0.34- 1.24	0.69(3/ 4) 0.47- 1.02	
BI-214	0.050	0.18(12/ 12) 0.08- 0.32	TRM 518.0	0.23(4/ 4) 0.13- 0.32	0.15(4/ 4) 0.08- 0.26	
PB-214	0.050	0.18(10/ 12) 0.10- 0.29	TRM 518.0	0.22(4/ 4) 0.13- 0.29	0.13(4/ 4) 0.10- 0.20	
PB-212	NOT ESTAB	0.15(12/ 12) 0.05- 0.27	TRM 518.0	0.16(4/ 4) 0.09- 0.20	0.09(4/ 4) 0.06- 0.12	
RA-226	0.050	0.19(8/ 12) 0.11- 0.32	TRM 518.0	0.24(3/ 4) 0.13- 0.32	0.12(2/ 4) 0.08- 0.16	
TL-208	0.020	0.05(11/ 12) 0.02- 0.10	TRM 518.0	0.06(4/ 4) 0.04- 0.08	0.04(3/ 4) 0.03- 0.04	
AC-228	0.060	0.27(10/ 12) 0.11- 0.45	TRM 518.0	0.36(4/ 4) 0.15- 0.45	0.15(3/ 4) 0.11- 0.18	
PA-234M	NOT ESTAB	0.18(1/ 12) 0.18- 0.18	TRM 527.4	0.18(1/ 4) 0.18- 0.18	4 VALUES <LLD	

a. Nominal Lower Limit of Detection (LLD) as described in Table 3.

b. Mean and range based upon detectable measurements only. Fraction of detectable measurements of specified locations is indicated in parentheses (F).

Quality Control

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

Conclusions

Since Watts Bar Nuclear Plant has not achieved criticality, there has been no contribution of radioactivity from the plant to the environment. The levels of radioactivity being reported in this document are due to natural background radiation, nuclear weapons testing, or other nuclear operations in the area.