

ENVIRONMENTAL RADIOACTIVITY LEVELS

SEQUOYAH NUCLEAR PLANT

ANNUAL REPORT - 1983

TVA/POWER/RHS

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TENNESSEE VALLEY AUTHORITY

RADIOLOGICAL HEALTH STAFF

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Introduction

The Sequoyah Nuclear Plant (SQN), operated by the Tennessee Valley Authority, is located on a site owned by TVA containing 525 acres of land in Hamilton County, Tennessee, bounded on the east by Chickamauga Reservoir (see figure 1). The site is 12 miles (19.3 kilometers) northeast of Chattanooga, Tennessee, and 11 miles (17.7 kilometers) west-northwest of Cleveland, Tennessee. The plant consists of two pressurized water reactors; each unit is rated at 3,423 MWt and 1,171 MWe. Fuel was loaded in unit 1 on March 1, 1980, and the unit achieved criticality on July 5, 1980. Fuel was loaded in unit 2 in July 1981 and the unit achieved initial criticality on November 5, 1981. This report describes the environmental radiological monitoring conducted in 1983.

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.

The Radiological Health Staff (Office of Power) and the Office of Natural Resources and Economic Development carried out the sampling program outlined in tables 1 and 25. Sampling locations are shown in figures 2, 3, 4, and 10, 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 at Muscle Shoals, Alabama, and until its closing in October 1983, Eastern Area Radiological Laboratory (EARL) at Vonore, Tennessee, with the EARL being the primary laboratory for samples from SQN. Alpha and beta analyses were performed on Beckman Low Beta II, Beckman Wide Beta II, and Tennelec LB 5100 low background proportional counters. Nuclear Data (ND) Model 100 multichannel analyzer systems employing sodium iodide, NaI(Tl) detectors and ND Model 6620 Systems in conjunction with germanium detection systems were used to analyze the samples for specific gamma-emitting radionuclides. At EARL, a ND Model 6620 system was used with both types of detectors. 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 germanium system. Identification of gamma-emitting radionuclides in all other types of

samples is routinely performed by analysis on the germanium system. TVA-fabricated and Tennelec beta-gamma coincidence counting systems are utilized for the determination of ^{131}I concentrations in milk. Tritium determinations are made with Beckman LS150, Beckman LS100C, and Packard Model 3250 liquid scintillation counting systems.

Data were entered in computer storage for processing specific to the analysis conducted. A computer, employing the ALPHA-M least-squares code, a multimatrix technique, was used to estimate the activities of the gamma-emitting nuclides analyzed by NaI(Tl). The data obtained by germanium detectors were resolved by the appropriate analyzer software and the software program HYPERMET.

The detection capabilities for environmental sample analysis given as the nominal lower limit of detection (LLD) are listed in table 3. Samples processed by NaI(Tl) gamma spectroscopy were analyzed for 14 specific gamma-emitting radionuclides and radionuclide combinations^a. For these analyses, radionuclide combinations such as $^{103,106}\text{Ru}$ and $^{95}\text{Zr-Nb}$ are analyzed as one radionuclide. 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 the analysis of the radionuclides listed below^a are given in table 3B. LLDs for additional radionuclides identified by germanium 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 WARL, as did EARL until its closing, 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 1983 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.

^aThe following radionuclides and radionuclide combinations are quantified by the ALPHA-M least-squares computer code: $^{141,144}\text{Ce}$; ^{51}Cr ; ^{131}I ; $^{103,106}\text{Ru}$; ^{134}Cs ; ^{137}Cs ; $^{95}\text{Zr-Nb}$; ^{58}Co ; ^{54}Mn ; ^{65}Zn ; ^{59}Fe ; ^{60}Co ; ^{40}K ; and $^{140}\text{Ba-La}$.

Table 1
ENVIRONMENTAL RADIOACTIVITY SAMPLING SCHEDULE

Station Location	Air Filter	Charcoal Filter	Rain-water	Heavy Particle Fallout	Atmospheric Moisture	Soil	Vegetation	Milk	River Water	Well Water	Public Water	Aquatic Life and Sediment
Chattanooga	W	W	M	M		A					M	
Dayton	W	W	M	M	BW	A					M	
Sale Creek	W	W	M	M		A						
Daisy	W	W	M	M		A					M	
Northwoods	W	W	M	M		A						
Volunteer Ordinance Works (Harrison)	W	W	M	M		A						
Harrison Bay	W	W	M	M		A						
Georgetown	W	W	M	M		A						
Chester Frost Park (formerly Hamilton County Park)	W	W	M	M		A						
Work	W	W	M	M		A						
Site N	W	W	M	M	BW	A						
Site SW	W	W	M	M	BW	A						
Farm L							Q	W		M		
Farm J							Q	W				
Farm HW							Q	W				
Farm H							Q	W				
Farm Le*							M	W				
Farm Sm*							M	W				
Farm Su*							M	W				
Farm EM							M					
Farm Br							M					
Farm G							M					
Chickamauga Reservoir									M			Q/S
E. I. Dupont											M	
Cleveland, TN											M	
C. F. Industries											M	
On Site Well (1)										M		
Farm Ma										M		
Farm S (Control)							M	W				
Farm B (Control)							M	W				
Farm C (Control)							M	W				

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

*Added to collection schedule in November 1981 - Farm Le provided only two weekly milk samples. Farms Sm and Su did not provide any milk samples.

Table 2

ATMOSPHERIC AND TERRESTRIAL MONITORING STATION LOCATIONSSEQUOYAH NUCLEAR PLANT

<u>Sample Station</u>	<u>Approximate Distance and Direction from Plant</u>		
LM-1 SQ, Southwest	0.75 miles	(1.2 kilometers)	SW
LM-2 SQ, Northeast	0.75 miles	(1.2 kilometers)	N
PM-1 SQ, Northwoods	10.5 miles	(16.9 kilometers)	WSW
PM-2 SQ, Chester Frost Park, TN (formerly Hamilton County Park)	3.75 miles	(6.0 kilometers)	SW
PM-3 SQ, Daisy, TN	5.5 miles	(8.8 kilometers)	W
PM-4 SQ, Sale Creek, TN	10.5 miles	(16.9 kilometers)	N
PM-5 SQ, Georgetown, TN	9.5 miles	(15.3 kilometers)	ENE
PM-6 SQ, Work, TN	4.5 miles	(7.2 kilometers)	NNE
PM-7 SQ, Harrison Bay, TN	3.5 miles	(5.6 kilometers)	SE
PM-8 SQ, Harrison, TN	8.75 miles	(14.1 kilometers)	SSW
RM-1 SQ, Chattanooga, TN (Control)	16.75 miles	(27.0 kilometers)	SW
RM-2 SQ, Dayton, TN (Control)	17.75 miles	(28.6 kilometers)	NNE
Farm J	1.25 miles	(2.0 kilometers)	W
Farm HW	1.25 miles	(2.0 kilometers)	NW
Farm L	2.75 miles	(4.4 kilometers)	NNE
Farm M	3.5 miles	(5.6 kilometers)	NNE
Farm Ma	0.75 miles	(1.2 kilometers)	W
Farm Le	3.5 miles	(5.6 kilometers)	S
Farm Sm	1.75 miles	(2.8 kilometers)	SE
Farm Su	3.25 miles	(5.2 kilometers)	SSE
Farm EM	2.5 miles	(4.0 kilometers)	N
Farm Br	2.25 miles	(3.6 kilometers)	SSW
Farm G	1.5 miles	(2.4 kilometers)	NNW
Farm B (Control)	43.0 miles	(69.2 kilometers)	NE
Farm C (Control)	16.0 miles	(25.7 kilometers)	NE
Farm S (Control)	12.0 miles	(19.3 kilometers)	NNE

Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSISA. Specific AnalysesNOMINAL 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/Kgm, 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						
¹³¹ I		0.02								0.5
⁶³ 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 = 3.7×10^{-2} Bq; 1 mCi = 3.7×10^7 Bq.

Table 3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

B. Gamma Analyses

NOMINAL LOWER LIMIT OF DETECTION (LLD)

	Air particulates		Water and milk		Vegetation and grain		Soil and sediment		Fish		Clam flesh and plankton		Clam shells		Foods, (tomatoes, potatoes, etc.)		Meat and poultry	
	pCi/m ³		pCi/l		pCi/g, dry		pCi/g, dry		pCi/g, dry		pCi/g, dry		pCi/g, dry		pCi/Kg, wet		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 Ba- 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 Ru- 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 petri dishes centered on the detector endcap. The counting system consists of a ND-6620 multichannel analyzer and germanium detector having an efficiency of at least 20 percent. The counting time is normally 4-8 hours. All spectral analysis is 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. WARL ^a EARL ^b		EPA value ($\pm 3\sigma$)	TVA AVG. WARL EARL		EPA value ($\pm 3\sigma$)	TVA AVG. WARL EARL		EPA value ($\pm 3\sigma$)	TVA AVG. WARL EARL	
3/83	26 \pm 11	25	25	68 \pm 9	69	63	20 \pm 3	21	17	29 \pm 9	30	25
8/83	13 \pm 9	14		36 \pm 9	38		10 \pm 3	11		15 \pm 9	17	

B. Tritium in Urine (pCi/L)

Date	EPA Value ($\pm 3\sigma$)	TVA AVERAGE	
		WARL	EARL
3/83	2470 \pm 610	2420	2540
5/83	1330 \pm 575	1793	1650 ^c
6/83	1589 \pm 585	1753	1580
11/83	1008 \pm 585	1053	

^a Western Area Radiological Laboratory, Muscle Shoals, Alabama

^b Eastern Area Radiological Laboratory, Vonore, Tennessee, closed 10/83

^c Equipment failure, values determined after report date

Table 4 (continued)
Results Obtained in Interlaboratory Comparison Program
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 WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL
1/83	29 \pm 13	27	25	31 \pm 9	29	28	29.2 \pm 8.7	33.0	16 \pm 10.6 ^{ef}	17.2 \pm 2.6	17.7	15.9 \pm 3.2 ^e	2560 \pm 611	2510	2627			
2/83																		
3/83	31 14	27	35	28 \pm 9	28	32												
4/83																		
5/83	11 \pm 9	10	11	57 \pm 9	53	43	57.1 \pm 8.7	63.7	71.3 ^f	37.7 \pm 3.3	38.3	29.3 ^f	3330 \pm 627	3733	3373	26.8 \pm 10.4	28.0	25.3
5/83 ^d	64 \pm 28	47	60	149 \pm 13	133 ^g	136	24 \pm 9	29	31	13 \pm 3	13	10						
6/83													1529 \pm 584	1573	1577			
7/83	7 \pm 9	7	6	22 \pm 9	22	20												
8/83													1836 \pm 592	1930	1807	14 \pm 10	14	14
9/83	5 \pm 9	5		9 \pm 9	10		15 \pm 9	13		10 \pm 3	12							
10/83													1210 \pm 570	720				
11/83	14 \pm 9	13		16 \pm 9	18													
11/83 ^d	22 \pm 9	19		63 \pm 9	61		17 \pm 9	14		8 \pm 3	6							
12/83													2389 \pm 608	2390		20 \pm 10	18	

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

Date	Chromium - 51			Cobalt - 60			Zinc - 65			Ruthenium - 106			Cesium - 134			Cesium - 137		
	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL
2/83	45 \pm 9	45	<35 ^f	22 \pm 9	24	24	21 \pm 9	22	25	48 \pm 9	55	50	20 \pm 9	20	20	19 \pm 9	18	18
5/83 ^d				30 \pm 9	33	33							33 \pm 9	32	33	27 \pm 9	27	28
6/83	60 \pm 9	67	<72	13 \pm 9	14	16	36 \pm 9	38	36	40 \pm 9	42	<36	47 \pm 9	46	47	26 \pm 9	27	27
10/83	51 \pm 9	47		19 \pm 9	20		40 \pm 9	41		52 \pm 9	53		15 \pm 9	17		22 \pm 9	25	
11/83 ^d				11 \pm 9	11								15 \pm 9	15		15 \pm 9	15	

^d Laboratory Performance Evaluation Study

^e Only 2 values reported, calculated error terms increase

^f Previous and subsequent results satisfactory. No known explanation.

^g Calibration of beta detectors is done with Cs-137. Nine isotopes and their daughters were present in this sample. Average value reported nationwide was 136 pCi/L.

Table 4 (continued)
Results Obtained in Interlaboratory Comparison Program
E. Foods (pCi/kg, Wet Weight)

Date	Strontium - 89			Strontium - 90			Iodine - 131			Cesium - 137			Barium - 140			Potassium - 40		
	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL
3/83	34.6 \pm 8.7	40.0	31.7	27.8 \pm 2.6	28.3	31.3 ^h	36.9 \pm 10.4	33.3	37.7	31.3 \pm 8.7	29.7	30.0	0	<25	<15	2592 \pm 225	2533	2887 ^h

F. Milk (pCi/L)

Date	Strontium - 89			Strontium - 90			Iodine - 131			Cesium - 137			Barium - 140			Potassium - 40		
	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL	EPA value ($\pm 3\sigma$)	TVA WARL	AVG. EARL
2/83	37.4 \pm 8.7	ⁱ	42.3	17.8 \pm 2.6	ⁱ	18	54.5 \pm 10.4	52.7	56.0	25.6 \pm 8.7	22.3	26.7	0	<25	<20	1512 \pm 132	1497	1613
6/83	25 \pm 9	27	29	16 \pm 3	17	18	30 \pm 10	30	38	47 \pm 9	48	47				1486 \pm 128	1520	1480
10/83	15 \pm 9	16		14 \pm 3	13		40 \pm 10	39		33 \pm 9	34					1550 \pm 135	1563	

^h A history of sporadic difficulty with this sample type for all participants nationwide is probably due to sample inhomogeneity.

ⁱ Sample spoiled before analysis

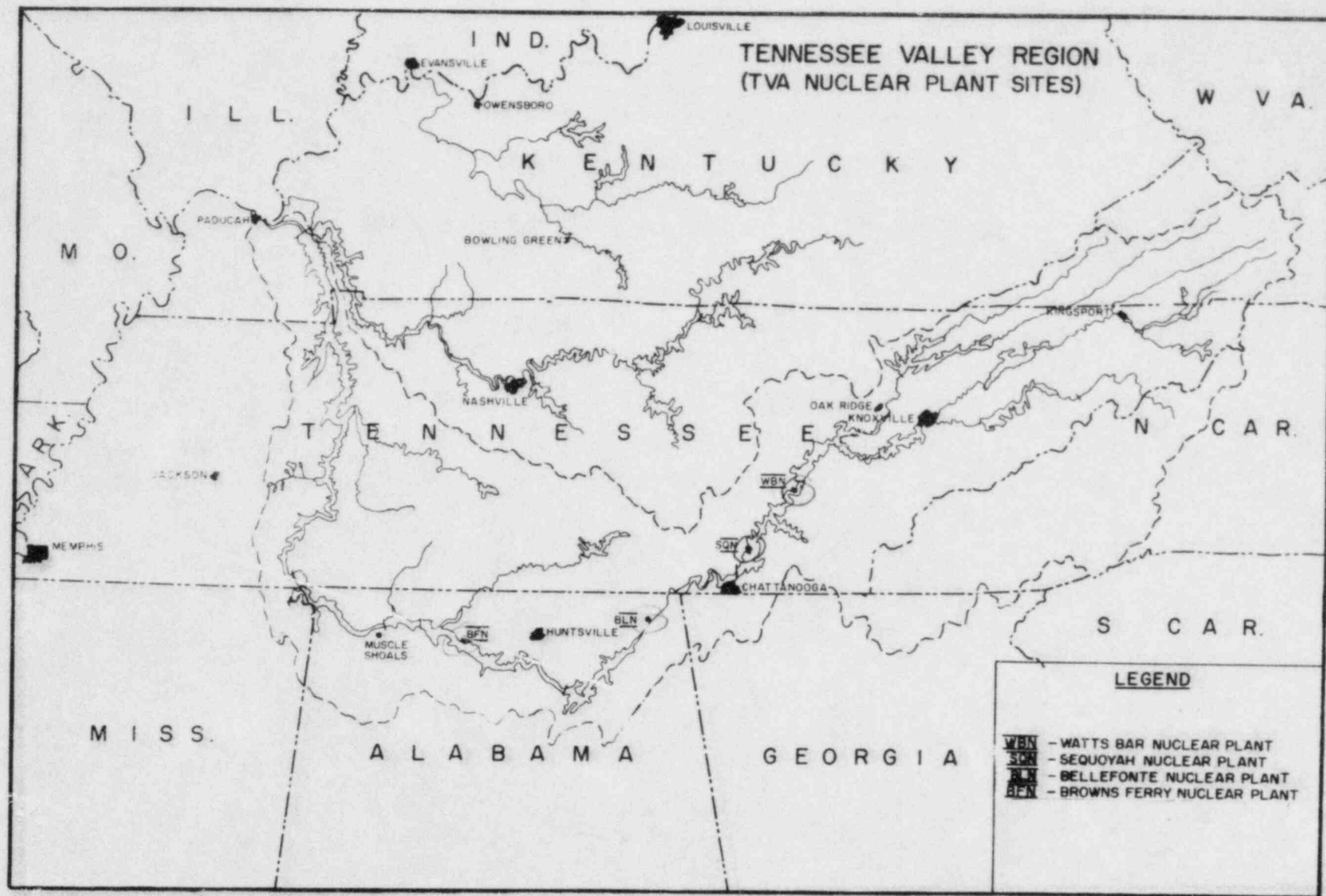


Figure 1

Atmospheric Monitoring

The atmospheric monitoring network is divided into three subgroups. Two local air monitors are located within the plant boundary. Eight perimeter air monitors are located at distances out to 10.5 miles (16.9 kilometers) from the plant in the towns of Sale Creek, Daisy, Northwoods, Harrison, and four other populated areas. The remote air monitors used as control or baseline stations are located at distances out to 17.75 miles (28.6 kilometers) from the plant in the town of Dayton and the city of Chattanooga. See figures 2, 3, 4, and 5.

At each monitor, air is continuously pulled through a Hollingsworth and Voss LB 5211 glass fiber particulate filter at a flow rate of 3 ft³/min (0.085 m³/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.

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. The data from the two local monitors and the four perimeter monitors located within approximately five miles of the plant are radiotelemetered into the plant control room.

Air filters are collected weekly and analyzed for gross beta activity. Analyses are not performed until three days after sample collection. The samples are composited monthly for analysis of specific gamma-emitting radionuclides and quarterly for ⁸⁹Sr and ⁹⁰Sr analysis. The results are presented in table 6. During this reporting period eleven weekly air filters were not collected because of equipment malfunction, three weekly air filters were damaged during processing and were unusable. One quarterly composite for strontium analysis was destroyed during analysis and unusable.

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 1971-1983 are presented in figure 6. Increased levels due to fallout from atmospheric nuclear weapons testing are evident, especially in 1971, 1977, 1978, and 1981. These fluctuations are consistent with data from radiological 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 is collected and analyzed for gross beta activity, specific gamma-emitting isotopes, strontium, and tritium. During this period one sample was not available for any analyses because of equipment malfunction. One beta activity and two strontium analyses were not completed because the samples were inadvertently destroyed during processing. For the gross beta analysis, a maximum of 500 ml of the sample is boiled to dryness and counted. 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. The samples are 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 eleven samples were not obtained because of equipment malfunction and six samples were inadvertently lost or destroyed during processing and were unusable. The filter is counted in a single channel analyzer system. The data are shown in table 9.

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. During this reporting period six samples were not collected because of equipment malfunction, two samples collected were not usable because of insufficient volume, and two samples were lost or damaged during processing.

Table 5

MAXIMUM PERMISSIBLE CONCENTRATIONSFOR 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.

$$\begin{aligned} \text{pCi/l (water)} \times 10^{-9} &= \mu\text{Ci/ml (water)} \\ \text{pCi/m}^3(\text{air}) \times 10^{-12} &= \mu\text{Ci/cc (air)} \end{aligned}$$

TABLE 6

RADIOACTIVITY IN AIR FILTER

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

NAME OF FACILITY SEQUOYAH
LOCATION OF FACILITY HAMILTON TENNESSEEDOCKET NO. 50-3274328
REPORTING PERIOD 1983

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 BETA	0.010	0.02(476/ 519) 0.01- 0.04	NORTHWOODS, TN 10.5 MILES WSW	0.02(51/ 53) 0.01- 0.04	0.02(92/ 103) 0.01- 0.03	
GAMMA (GELI)						
622						
166						
K-40	NOT ESTAB	0.02(97/ 139) 0.00- 0.06	LM2 NORTHEAST 0.75 MILES N	0.02(9/ 14) 0.01- 0.04	0.02(21/ 27) 0.00- 0.04	
BI-212	NOT ESTAB	0.02(1/ 139) 0.02- 0.02	SALE CREEK, TN 10.5 MILES N	0.02(1/ 14) 0.02- 0.02	27 VALUES <LLD	
PB-214	0.020	0.02(1/ 139) 0.02- 0.02	LM2 NORTHEAST 0.75 MILES N	0.02(1/ 14) 0.02- 0.02	27 VALUES <LLD	
PB-212	NOT ESTAB	0.00(62/ 139) 0.00- 0.00	LM2 NORTHEAST 0.75 MILES N	0.00(7/ 14) 0.00- 0.00	0.00(12/ 27) 0.00- 0.00	
RA-226	NOT ESTAB	139 VALUES <LLD			0.01(2/ 27) 0.01- 0.01	
BE-7	0.050	0.06(80/ 139) 0.05- 0.10	NORTHWOODS, TN 10.5 MILES WSW	0.07(9/ 14) 0.05- 0.09	0.07(14/ 27) 0.05- 0.09	
TL-208	NOT ESTAB	0.00(27/ 139) 0.00- 0.00	LM2 NORTHEAST 0.75 MILES N	0.00(2/ 14) 0.00- 0.00	0.00(4/ 27) 0.00- 0.00	
AC-228	NOT ESTAB	0.00(19/ 139) 0.00- 0.01	HARRISON, TN 8.75 MILES SSW	0.00(4/ 13) 0.00- 0.01	27 VALUES <LLD	
SR 89	0.005	0.01(1/ 39) 0.01- 0.01	DAISY, TN 5.5 MILES W	0.01(1/ 4) 0.01- 0.01	8 VALUES <LLD	
SR 90	0.001	39 VALUES <LLD ANALYSIS PERFORMED			8 VALUES <LLD	
47						
47						

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 at specified locations is indicated in parentheses (F).

TABLE 7

RADIOACTIVITY IN RAINWATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-327,328</u>				REPORTING PERIOD <u>1983</u>	
LOCATION OF FACILITY <u>HAMILTON</u>		<u>TENNESSEE</u>					
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 BETA	162 2.400	4.84(27/ 134) 2.68- 9.66	GEORGETOWN, TN	6.52(3/ 13) 5.39- 8.58	6.90(12/ 28) 2.51- 35.60		
GAMMA (GELI)	163		9.0 MILES ENE				
K-40	NOT ESTAB	19.31(44/ 135) 0.16- 57.47	LM1 SOUTHWEST	25.32(9/ 14) 4.33- 57.47	26.14(7/ 28) 4.00- 56.19		
BI-214	NOT ESTAB	3.29(27/ 135) 0.40- 7.50	LM2 NORTHEAST	7.50(1/ 13) 7.50- 7.50	4.48(4/ 28) 1.02- 11.28		
PB-214	NOT ESTAB	3.14(8/ 135) 0.06- 9.22	HARRISON BAY, TN	9.22(1/ 13) 9.22- 9.22	1.93(3/ 28) 0.20- 3.61		
PB-212	NOT ESTAB	1.75(46/ 135) 0.04- 6.54	HARRISON BAY, TN	4.32(2/ 13) 2.86- 5.77	1.51(8/ 28) 0.01- 3.07		
BE-7	NOT ESTAB	48.49(48/ 135) 25.11- 107.48	WORK, TN	56.75(5/ 13) 38.71- 76.33	45.15(14/ 28) 29.04- 62.49		
SR 89	161 10.000	13.73(5/ 133) 10.03- 22.02	HARRISON, TN	22.02(1/ 12) 22.02- 22.02	11.15(1/ 28) 11.15- 11.15		
SR 90	161 2.000	133 VALUES <LLD ANALYSIS PERFORMED	8.75 MILES SSW		28 VALUES <LLD		
TRITIUM	163 330.000	364.03(4/ 135) 332.44- 438.08	WORK, TN	438.08(1/ 13) 438.08- 438.08	367.61(1/ 28) 367.61- 367.61		

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 at 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 <u>SEQUOYAH</u>		DOCKET NO. <u>50-327,328</u>	
LOCATION OF FACILITY <u>HAMILTON</u>		REPORTING PERIOD <u>1983</u>	
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a <u>(LLD)</u>	ALL	LOCATION WITH HIGHEST ANNUAL MEAN
		INDICATOR LOCATIONS MEAN (F) ^b RANGE ^b	NAME MEAN (F) ^b RANGE ^b
GROSS BETA	0.050	0.13 (127 / 130) 0.05- 0.35	LM2 NORTHEAST 0.18 (13 / 13) 0.07- 0.29
			CONTROL LOCATIONS MEAN (F) ^b RANGE ^b
			0.14 (25 / 26) 0.07- 0.31
			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
156		0.75 MILES N	

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 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>SEQUOYAH</u>		DOCKET NO. <u>50-327,328</u>	
LOCATION OF FACILITY <u>HAMILTON</u>		REPORTING PERIOD <u>1983</u>	
TYPE AND TOTAL NUMBER OF ANALYSIS	LOWER LIMIT OF DETECTION ^a	ALL INDICATOR LOCATIONS MEAN (F) ^b	LOCATION WITH HIGHEST ANNUAL MEAN NAME MEAN (F) ^b
<u>PERFORMED</u>	<u>(LLD)</u>	<u>RANGE^b</u>	<u>DISTANCE AND DIRECTION</u>
<u>IODINE-131</u>	<u>0.020</u>	<u>0.02 (76 / 517)</u>	<u>SALE CREEK, TN</u>
<u>519</u>		<u>0.02- 0.03</u>	<u>10.5 MILES N</u>

CONTROL LOCATIONS MEAN (F) ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
<u>RANGE</u>	
<u>0.02 (6 / 52)</u>	
<u>0.02- 0.03</u>	

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 at specified locations is indicated in parentheses (F).

TABLE 10

RADIOACTIVITY IN ATMOSPHERIC MOISTURE

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

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-327,328</u>	
LOCATION OF FACILITY <u>HAMILTON</u>		REPORTING PERIOD <u>1993</u>	
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a (LLD)	ALL	LOCATION WITH HIGHEST ANNUAL MEAN
		INDICATOR LOCATIONS MEAN (F) ^b RANGE ^b	NAME MEAN (F) ^b RANGE ^b
TRITIUM	NOT ESTAB	2.93(43/ 45) 0.18- 16.06	LM2 NORTHEAST 0.75 MILES N 3.91(22/ 23) 0.42- 16.06
			CONTROL LOCATIONS MEAN (F) ^b RANGE ^b
68			2.73(22/ 23) 0.17- 12.98
			NUMBER OF NONROUTINE REPORTED MEASUREMENTS

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 at specified locations is indicated in parentheses (F).

Figure 2

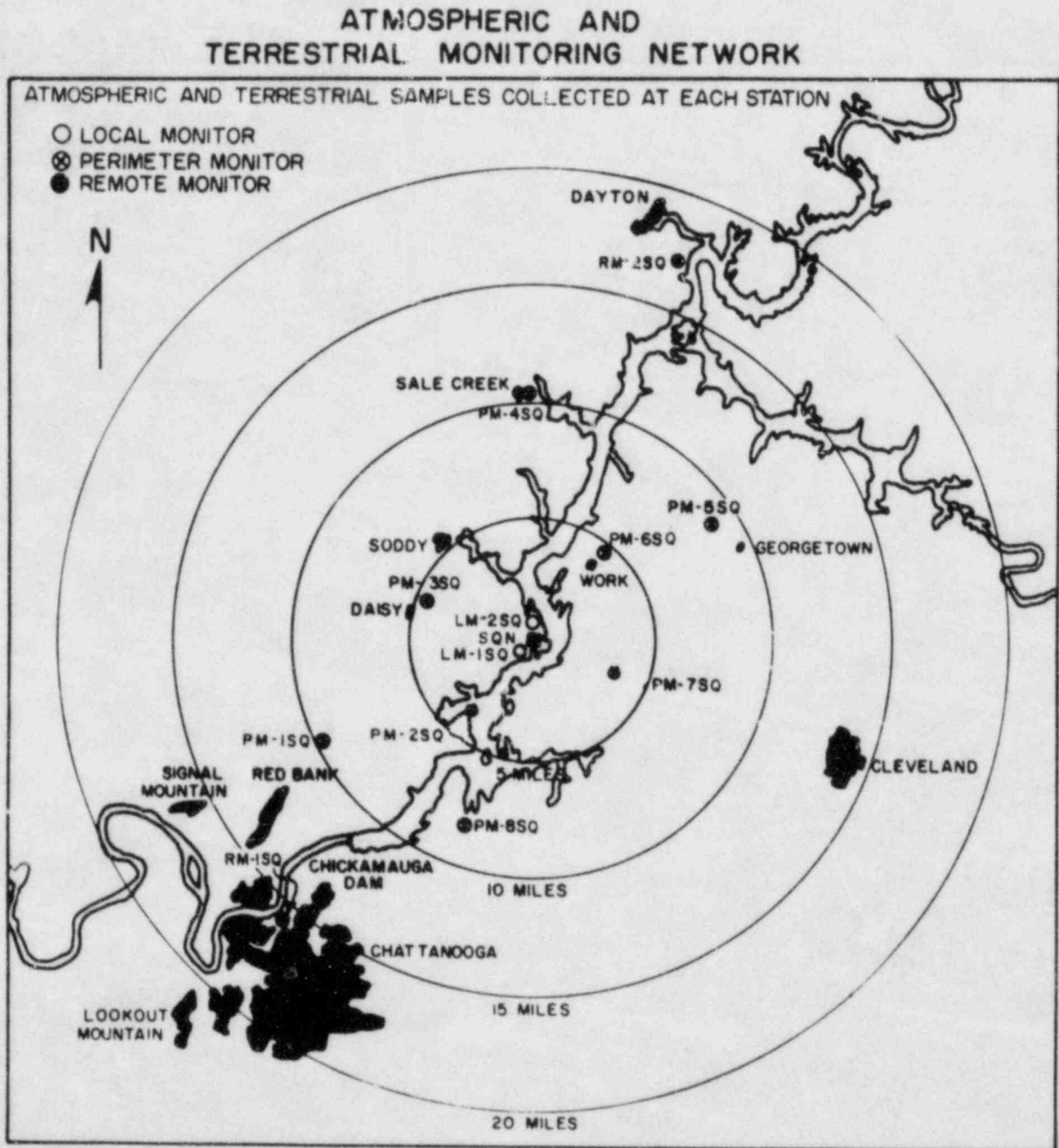
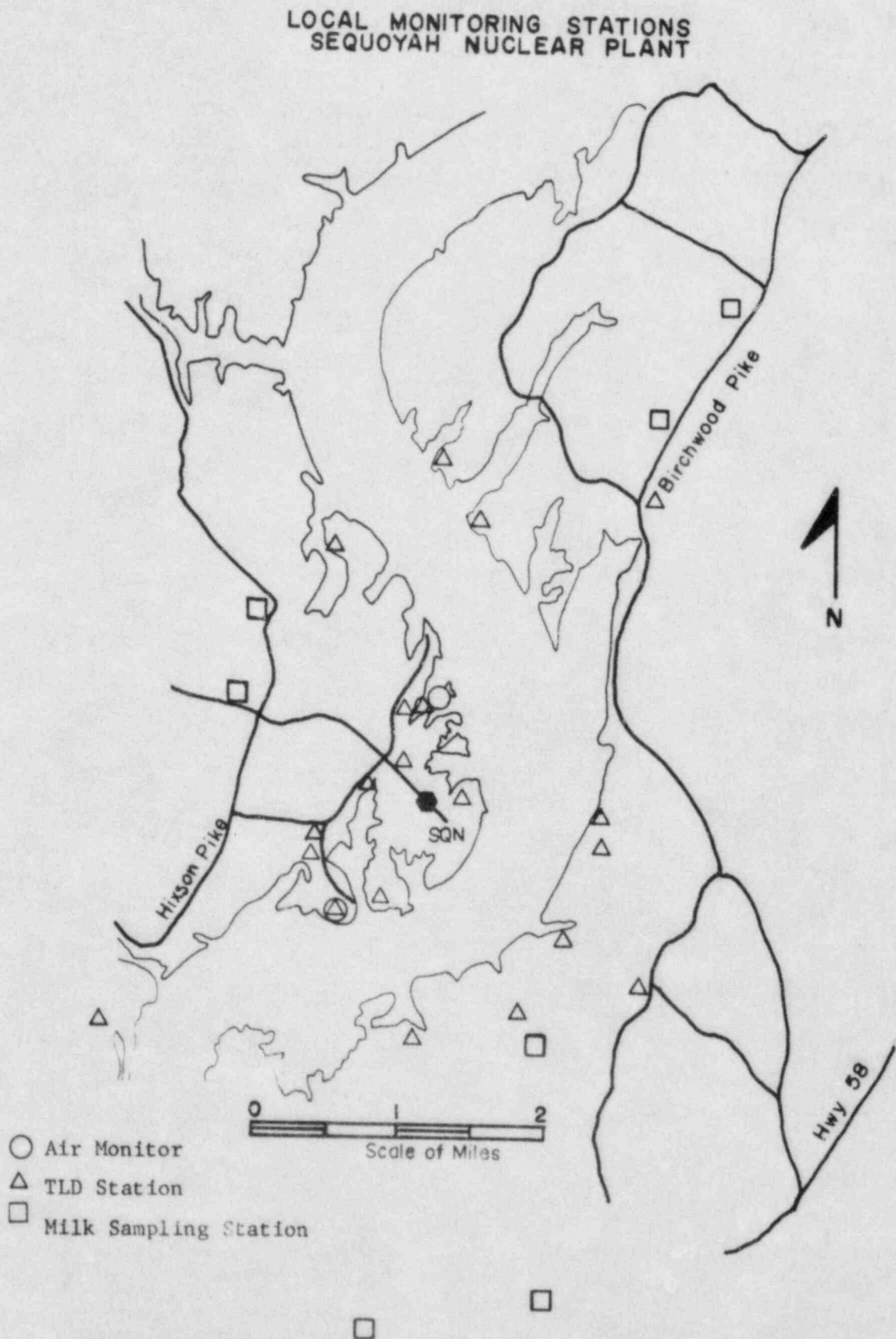


FIGURE 3



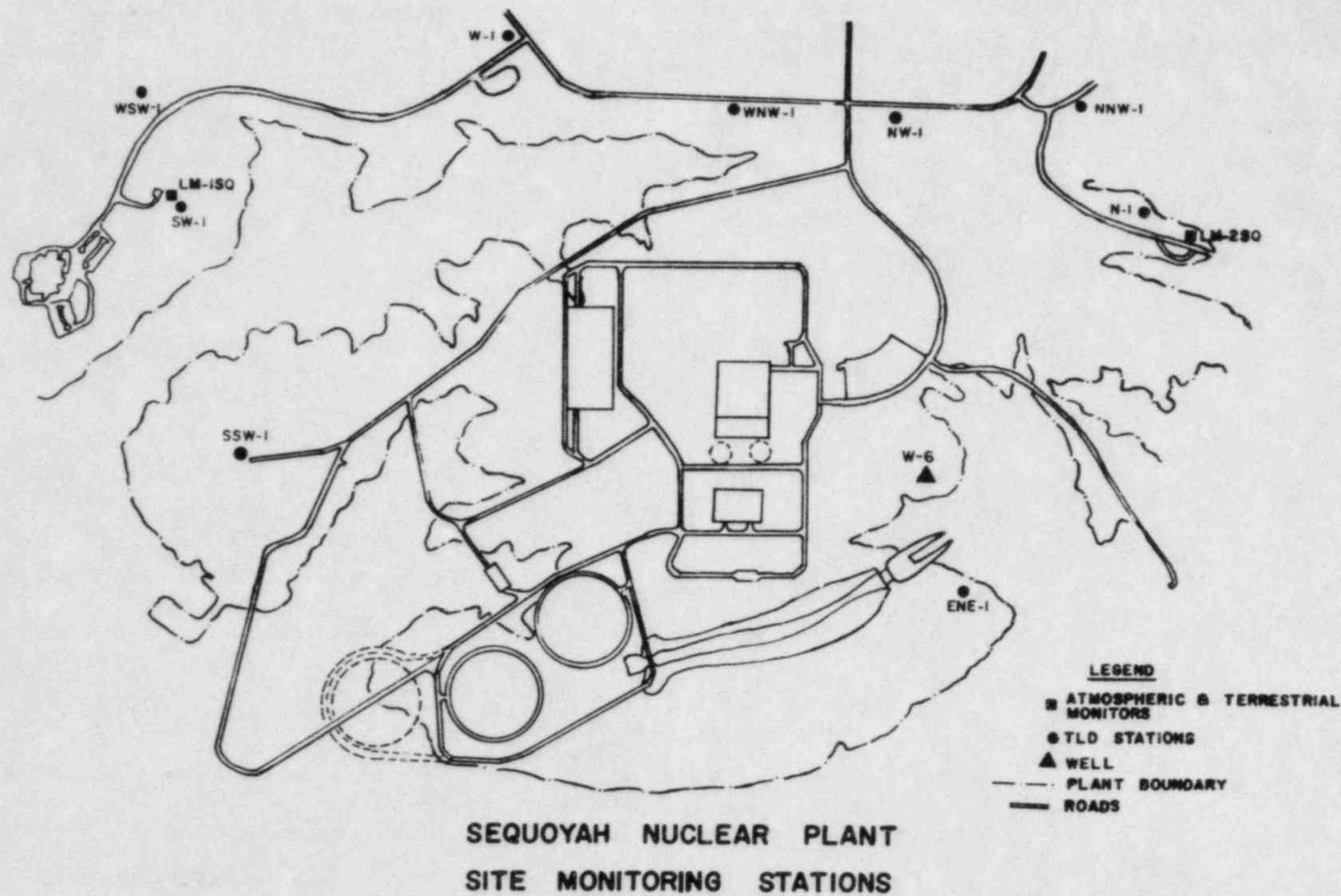


Figure 4

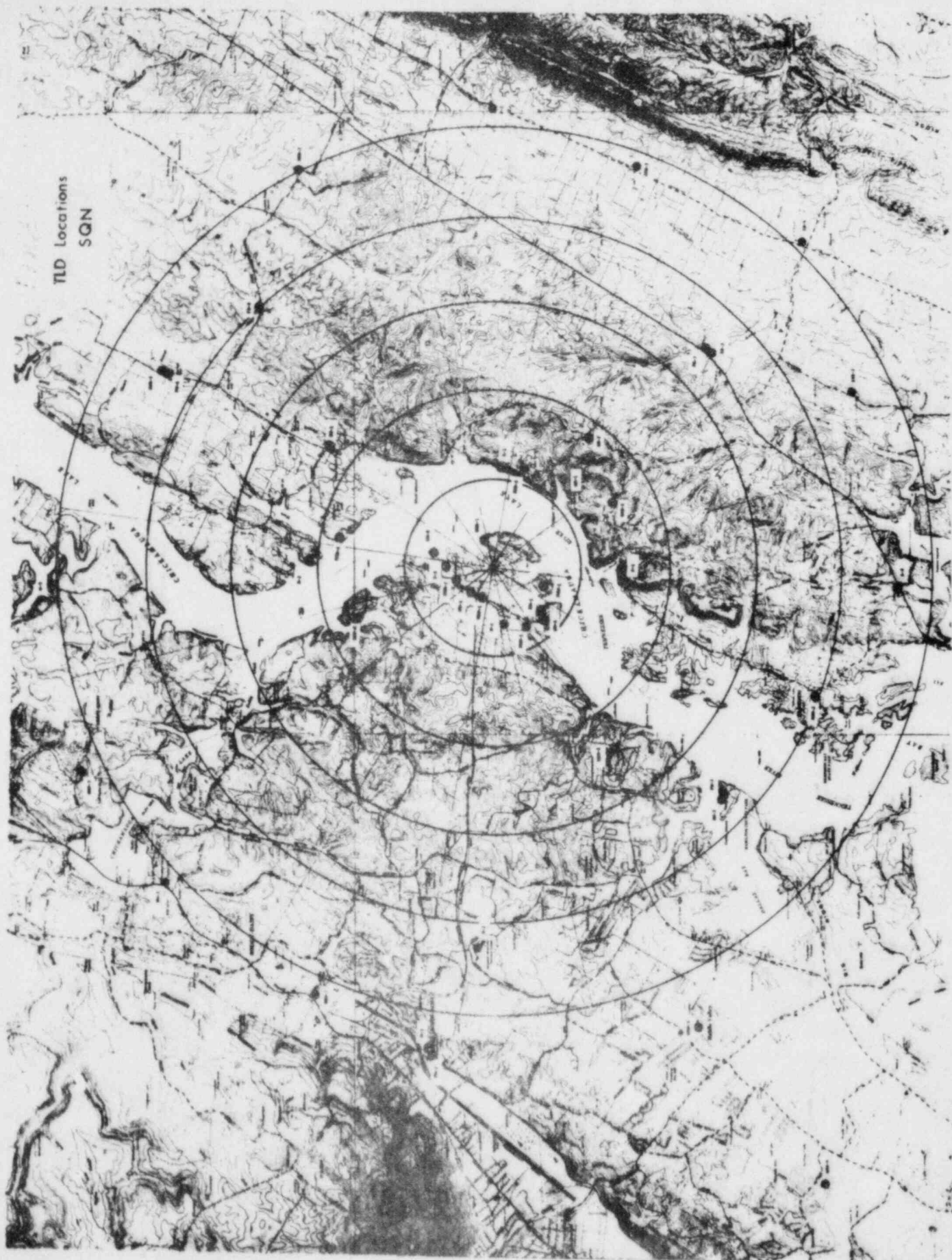
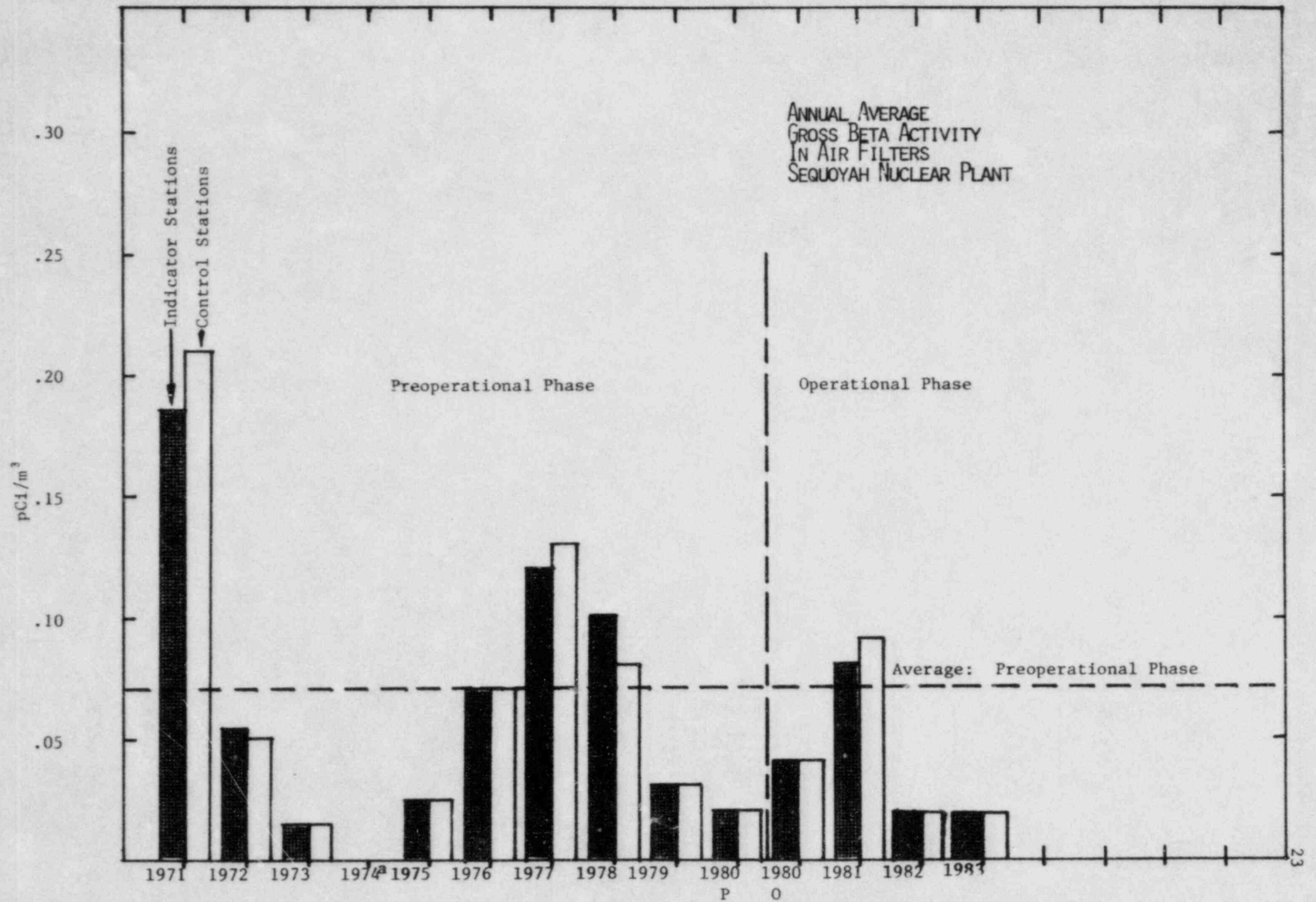


Figure 6



a. Data not collected in 1974.

Terrestrial Monitoring

Milk

Milk is collected weekly from two dairy farms and three other farms (one farm provided only two weekly samples) within a 5-mile radius of the plant (see figure 3), and from one or more of the three control dairy farms. Raw milk is analyzed weekly for ^{131}I , and monthly for gamma-emitting isotopes and strontium. The results are shown in table 11. Two samples were not available for pickup during this reporting period.

As has been noted in previous reports, the levels of ^{90}Sr in milk samples from farms producing milk for private consumption only are up to six times the levels found in milk from commercial dairy farms. Samples of feed and water supplied to the animals were analyzed in 1979 in an effort to determine the source of the strontium. Analysis of dried hay samples indicated levels of ^{90}Sr slightly higher than those encountered in routine vegetation samples. Analysis of pond water indicated no significant strontium activity.

This phenomenon was observed during preoperational radiological monitoring near Sequoyah and Bellefonte Nuclear Plants at farms where only one or two cows were being milked for private consumption of the milk. It is postulated that the feeding practices of these small farmers differ from those of the larger dairy farmers to the extent that fallout from atmospheric nuclear weapons testing may be more concentrated in these instances. Similarly, Hansen, et al., reported an inverse relationship between the levels of ^{90}Sr in milk and the quality of fertilization and land management.^a

Land Use Survey

The routine land use survey was conducted in the summer of 1983. Results of the survey identified three additional farms which should be included in the sampling program. These farms were added to the sampling schedule in November 1983. One farm provided two weekly milk samples and two monthly vegetation samples. The other farms provided two monthly vegetation samples (milk samples are expected to be available in the spring of 1984). It was concluded from evaluations of the survey results that the small changes in land use have not increased the projected doses to individuals in the area and that appropriate sampling is being conducted.

Vegetation

Vegetation samples are collected quarterly from four farms from which milk is collected and are analyzed for gamma-emitting radionuclides and strontium. Monthly vegetation sampling is conducted at six additional locations (three of these were added to the sampling program in November 1983) and at three control

^aHansen, W.G., et al., Farming Practices and Concentrations of Emission Products in Milk, U.S. Department of Health, Education, and Welfare; Public Health Service Publication No. 999-R-6, May 1964.

farms. The monthly samples are analyzed for gamma-emitting radionuclides with quarterly analyses for strontium. Approximately 1-2 kg 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 animals graze. Table 12 gives the results obtained from the laboratory analyses.

Soil

Soil samples were collected annually near each monitoring station to provide an indication of any long-term buildup of radioactivity in the environment. Two additional samples were taken at one of the control stations in conjunction with the Watts Bar Nuclear Plant radiological monitoring program. 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 for gross beta activity, gamma-emitting radionuclides, ^{89}Sr , and ^{90}Sr . The results are given in table 13.

Ground Water

An automatic sequential-type sampling device has been installed on a well downgradient from Sequoyah Nuclear Plant. A composite sample from this well is analyzed for gross beta activity and gamma-emitting radionuclides monthly and composited quarterly for determination of tritium. A grab sample is also taken from a farm near the plant and a control well across the river from the plant. The results of the analysis of well water are shown in table 14. During this reporting period four samples for gross beta activity and gamma-emitting radionuclide analysis were not available for collection.

Public Water

Potable water supplies taken from the Tennessee River in the vicinity of Sequoyah Nuclear Plant are sampled and analyzed monthly for gross beta and gamma-emitting radionuclides. Tritium, ^{89}Sr , and ^{90}Sr concentrations are determined in quarterly composite samples. The first potable water supply downstream from the plant is equipped with an automatic sampler with composite samples analyzed monthly. The results are shown in table 15.

Figure 7 shows the trends in gross beta activity in drinking water from 1971 through 1983. The annual averages reported in 1983 are consistent with the patterns established in the preoperational phase of the monitoring program and are slightly lower than levels reported in surface water samples (figure 11).

Environmental Gamma Radiation Levels

Bulb-type Victoreen manganese-activated calcium fluoride ($\text{Ca}_2\text{F:Mn}$) thermoluminescent dosimeters (TLDs) are placed at 16 stations around the plant near the site boundary, at the perimeter and remote air monitors, and at 22 additional stations approximately 5 miles from the site to determine the gamma exposure rates at these locations. The dosimeters, located within 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 16, which indicates that average levels at onsite stations are approximately 2-3 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 8 compares plots of the data from the onsite or site boundary stations with those from the offsite stations over the period from 1976 through 1983. To reduce the variations present in the data sets, a four-quarter moving average was constructed for each set. Figure 9 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 this phase of the preoperational monitoring program are 1-2 times the levels reported herein. Those data are not included in this report.

Food Crops, Poultry, and Beef

Food crops, poultry, and beef raised in the vicinity of SQN are sampled annually as they become available during the growing season. During this sampling period, samples of apples, cabbage, corn, green beans, potatoes, and tomatoes were collected and analyzed for gross beta and specific gamma-emitting radionuclides. Two samples were lost during processing and analyses for gross beta unobtainable. Poultry and beef samples were collected and analyzed for gross beta activity and gamma-emitting radionuclides. The results are given in tables 17 through 24.

TABLE 11
RADIOACTIVITY IN MILK
PCI/L - 0.037 BQ/L

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-327,328</u>		REPORTING PERIOD <u>1983</u>	
LOCATION OF FACILITY <u>HAMILTON</u>		<u>TENNESSEE</u>			
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a (LLD)	ALL INDICATOR LOCATIONS MEAN (F) ^b RANGE ^b 211 VALUES <LLD ANALYSIS PERFORMED	LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION RANGE ^b	CONTROL LOCATIONS MEAN (F) ^b RANGE ^b 160 VALUES <LLD	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
IODINE-131 371 GAMMA (GELI) 91	0.500				
CS-137	5.000	5.85(3/ 52) 5.01- 6.54	H WALKER FARM 1.25 MILES NW	5.85(3/ 13) 5.01- 6.54	39 VALUES <LLD
K-40	NOT ESTAB	1269.74(52/ 52) 1006.99- 1544.67	LOVELL FARM 2.75 MILES NNE	1348.93(13/ 13) 1160.60- 1501.29	1334.27(39/ 39) 1101.09- 1513.09
BI-214	NOT ESTAB	6.43(23/ 52) 0.65- 22.01	JONES FARM 1.25 MILES W	10.24(5/ 13) 1.17- 22.01	10.21(23/ 39) 0.34- 32.68
PB-214	NOT ESTAB	4.16(8/ 52) 0.76- 12.46	JONES FARM 1.25 MILES W	6.68(4/ 13) 4.02- 12.46	11.34(12/ 39) 0.07- 30.83
PB-212	NOT ESTAB	1.92(21/ 52) 0.18- 4.69	JONES FARM 1.25 MILES W	2.22(5/ 13) 0.18- 4.69	1.92(13/ 39) 0.05- 5.07
TL-208	NOT ESTAB	1.67(7/ 52) 0.68- 2.79	JONES FARM 1.25 MILES W	1.86(4/ 13) 0.68- 2.79	2.32(7/ 39) 0.24- 5.87
SR 89 91	10.000	52 VALUES <LLD ANALYSIS PERFORMED			39 VALUES <LLD
SR 90 91	2.000	7.59(47/ 52) 2.02- 18.21	H WALKER FARM 1.25 MILES NW	12.75(12/ 13) 8.75- 18.21	3.08(26/ 39) 2.08- 5.37

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 at specified locations is indicated in parentheses (F).

TABLE 12

RADIOACTIVITY IN VEGETATION

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED GAMMA (GELI)	LOWER LIMIT OF DETECTION ^a (LLD)	ALL INDICATOR LOCATIONS MEAN (F) ^b RANGE ^b		LOCATION WITH HIGHEST ANNUAL MEAN ^b NAME MEAN (F) ^b DISTANCE AND DIRECTION RANGE ^b		CONTROL LOCATIONS ^b MEAN (F) ^b RANGE ^b		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
100								
CS-137	0.060	0.26(11/ 55)	GOINS FARM	0.32(7/ 13)	0.09(2/ 45)			
		0.08- 0.97	1.5 MILES NNW	0.09- 0.97	0.06- 0.12			
K-40	NOT ESTAB	17.43(55/ 55)	LOVELL FARM	29.69(4/ 4)	19.04(45/ 45)			
		1.57- 46.67	2.75 MILES NNE	19.92- 37.67	2.50- 37.12			
BI-214	0.100	0.19(11/ 55)	GOINS FARM	0.22(6/ 13)	0.13(5/ 45)			
		0.11- 0.33	1.5 MILES NNW	0.11- 0.33	0.11- 0.15			
BI-212	NOT ESTAB	55 VALUES <LLD			0.70(1/ 45)			
					0.70- 0.70			
PB-214	NOT ESTAB	0.10(34/ 55)	GOINS FARM	0.16(11/ 13)	0.07(23/ 45)			
		0.00- 0.36	1.5 MILES NNW	0.01- 0.36	0.00- 0.20			
PB-212	NOT ESTAB	0.06(40/ 55)	GOINS FARM	0.10(11/ 13)	0.07(38/ 45)			
		0.00- 0.24	1.5 MILES NNW	0.01- 0.24	0.00- 0.37			
RA-226	NOT ESTAB	0.04(3/ 55)	JONES FARM	0.09(1/ 4)	0.09(4/ 45)			
		0.01- 0.09	1.25 MILES W	0.09- 0.09	0.01- 0.12			
BE-7	NOT ESTAB	7.62(55/ 55)	H WALKER FARM	9.13(4/ 4)	6.84(45/ 45)			
		1.34- 25.04	1.25 MILES NW	3.27- 15.00	0.51- 14.17			
TL-208	NOT ESTAB	0.03(28/ 55)	JONES FARM	0.06(2/ 4)	0.04(25/ 45)			
		0.00- 0.11	1.25 MILES W	0.05- 0.07	0.00- 0.17			
AC-228	NOT ESTAB	0.18(17/ 55)	GOINS FARM	0.27(8/ 13)	0.15(11/ 45)			
		0.06- 0.65	1.5 MILES NNW	0.08- 0.65	0.00- 0.20			
SR 89	0.250	0.26(1/ 28)	LOVELL FARM	0.26(1/ 4)	0.40(2/ 18)			
46		0.26- 0.26	2.75 MILES NNE	0.26- 0.26	0.32- 0.48			
SR 90	0.050	0.29(28/ 28)	EDGAR MALONE FAR	0.44(4/ 4)	0.27(17/ 18)			
46		0.06- 0.75	2.5 MILES N	0.13- 0.74	0.06- 0.77			

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 at specified locations is indicated in parentheses (F).

TABLE 13

RADIOACTIVITY IN SOIL

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

NAME OF FACILITY		DOCKET NO.		REPORTING PERIOD		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
LOCATION OF FACILITY						
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a --(LLD)--	ALL INDICATOR LOCATIONS MEAN (F) ^b --(LLD)--	LOCATION WITH HIGHEST ANNUAL MEAN NAME	CONTROL LOCATIONS MEAN (F) ^b --(LLD)--		
GROSS BETA	0.700	RANGE ^b 19.34(10/ 10)	DISTANCE AND DIRECTION	RANGE ^b 33.80(1/ 1)	RANGE ^b 14.31(4/ 4)	
GAMMA (GELI)		12.06- 33.80	9.0 MILES ENE	33.80- 33.80	9.95- 19.28	
14						
CS-137	0.020	0.36(10/ 10)	COUNTY PARK, TN	0.97(1/ 1)	0.27(4/ 4)	
		0.10- 0.97	3.75 MILES SW	0.97- 0.97	0.19- 0.37	
K-40	0.250	7.54(10/ 10)	GEORGETOWN, TN	19.00(1/ 1)	3.91(4/ 4)	
		2.08- 19.00	9.0 MILES ENE	19.00- 19.00	2.52- 7.46	
BI-214	0.050	0.81(10/ 10)	LM1 SOUTHWEST	1.05(1/ 1)	0.70(4/ 4)	
		0.56- 1.05	0.75 MILES SW	1.05- 1.05	0.64- 0.78	
BI-212	0.100	1.28(10/ 10)	LM1 SOUTHWEST	1.93(1/ 1)	0.71(4/ 4)	
		0.88- 1.93	0.75 MILES SW	1.93- 1.93	0.56- 0.94	
PB-214	0.050	0.91(10/ 10)	HARRISON, TN	1.16(1/ 1)	0.77(4/ 4)	
		0.65- 1.16	8.75 MILES SSW	1.16- 1.16	0.70- 0.86	
PB-212	NOT ESTAB	1.14(10/ 10)	LM1 SOUTHWEST	1.68(1/ 1)	0.65(4/ 4)	
		0.71- 1.68	0.75 MILES SW	1.68- 1.68	0.51- 0.98	
RA-226	0.050	0.81(10/ 10)	LM1 SOUTHWEST	1.05(1/ 1)	0.70(4/ 4)	
		0.56- 1.05	0.75 MILES SW	1.05- 1.05	0.64- 0.78	
RA-224	NOT ESTAB	1.30(9/ 10)	LM1 SOUTHWEST	1.69(1/ 1)	0.74(4/ 4)	
		0.83- 1.69	0.75 MILES SW	1.69- 1.69	0.54- 0.91	
TL-208	0.020	0.40(10/ 10)	LM1 SOUTHWEST	0.60(1/ 1)	0.23(4/ 4)	
		0.25- 0.60	0.75 MILES SW	0.60- 0.60	0.17- 0.35	
AC-228	0.060	1.19(10/ 10)	LM1 SOUTHWEST	1.78(1/ 1)	0.71(4/ 4)	
		0.74- 1.78	0.75 MILES SW	1.78- 1.78	0.55- 1.03	
PA-234M	NOT ESTAB	2.93(5/ 10)	HARRISON, TN	3.54(1/ 1)	2.09(1/ 4)	
		2.26- 3.54	8.75 MILES SSW	3.54- 3.54	2.09- 2.09	
SR 89	1.500	2.50(8/ 10)	NORTHWOODS, TN	4.36(1/ 1)	3.07(2/ 4)	
		1.59- 4.36	10.5 MILES WSW	4.36- 4.36	1.75- 4.38	
SR 90	0.300	10 VALUES <LLD		4 VALUES <LLD		
14		ANALYSIS PERFORMED				
14						

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 at specified locations is indicated in parentheses (F).

TABLE 14

RADIOACTIVITY IN WELL WATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY		SEQUOYAH		DOCKET NO.		50-327328		
LOCATION OF FACILITY		HAMILTON		REPORTING PERIOD		1983		
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a (LLD)	ALL INDICATOR LOCATIONS MEAN (F) ^b		LOCATION WITH HIGHEST ANNUAL MEAN NAME		CONTROL LOCATIONS MEAN (F) ^b		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		RANGE ^b		DISTANCE AND DIRECTION		RANGE ^b		
GROSS BETA	36	2.400	2.81(6/ 24)	SQN WELL #6	2.97(4/ 14)	3.48(11/ 12)		
GAMMA (GELI)	36		2.48- 3.36	ONSITE NNE	2.61- 3.36	2.60- 4.24		
K-40	NOT ESTAB		20.77(7/ 24)	SQN WELL #6	21.64(5/ 14)	32.49(3/ 12)		
			3.32- 40.83	ONSITE NNE	3.32- 40.83	12.44- 42.61		
BI-214	NOT ESTAB		13.75(13/ 24)	MAYS FARM	21.07(6/ 10)	11.67(8/ 12)		
			0.08- 51.71	0.75 MILES W	0.08- 51.71	0.48- 32.48		
PB-214	NOT ESTAB		20.69(9/ 24)	MAYS FARM	35.08(4/ 10)	17.04(4/ 12)		
			4.12- 53.08	0.75 MILES W	16.96- 53.08	2.48- 37.68		
PB-212	NOT ESTAB		1.35(8/ 24)	MAYS FARM	2.46(3/ 10)	4.73(1/ 12)		
			0.02- 4.24	0.75 MILES W	1.23- 4.24	4.73- 4.73		
TL-208	NOT ESTAB		1.36(4/ 24)	MAYS FARM	3.54(1/ 10)	12 VALUES <LLD		
			0.14- 3.54	0.75 MILES W	3.54- 3.54			
AC-228	NOT ESTAB		4.41(2/ 24)	SQN WELL #6	4.41(2/ 14)	12 VALUES <LLD		
			3.68- 5.14	ONSITE NNE	3.68- 5.14			
TRITIUM	330.000		9 VALUES <LLD			4 VALUES <LLD		
	13		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 at specified locations is indicated in parentheses (F).

TABLE 15

RADIOACTIVITY IN PUBLIC WATER SUPPLY

PCI/L - 0.037 BQ/L

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-327328</u>			
LOCATION OF FACILITY <u>HAMILTON</u>		REPORTING PERIOD <u>1983</u>			
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 79	2.400	3.36(14/ 52) 2.45- 6.15	E.I. DUPONT TRM 470.5	3.72(3/ 13) 2.64- 4.87	4.89(12/ 27) 2.41- 12.63
GAMMA (GELI) 79					
K-40	NOT ESTAB	16.26(19/ 52) 0.79- 46.37	DAISY, TN 5.5 MILES W	20.01(5/ 13) 7.68- 33.90	9.15(6/ 27) 0.92- 31.89
BI-214	NOT ESTAB	14.67(20/ 52) 1.32- 138.29	DAISY, TN 5.5 MILES W	39.36(6/ 13) 9.33- 138.29	3.08(12/ 27) 0.45- 9.13
PB-214	NOT ESTAB	20.27(13/ 52) 0.93- 137.19	DAISY, TN 5.5 MILES W	35.53(7/ 13) 3.32- 137.19	1.19(6/ 27) 0.45- 3.28
PB-212	NOT ESTAB	1.60(17/ 52) 0.18- 4.48	CHICKAMAUGA DAM TRM 465.3	2.44(6/ 13) 0.51- 4.48	1.87(13/ 27) 0.22- 4.36
TL-208	NOT ESTAB	1.27(9/ 52) 0.20- 3.87	CHICKAMAUGA DAM TRM 465.3	2.14(3/ 13) 0.98- 3.87	1.69(3/ 27) 1.01- 3.01
AC-228	NOT ESTAB	5.07(5/ 52) 1.68- 10.23	CHICKAMAUGA DAM TRM 465.3	5.77(3/ 13) 2.31- 10.23	1.53(1/ 27) 1.53- 1.53
SR 89	10.000	16 VALUES <LLD			9 VALUES <LLD
SR 90	2.000	ANALYSIS PERFORMED 16 VALUES <LLD			9 VALUES <LLD
TRITIUM	330.000	ANALYSIS PERFORMED 359.06(1/ 16) 359.06- 359.06	CF INDUSTRIES TRM 473.0	359.06(1/ 4) 359.06- 359.06	9 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 at specified locations is indicated in parentheses (F).

Table 16

ENVIRONMENTAL GAMMA RADIATION LEVELS

Average External Gamma Radiation Levels at Various Distances from Sequoyah
Nuclear Plant for Each Quarter - 1983
mR/Quarter^a

Distance miles	Average External Gamma Radiation Levels ^b			
	1st Quarter (Feb-Apr 83)	2nd Quarter (May-Jul 83)	3rd Quarter (Aug-Oct 83)	4th Quarter (Nov 83-Jan 84)
0-1	18.0 ± 3.7	19.4 ± 1.9	20.4 ± 4.5	21.0 ± 2.1
1-2	15.0 ± 5.1	16.9 ± 3.3	17.5 ± 5.1	17.5 ± 3.8
2-4	12.9 ± 2.6	15.2 ± 3.0	16.4 ± 5.1	16.4 ± 3.0
4-6	13.4 ± 1.4	15.9 ± 2.6	16.8 ± 3.6	16.3 ± 2.7
>6	13.2 ± 1.6	15.8 ± 1.5	17.1 ± 2.9	16.3 ± 1.9
Average, 0-2 miles (Onsite)	16.6 ± 4.5	18.4 ± 2.8	19.4 ± 4.9	19.6 ± 3.3
Average, >2 miles (Offsite)	13.2 ± 1.7	15.7 ± 2.4	16.8 ± 3.7	16.3 ± 2.5

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

b. All averages reported ±1σ (68 percent confidence level).

TABLE 17

RADIOACTIVITY IN APPLES

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

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-327,328</u>			
LOCATION OF FACILITY <u>HAMILTON</u>		<u>TENNESSEE</u>		REPORTING PERIOD <u>1983</u>	
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 MEAN (F) ^b DISTANCE AND DIRECTION RANGE ^b	CONTROL LOCATIONS MEAN (F) ^b RANGE ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	2 NOT ESTAB	2686.64(1/ 1) 2686.64- 2686.64	HARRISON BAY, TN 2686.64(1/ 1) 3.5 MILES SE 2686.64- 2686.64	2298.00(1/ 1) 2298.00- 2298.00	
GAMMA (GELI)	2				
K-40	2 NOT ESTAB	1421.00(1/ 1) 1421.00- 1421.00	HARRISON BAY, TN 1421.00(1/ 1) 3.5 MILES SE 1421.00- 1421.00	1812.76(1/ 1) 1812.76- 1812.76	

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 at specified locations is indicated in parentheses (F).

TABLE 18

RADIOACTIVITY IN CABBAGE

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

		NAME OF FACILITY <u>SEQUOYAH</u>				DOCKET NO. <u>50-327-328</u>			
		LOCATION OF FACILITY <u>HAMILTON</u>				REPORTING PERIOD <u>1983</u>			
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a <u>(LLD)</u>	ALL INDICATOR LOCATIONS MEAN (F) ^b		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) ^b		NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
		RANGE ^b		NAME DISTANCE AND DIRECTION		RANGE ^b			
GROSS BETA	25.000	3441.34(1/ 1)		1 MILES NW	3441.34(1/ 1)	3612.76(1/ 1)			
		3441.34- 3441.34			3441.34- 3441.34	3612.76- 3612.76			
GAMMA (GELI)	2								
K-40	NOT ESTAB	1435.73(1/ 1)		1 MILES NW	1435.73(1/ 1)	1941.94(1/ 1)			
		1435.73- 1435.73			1435.73- 1435.73	1941.94- 1941.94			
BI-214	NOT ESTAB	9.52(1/ 1)		1 MILES NW	9.52(1/ 1)	1 VALUES <LLD			
		9.52- 9.52			9.52- 9.52				
PB-214	NOT ESTAB	7.31(1/ 1)		1 MILES NW	7.31(1/ 1)	1 VALUES <LLD			
		7.31- 7.31			7.31- 7.31				
PB-212	NOT ESTAB	1 VALUES <LLD				1.94(1/ 1)			
						1.94- 1.94			

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 at specified locations is indicated in parentheses (F).

TABLE 19

RADIOACTIVITY IN CORN

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

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-327,328</u>			
LOCATION OF FACILITY <u>HAMILTON</u>		REPORTING PERIOD <u>1983</u>			
TYPE AND TOTAL NUMBER OF ANALYSIS <u>PERFORMED</u>	LOWER LIMIT OF DETECTION ^a	ALL INDICATOR LOCATIONS MEAN (F) ^b	LOCATION WITH HIGHEST ANNUAL MEAN NAME	CONTROL LOCATIONS MEAN (F) ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	<u>(LLD)</u>	RANGE ^b	DISTANCE AND DIRECTION	RANGE ^b	
GROSS BETA	25.000	4539.01(1/ 1) 4539.01- 4539.01	1 MILES NW 4539.01(1/ 1) 4539.01- 4539.01	3062.59(1/ 1) 3062.59- 3062.59	
GAMMA (GELI)	2				
K-40	NOT ESTAB	2156.11(1/ 1) 2156.11- 2156.11	1 MILES NW 2156.11(1/ 1) 2156.11- 2156.11	3103.18(1/ 1) 3103.18- 3103.18	
PB-212	NOT ESTAB	1 VALUES <LLD		1.75(1/ 1) 1.75- 1.75	

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 at specified locations is indicated in parentheses (F).

TABLE 20

RADIOACTIVITY IN GREEN BEANS

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

NAME OF FACILITY		SEQUOYAH		DOCKET NO.		50-327,328		
LOCATION OF FACILITY		HAMILTON		REPORTING PERIOD		1991		
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 MEAN (F) ^b DISTANCE AND DIRECTION RANGE ^b		CONTROL LOCATIONS MEAN (F) ^b RANGE ^b		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	3118.30(1/ 1)		1 MILES NW	3118.30(1/ 1)	5238.54(1/ 1)		
		3118.30- 3118.30			3118.30- 3118.30	5238.54- 5238.54		
GAMMA (GELI)								
K-40	NOT ESTAB	1631.93(1/ 1)		1 MILES NW	1631.93(1/ 1)	2601.57(1/ 1)		
		1631.93- 1631.93			1631.93- 1631.93	2601.57- 2601.57		
PB-214	NOT ESTAB	2.38(1/ 1)		1 MILES NW	2.38(1/ 1)	1 VALUES <LLD		
		2.38- 2.38			2.38- 2.38			

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 at specified locations is indicated in parentheses (F).

TABLE 21

RADIOACTIVITY IN POTATOES

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

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-3274328</u>		REPORTING PERIOD <u>1983</u>	
LOCATION OF FACILITY <u>HAMILTON</u>		<u>TENNESSEE</u>			
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 RANGE ^b	CONTROL LOCATIONS MEAN (F) ^b RANGE ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	6154.37(1/ 1) 6154.37- 6154.37	1 MILES NW 6154.37(1/ 1) 6154.37- 6154.37		
GAMMA (GELI)					
K-40	NOT ESTAB	3452.66(1/ 1) 3452.66- 3452.66	1 MILES NW 3452.66(1/ 1) 3452.66- 3452.66	3118.61(1/ 1) 3118.61- 3118.61	

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 at specified locations is indicated in parentheses (F).

TABLE 22

RADIOACTIVITY IN TOMATOES

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

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-327,328</u>			REPORTING PERIOD <u>1983</u>	
LOCATION OF FACILITY <u>HAMILTON</u>		<u>TENNESSEE</u>				
TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a <u>(LLD)</u>	ALL INDICATOR LOCATIONS MEAN (F) ^b <u>RANGE^b</u>	LOCATION WITH HIGHEST ANNUAL MEAN NAME MEAN (F) ^b <u>RANGE^b</u>	CONTROL LOCATIONS MEAN (F) ^b <u>RANGE^b</u>	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
GROSS BETA	25.000	3564.41(1/ 1) 3564.41- 3564.41	1 MILES NW 3564.41(1/ 1) 3564.41- 3564.41			
GAMMA (GELI)						
K-40	NOT ESTAB	1876.07(1/ 1) 1876.07- 1876.07	1 MILES NW 1876.07(1/ 1) 1876.07- 1876.07	1834.11(1/ 1) 1834.11- 1834.11		
PB-214	NOT ESTAB	1 VALUES <LLD		4.06(1/ 1) 4.06- 4.06		

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 at specified locations is indicated in parentheses (F).

TABLE 23

RADIOACTIVITY IN POULTRY

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

NAME OF FACILITY <u>SEQUOYAH</u>		DOCKET NO. <u>50-3274328</u>	
LOCATION OF FACILITY <u>HAMILTON</u>		REPORTING PERIOD <u>1983</u>	
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	
GROSS BETA	25.000	6219.24 (1/ 1) 6219.24- 6219.24	H WALKER FARM 1.25 MILES NW 6219.24 (1/ 1) 6219.24- 6219.24
GAMMA (GELI)	2		3939.51 (1/ 1) 3939.51- 3939.51
K-40	NOT ESTAB	2281.30 (1/ 1) 2281.30- 2281.30	H WALKER FARM 1.25 MILES NW 2281.30 (1/ 1) 2281.30- 2281.30
TL-208	NOT ESTAB	0.12 (1/ 1) 0.12- 0.12	H WALKER FARM 1.25 MILES NW 0.12 (1/ 1) 0.12- 0.12
			1530.64 (1/ 1) 1530.64- 1530.64 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 at specified locations is indicated in parentheses (F).

RADIOACTIVITY IN BEEF

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

DOCKET NO. 50-327,328
REPORTING PERIOD 1983

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	25.000	4972.13(1/ 1) 4972.13- 4972.13	JONES FARM 1.25 MILES W	4972.13(1/ 1) 4972.13- 4972.13	3885.57(1/ 1) 3885.57- 3885.57	
GAMMA (GELI)						
K-40	NOT ESTAB	1797.00(1/ 1) 1797.00- 1797.00	JONES FARM 1.25 MILES W	1797.00(1/ 1) 1797.00- 1797.00	1624.53(1/ 1) 1624.53- 1624.53	

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

Figure 7

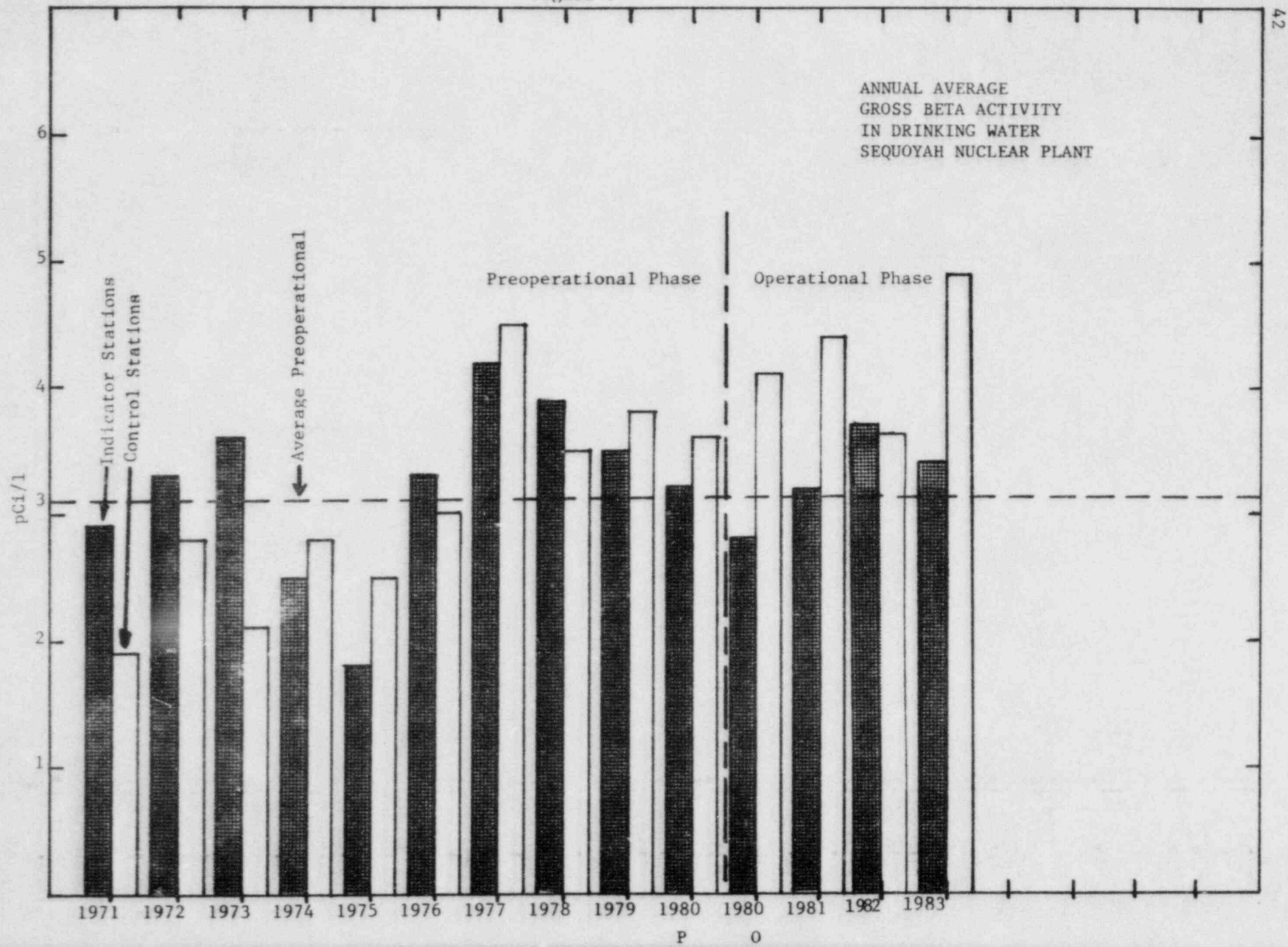


Figure 3

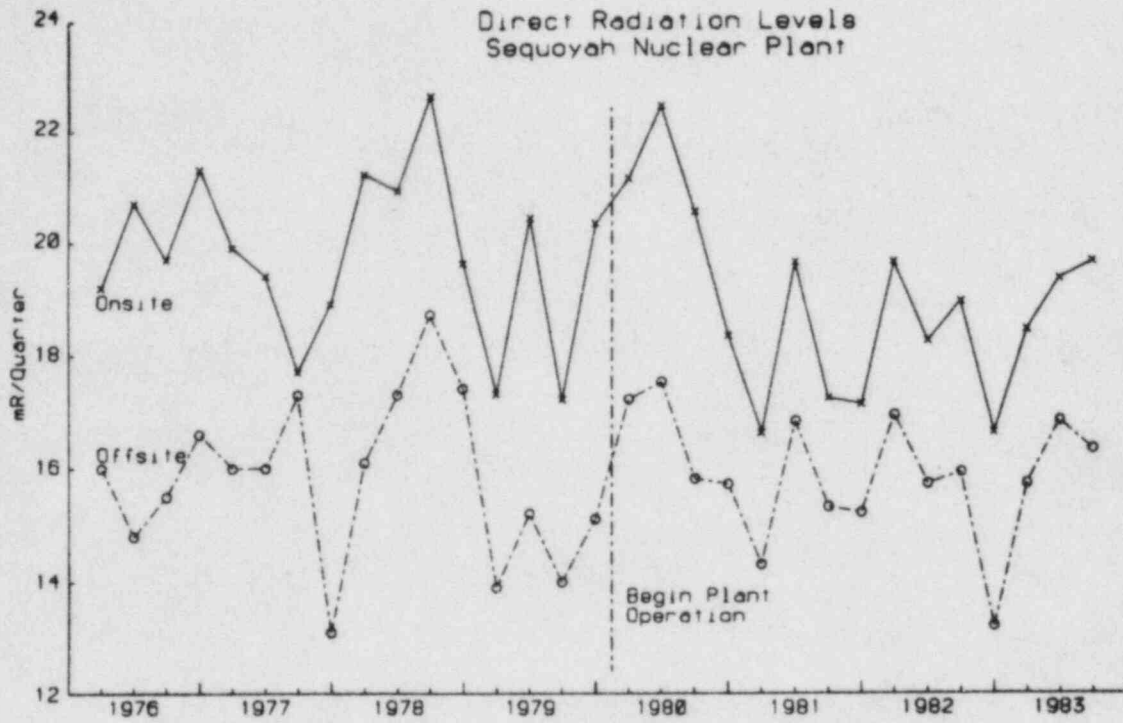
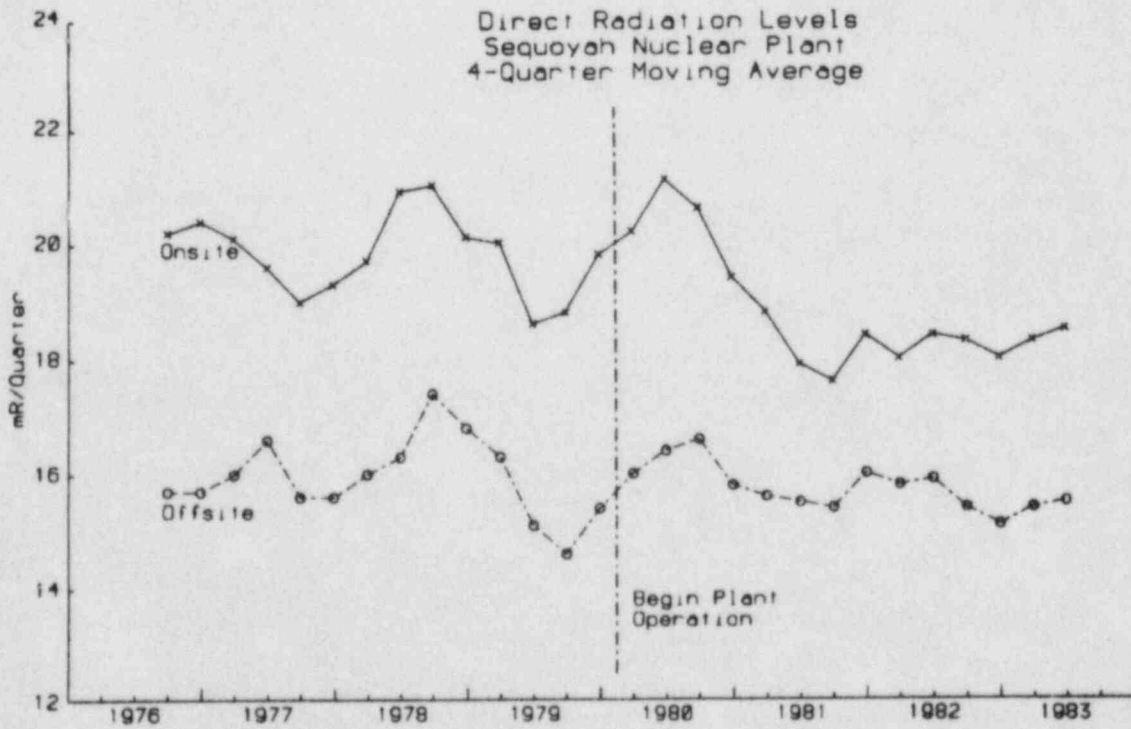


Figure 9



Reservoir Monitoring

Samples are collected from the Tennessee River as detailed in table 25. Samples collected for radiological analysis include water and Asiatic clams from three of these cross sections, sediment from four cross sections, and fish from three contiguous reservoirs. The locations of these cross sections are shown on the accompanying map (figure 10) 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 alpha and beta activity and gamma-emitting radionuclides. Further composites are made quarterly for strontium and tritium analyses. Results are displayed in table 26. Figure 11 presents a plot of the gross beta activity in surface water from 1971 through 1983. Indicator stations are those located downstream from the plant and controls are located upstream. 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. During this reporting period one station had intermittent power supply problems and three monthly samples were not collected.

Fish

Radiological monitoring for fish was accomplished by analyses of composite samples of adult fish taken semiannually 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, are collected representing both commercial and game species. Sufficient fish are collected in each reservoir to yield 250 or 300 grams oven-dry weight for analytical purposes. All samples are analyzed for gross alpha and gross beta activity, for gamma-emitting radionuclides, and for strontium content. Results are given in tables 27 through 30. During this reporting period one sample was of insufficient size to permit analysis.

Sediment

Sediment samples were collected semiannually from dredge hauls made for bottom fauna. Gamma, gross alpha, and gross beta activity and ^{89}Sr and ^{90}Sr content were determined in samples collected from points in four cross sections. 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 31.

In addition to the sampling described above, shoreline sediment samples were collected at three recreation-use areas (two downstream from the plant and one upstream) in the vicinity of SQN. Samples were taken in May and November and analyzed for gross alpha, gross beta, gamma-emitting radionuclides, ^{89}Sr , and ^{90}Sr . Results are given in table 32.

Asiatic Clams

Samples of Asiatic clams were collected semiannually with a Ponar dredge from three stations and analyzed for gamma, gross alpha, and gross beta activity. The ^{89}Sr and ^{90}Sr content was determined in the shells. Results are given in tables 33 and 34.

Table 25

SAMPLING SCHEDULE - RESERVOIR MONITORING

<u>Tennessee River (Mile)</u>	<u>Biological Samples</u>				<u>Water Samples</u>
	<u>Benthic Fauna</u>	<u>Sediment</u>	<u>Shoreline Sediment</u>	<u>Fish^a</u>	
472.8		X			
473.2					Automatic sampler ^b
477.5			X		
478.3			X		
480.8	X	X			
483.4	X	X			Automatic sampler ^b
485.2 (Control)			X		
496.5 (Control)	X	X			
497.0 (Control)					Automatic sampler ^b

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

b. Composite sample analyzed monthly.

TABLE 26

RADIOACTIVITY IN SURFACE WATER TOTAL

PCI/L - 0.037 BQ/L

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

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 ALPHA	2.000	23 VALUES <LLD			2.51(1/ 13) 2.51- 2.51	
GROSS BETA	2.400	3.17(11/ 23) 2.52- 4.43	TRM 483.4	3.25(7/ 13) 2.52- 4.43	3.75(9/ 13) 2.45- 7.57	
GAMMA (GELI)						
K-40	NOT ESTAB	13.09(7/ 23) 2.84- 30.88	TRM 483.4	15.23(5/ 13) 2.84- 30.88	14.87(4/ 13) 0.25- 51.38	
BI-214	NOT ESTAB	3.81(10/ 23) 0.43- 15.29	TRM 473.2	5.95(4/ 10) 0.43- 15.29	3.53(6/ 13) 0.55- 6.17	
PB-214	NOT ESTAB	4.77(3/ 23) 2.64- 8.67	TRM 473.2	8.67(1/ 10) 8.67- 8.67	2.02(2/ 13) 0.02- 4.01	
PB-212	NOT ESTAB	2.23(11/ 23) 0.33- 5.14	TRM 473.2	2.82(5/ 10) 0.33- 5.14	3.67(3/ 13) 0.99- 8.80	
SR 89	10.000	8 VALUES <LLD			4 VALUES <LLD	
SR 90	2.000	8 VALUES <LLD			4 VALUES <LLD	
TRITIUM	330.000	ANALYSIS PERFORMED 565.40(2/ 8) 418.92- 711.87	TRM 483.4	711.87(1/ 4) 711.87- 711.87	380.63(2/ 4) 362.88- 398.39	

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 at specified locations is indicated in parentheses (F).

TABLE 27

RADIOACTIVITY IN WHITE CRAPPIE (FLESH)

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a (LLD)	ALL INDICATOR LOCATIONS MEAN (F) ^b		LOCATION WITH HIGHEST ANNUAL MEAN NAME DISTANCE AND DIRECTION		CONTROL LOCATIONS MEAN (F) ^b		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		RANGE ^b		RANGE ^b		RANGE ^b		
GROSS ALPHA	0.100	0.34(	1/ 4)	CHICKAMAUGA RES	0.34(	1/ 2)	2 VALUES <LLD	
6		0.34-	0.34	TRM 471-530	0.3 -	0.34		
GROSS BETA	0.100	34.69(	4/ 4)	NICKAJACK RES	35.10(	2/ 2)	18.38(	2/ 2)
6		31.76-	38.45	TRM 425-471	31.76-	38.45	16.43-	20.33
GAMMA (GELI)								
6								
CS-137	0.020	0.11(	4/ 4)	CHICKAMAUGA RES	0.11(	2/ 2)	0.07(	2/ 2)
		0.06-	0.13	TRM 471-530	0.11-	0.12	0.06-	0.08
K-40	NOT ESTAB	16.72(	4/ 4)	CHICKAMAUGA RES	17.32(	2/ 2)	7.74(	2/ 2)
		15.72-	17.51	TRM 471-530	17.13-	17.51	7.19-	8.23
PB-214	NOT ESTAB	0.01(	1/ 4)	CHICKAMAUGA RES	0.01(	1/ 2)	2 VALUES <LLD	
		0.01-	0.01	TRM 471-530	0.01-	0.01		
PB-212	NOT ESTAB	0.00(	2/ 4)	CHICKAMAUGA RES	0.00(	1/ 2)	2 VALUES <LLD	
		0.00-	0.00	TRM 471-530	0.00-	0.00		
SR 89	0.500	0.68(	1/ 4)	CHICKAMAUGA RES	0.68(	1/ 2)	2 VALUES <LLD	
6		0.68-	0.68	TRM 471-530	0.68-	0.68		
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 at specified locations is indicated in parentheses (F).

TABLE 28

RADIOACTIVITY IN CHANNEL CATFISH (FLESH)

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a	ALL INDICATOR LOCATIONS MEAN (F) ^b	LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN (F) ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
			NAME	MEAN (F) ^b		
GROSS ALPHA	0.100	RANGE ^b 4 VALUES <LLD	DISTANCE AND DIRECTION	RANGE ^b	RANGE ^b 2 VALUES <LLD	
6		ANALYSIS PERFORMED				
GROSS BETA	0.100	20.54(4/ 4)	CHICKAMAUGA RES	22.28(2/ 2)	17.53(2/ 2)	
6		14.39- 23.19	TRM 471-530	21.97- 22.60	11.91- 23.15	
GAMMA (GELI)						
6						
CS-137	0.020	0.04(2/ 4)	NICKAJACK RES	0.05(1/ 2)	0.08(1/ 2)	
		0.04- 0.05	TRM 425-471	0.05- 0.05	0.08- 0.08	
K-40	NOT ESTAB	9.37(4/ 4)	CHICKAMAUGA RES	10.43(2/ 2)	8.31(2/ 2)	
		6.49- 11.48	TRM 471-530	9.38- 11.48	5.53- 11.09	
PB-212	NOT ESTAB	0.00(1/ 4)	CHICKAMAUGA RES	0.00(1/ 2)	0.00(1/ 2)	
		0.00- 0.00	TRM 471-530	0.00- 0.00	0.00- 0.00	
SR 89	0.500	4 VALUES <LLD			2 VALUES <LLD	
5		ANALYSIS PERFORMED				
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 at specified locations is indicated in parentheses (F).

RADIOACTIVITY IN SMALLMOUTH BUFFALO (FLESH)

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-3274328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

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 ALPHA	0.100	4 VALUES <LLD			0.14(1/ 2) 0.14- 0.14	
GROSS BETA	0.100	20.63(4/ 4) 13.61- 26.52	NICKAJACK RES TRM 425-471	21.19(2/ 2) 18.94- 23.44	20.37(2/ 2) 19.07- 21.67	
GAMMA (GELI)						
CS-137	0.020	0.07(2/ 4) 0.07- 0.07	CHICKAMAUGA RES TRM 471-530	0.07(1/ 2) 0.07- 0.07	0.04(1/ 2) 0.04- 0.04	
K-40	NOT ESTAB	9.97(4/ 4) 6.61- 11.64	NICKAJACK RES TRM 425-471	10.82(2/ 2) 10.27- 11.37	8.37(2/ 2) 7.40- 9.33	
PB-214	NOT ESTAB	0.00(1/ 4) 0.00- 0.00	CHICKAMAUGA RES TRM 471-530	0.00(1/ 2) 0.00- 0.00	2 VALUES <LLD	
PB-212	NOT ESTAB	0.00(2/ 4) 0.00- 0.00	NICKAJACK RES TRM 425-471	0.00(1/ 2) 0.00- 0.00	2 VALUES <LLD	
SR 89	0.500	4 VALUES <LLD			2 VALUES <LLD	
SR 90	0.100	ANALYSIS PERFORMED 4 VALUES <LLD			2 VALUES <LLD	
		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 at specified locations is indicated in parentheses (F).

TABLE 30

RADIOACTIVITY IN SMALLMOUTH BUFFALO (WHOLE)

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) ^b	RANGE ^b	NAME	MEAN (F) ^b	MEAN (F) ^b	RANGE ^b	
GROSS ALPHA	0.100	0.20(1/ 3)	0.20- 0.20	CHICKAMAUGA RES	0.20(1/ 2)	0.18(1/ 2)	0.18- 0.18	
GROSS BETA	0.100	14.68(3/ 3)	12.60- 17.97	TRM 471-530	0.20- 0.20	12.54(2/ 2)	11.71- 13.36	
GAMMA (GEL)				CHICKAMAUGA RES	15.29(2/ 2)			
CS-137	0.020	0.03(1/ 3)	0.03- 0.03	TRM 471-530	12.60- 17.97	2 VALUES <LLD		
K-40	NOT ESTAB	5.65(3/ 3)	4.49- 7.62	CHICKAMAUGA RES	0.03(1/ 2)	5.38(2/ 2)	4.98- 5.77	
PB-214	NOT ESTAB	3 VALUES <LLD		TRM 471-530	4.49- 7.62	0.02(1/ 2)	0.02- 0.02	
PB-212	NOT ESTAB	0.01(3/ 3)	0.00- 0.02	CHICKAMAUGA RES	0.02(2/ 2)	0.00(1/ 2)	0.00- 0.00	
SR 89	0.500	1.17(1/ 3)	1.17- 1.17	TRM 471-530	0.01- 0.02	2 VALUES <LLD		
SR 90	0.100	0.14(2/ 3)	0.12- 0.16	CHICKAMAUGA RES	1.17(1/ 2)	0.11(1/ 2)	0.11- 0.11	
				TRM 471-530	0.16(1/ 2)			

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 at specified locations is indicated in parentheses (F).

TABLE 31

RADIOACTIVITY IN SEDIMENT

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

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 RANGE ^b	CONTROL LOCATIONS MEAN (F) ^b RANGE ^b	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.350	11.29(6/ 6) 7.63- 15.21	TRM 472.80 13.17(2/ 2) 11.14- 15.21	9.74(2/ 2) 8.06- 11.42	
GROSS BETA	0.700	48.43(6/ 6) 31.70- 64.56	TRM 472.80 55.06(2/ 2) 45.56- 64.56	44.34(2/ 2) 43.43- 45.26	
GAMMA (GELI)					
CO-60	0.010	0.27(6/ 6) 0.02- 0.60	TRM 480.82 0.43(2/ 2) 0.27- 0.60	0.10(2/ 2) 0.06- 0.14	
CS-137	0.020	1.33(6/ 6) 0.15- 3.16	TRM 472.80 2.49(2/ 2) 1.83- 3.16	0.91(2/ 2) 0.47- 1.36	
CO-58	0.010	0.09(1/ 6) 0.09- 0.09	TRM 472.80 0.09(1/ 2) 0.09- 0.09	2 VALUES <LLD	
K-40	NOT ESTAB	13.56(6/ 6) 10.92- 18.23	TRM 480.82 15.07(2/ 2) 11.92- 18.23	13.22(2/ 2) 12.45- 13.98	
MN-54	0.010	0.06(1/ 6) 0.06- 0.06	TRM 472.80 0.06(1/ 2) 0.06- 0.06	2 VALUES <LLD	
BI-214	0.020	0.95(6/ 6) 0.45- 1.43	TRM 472.80 1.17(2/ 2) 0.91- 1.43	0.76(2/ 2) 0.72- 0.80	
BI-212	0.100	1.72(5/ 6) 0.70- 2.57	TRM 472.80 2.04(2/ 2) 1.50- 2.57	1.11(2/ 2) 1.02- 1.20	
PB-214	NOT ESTAB	1.02(6/ 6) 0.48- 1.39	TRM 472.80 1.20(2/ 2) 1.02- 1.39	0.85(2/ 2) 0.84- 0.85	
PB-212	NOT ESTAB	1.22(6/ 6) 0.54- 1.83	TRM 472.80 1.29(2/ 2) 1.20- 1.37	1.06(2/ 2) 0.95- 1.18	
RA-226	NOT ESTAB	0.79(4/ 6) 0.45- 1.27	TRM 472.80 0.91(1/ 2) 0.91- 0.91	0.76(2/ 2) 0.72- 0.80	
RA-223	NOT ESTAB	6 VALUES <LLD		0.39(1/ 2) 0.39- 0.39	
RA-224	NOT ESTAB	1.26(3/ 6) 0.65- 1.78	TRM 472.80 1.33(1/ 2) 1.33- 1.33	1.12(2/ 2) 1.01- 1.22	
TL-208	0.020	0.47(6/ 6) 0.20- 0.66	TRM 472.80 0.53(2/ 2) 0.40- 0.66	0.36(2/ 2) 0.32- 0.40	
AC-228	0.060	1.37(6/ 6) 0.64- 1.88	TRM 472.80 1.55(2/ 2) 1.22- 1.88	1.10(2/ 2) 0.98- 1.21	
SR 89	1.500	1.96(2/ 6) 1.61- 2.31	TRM 483.4 2.31(1/ 2) 2.31- 2.31	3.93(1/ 2) 3.93- 3.93	
SR 90	0.300	6 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 at specified locations is indicated in parentheses (F).

TABLE 32

RADIOACTIVITY IN SHORE LINE SEDIMENT

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION ^a (LLD)	ALL INDICATOR LOCATIONS		LOCATION WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
		MEAN (F) ^b		NAME		MEAN (F) ^b		
		RANGE ^b		DISTANCE AND DIRECTION		RANGE ^b		
GROSS ALPHA	NOT ESTAB	8.01(	4/ 4)	GOLD POINT	10.62(2/ 2)	4.34(2/ 2)		
		4.96-	14.22	TRM 478	7.03- 14.22	2.86-	5.83	
GROSS BETA	0.700	23.30(	4/ 4)	GOLD POINT	27.79(2/ 2)	17.50(2/ 2)		
		18.05-	35.66	TRM 478	19.92- 35.66	14.07-	20.92	
GAMMA (GELI)								
CO-60	0.010	0.01(	2/ 4)	HARRISON FLATS	0.02(1/ 2)	2 VALUES <LLD		
		0.01-	0.02	TRM 477	0.02- 0.02			
CS-137	0.020	0.10(	3/ 4)	GOLD POINT	0.10(1/ 2)	0.15(2/ 2)		
		0.07-	0.11	TRM 478	0.10- 0.10	0.03-	0.26	
K-40	NOT ESTAB	3.96(	4/ 4)	GOLD POINT	5.50(2/ 2)	4.48(2/ 2)		
		2.32-	7.68	TRM 478	3.32- 7.68	3.69-	5.26	
BI-214	0.020	0.84(	4/ 4)	GOLD POINT	0.93(2/ 2)	0.51(2/ 2)		
		0.72-	1.15	TRM 478	0.72- 1.15	0.36-	0.67	
BI-212	0.100	0.80(	3/ 4)	GOLD POINT	1.00(1/ 2)	0.66(2/ 2)		
		0.66-	1.00	TRM 478	1.00- 1.00	0.51-	0.80	
PB-214	NOT ESTAB	0.92(	4/ 4)	GOLD POINT	1.02(2/ 2)	0.57(2/ 2)		
		0.81-	1.21	TRM 478	0.83- 1.21	0.41-	0.73	
PB-212	0.020	0.96(	4/ 4)	GOLD POINT	1.32(2/ 2)	0.58(2/ 2)		
		0.58-	1.77	TRM 478	0.88- 1.77	0.42-	0.74	
RA-226	NOT ESTAB	0.74(	3/ 4)	HARRISON FLATS	0.74(2/ 2)	0.51(2/ 2)		
		0.72-	0.76	TRM 477	0.73- 0.76	0.36-	0.67	
RA-223	NOT ESTAB	0.27(	1/ 4)	GOLD POINT	0.27(1/ 2)	0.12(1/ 2)		
		0.27-	0.27	TRM 478	0.27- 0.27	0.12-	0.12	
RA-224	NOT ESTAB	0.87(	3/ 4)	GOLD POINT	1.05(1/ 2)	0.62(2/ 2)		
		0.68-	1.05	TRM 478	1.05- 1.05	0.47-	0.77	
TL-208	0.020	0.32(	4/ 4)	GOLD POINT	0.42(2/ 2)	0.19(2/ 2)		
		0.21-	0.55	TRM 478	0.30- 0.55	0.14-	0.25	
AC-228	0.060	0.97(	4/ 4)	GOLD POINT	1.34(2/ 2)	0.62(2/ 2)		
		0.58-	1.80	TRM 478	0.88- 1.80	0.44-	0.80	
PA-234M	NOT ESTAB	2.42(	1/ 4)	HARRISON FLATS	2.42(1/ 2)	2 VALUES <LLD		
		2.42-	2.42	TRM 477	2.42- 2.42			
SR 89	1.500	4 VALUES <LLD				2 VALUES <LLD		
SR 90	0.300	4 VALUES <LLD				2 VALUES <LLD		
		ANALYSIS PERFORMED						
		ANALYSIS PERFORMED						
		ANALYSIS PERFORMED						

TABLE 33

RADIOACTIVITY IN CLAM FLESH

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328
 LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1983

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 ALPHA	0.100	0.23(4/ 4) 0.15- 0.32	TRM 480.82	0.29(2/ 2) 0.26- 0.32	0.35(2/ 2) 0.22- 0.49	
GROSS BETA	0.100	5.11(4/ 4) 2.13- 6.96	TRM 480.82	6.26(2/ 2) 5.56- 6.96	4.77(2/ 2) 3.69- 5.34	
GAMMA (GELI)						
CO-60	0.080	0.20(1/ 4) 0.20- 0.20	TRM 480.82	0.20(1/ 2) 0.20- 0.20	2 VALUES <LLD	
K-40	NOT ESTAB	2.30(3/ 4) 1.83- 3.06	TRM 480.82	3.06(1/ 2) 3.06- 3.06	0.52(1/ 2) 0.52- 0.52	
BI-214	NOT ESTAB	0.80(3/ 4) 0.45- 1.38	TRM 480.82	1.38(1/ 2) 1.38- 1.38	0.32(2/ 2) 0.13- 0.51	
PB-214	NOT ESTAB	0.76(3/ 4) 0.35- 1.52	TRM 480.82	1.52(1/ 2) 1.52- 1.52	0.34(2/ 2) 0.17- 0.51	
PB-212	NOT ESTAB	0.09(2/ 4) 0.07- 0.11	TRM 480.82	0.11(1/ 2) 0.11- 0.11	0.00(1/ 2) 0.00- 0.00	
RA-226	NOT ESTAB	0.57(1/ 4) 0.57- 0.57	TRM 483.4	0.57(1/ 2) 0.57- 0.57	2 VALUES <LLD	
TL-203	NOT ESTAB	0.04(1/ 4) 0.04- 0.04	TRM 480.82	0.04(1/ 2) 0.04- 0.04	0.02(1/ 2) 0.02- 0.02	
AC-228	NOT ESTAB	0.07(1/ 4) 0.07- 0.07	TRM 483.4	0.07(1/ 2) 0.07- 0.07	0.10(2/ 2) 0.06- 0.14	

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 at specified locations is indicated in parentheses (F).

RESERVOIR MONITORING NETWORK SEQUOYAH NUCLEAR PLANT

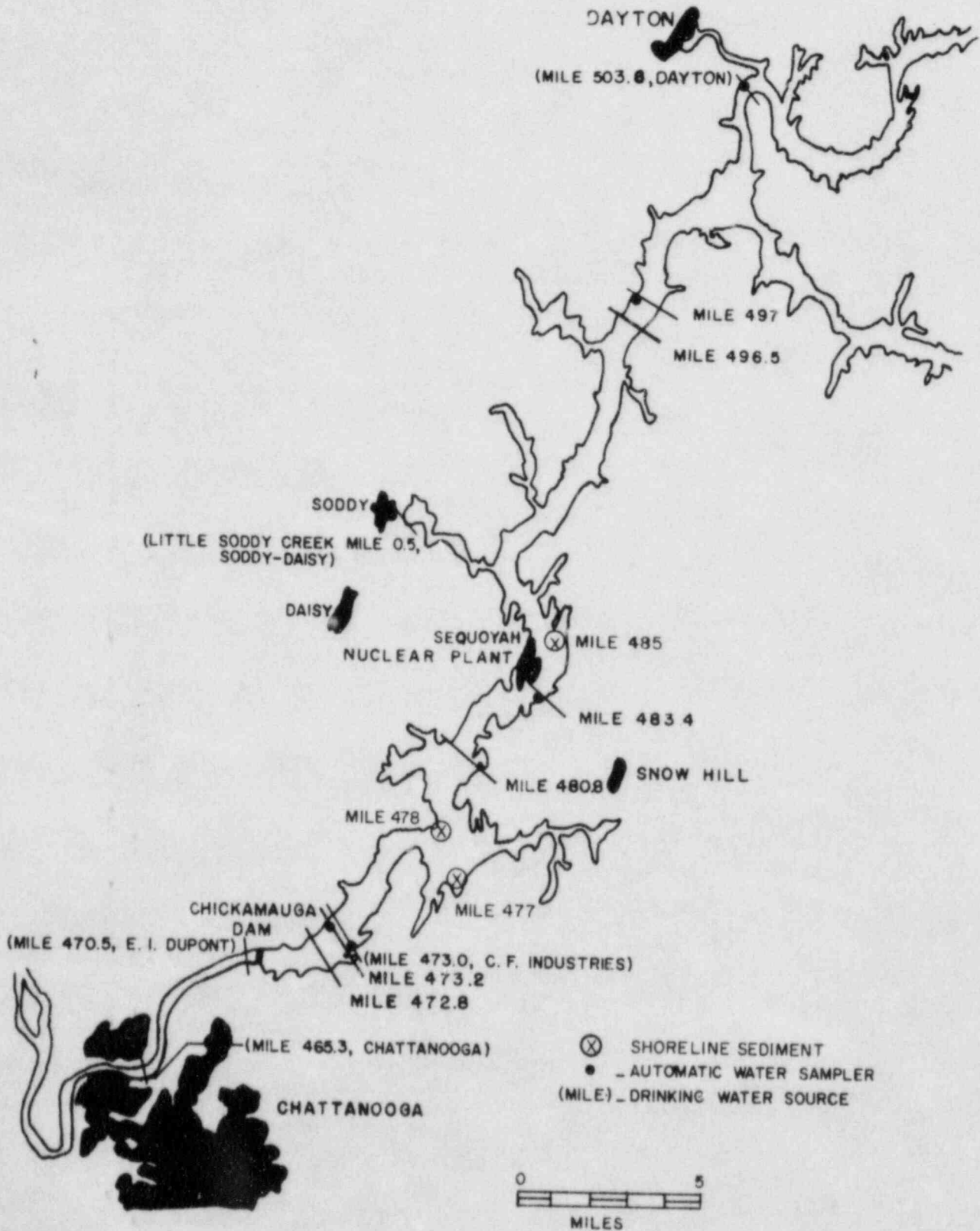


Figure 11

ANNUAL AVERAGE
GROSS BETA ACTIVITY
IN SURFACE WATER
SEQUOYAH NUCLEAR PLANT

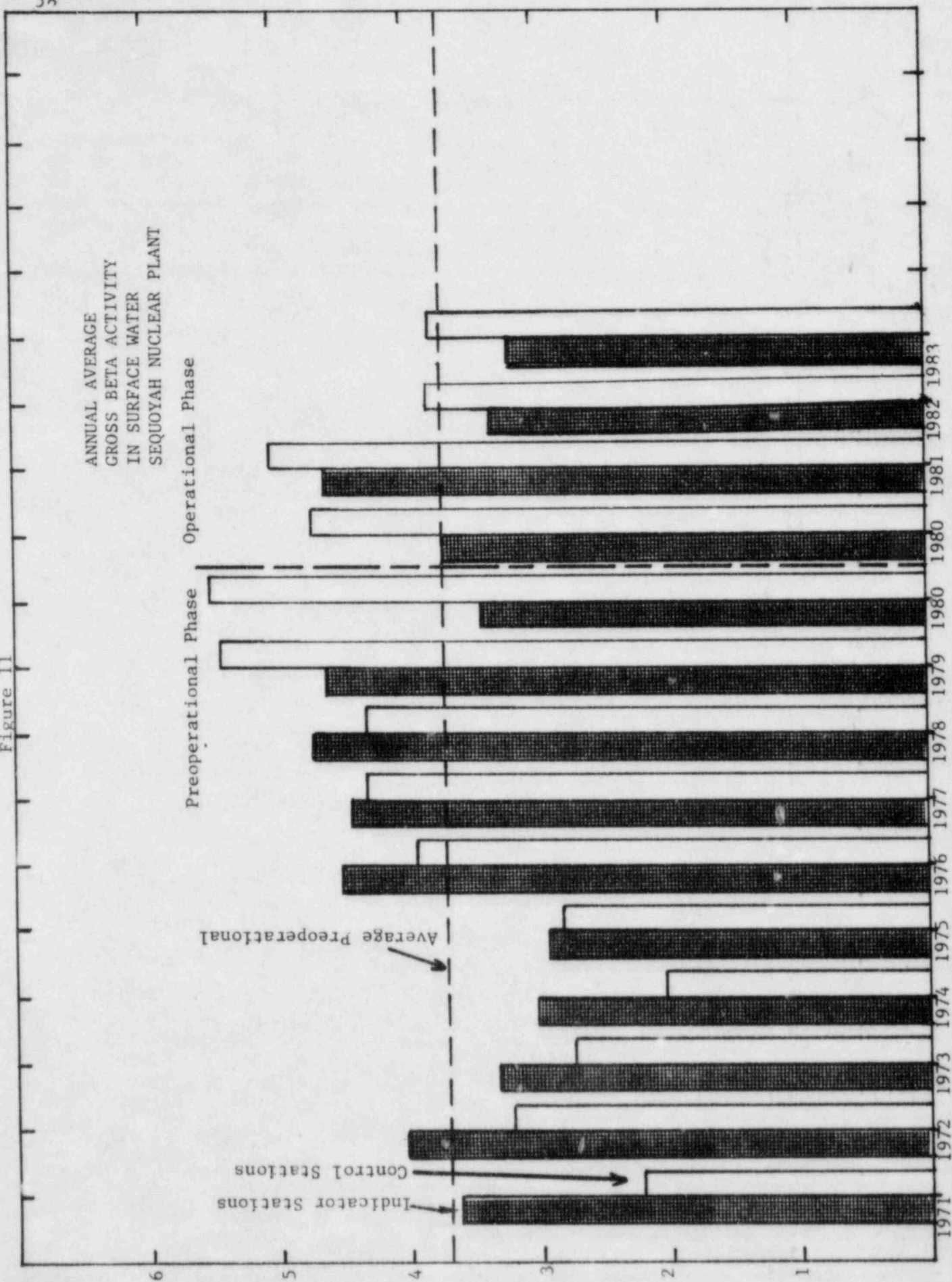
Preoperational Phase Operational Phase

Average Preoperational

Indicator Stations
Control Stations

pci/1

1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1980 1981 1982 1983



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.

Data Analysis

Data measured at the control stations for each medium were averaged for each sampling period. In order to describe the distribution of control station data, a mean, standard deviation, and 3-sigma limits were calculated. We can expect that background concentrations would be distributed within these limits. This provides the basis for comparing control and indicator data. If the indicator data fall within the 3-sigma limits defined for control data, we conclude that the indicator data were not significantly affected by the nuclear plant. If the data do not fall within the limits, we will perform further analyses to determine if the difference is attributable to the nuclear plant.

Conclusions

A vast majority of the indicator station data was found to be within the distribution defined by the control station data. The data analysis software identified concentrations slightly exceeding the limits of the control station data for a small number of radionuclides in samples for indicator stations. Many of these values may be discounted because the error reported by the analysis program was greater than the calculated concentration. The remaining isolated, elevated concentrations may be the result of fallout, fluctuations in the existing environment, computer program artifacts, or analytical errors. The same type of isolated high values occurred in the control station data and may be attributed to the same sources.

Dose estimates were made from concentrations of radioactivity found in samples of environmental media such as air, milk, drinking water, and fish. Doses estimated for persons at the indicator locations were essentially identical to those determined for persons at control locations. Greater than 99 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 conducted over the last several years.

From the above analysis of the data and from the trend plots presented earlier, it is concluded that there were no significant increases in the exposure to members of the general public attributable to the operation of SQN. Indications of the presence of small quantities of fission products have been seen in aquatic media such as Asiatic clams and shoreline sediment. The levels measured were extremely low, for example near the nominal lower limits of detection, and were well below the reporting levels required by the NRC. No increases of radioactivity have been seen in water samples. These media will be monitored closely for indications of increases.