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TENNESSEE VALLEY AUTHORITY

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RADIOLOGICAL HEALTH STAFF

ENVIRONMENTAL RADIOACTIVITY LEVELS
SEQUOYAH NUCLEAR PLANT
ANNUAL REPORT - 1982

TVA/POWER/RHS

April 1983

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ENVIRONMENTAL RADIOACTIVITY LEVELS

SEQUOYAH NUCLEAR PLANT

ANNUAL REPORT

1982

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 1982.

The preoperational environmental 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 carried out the sampling program outlined in tables 1 and 27. 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 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 4420 Systems in conjuction with Germanium, Ge(Li) detection systems were used to analyze the samples for specific gamma-emitting radionuclides. At EARL, a ND Model 6620 system is 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 Ge(Li) system. Identification of gamma-emitting radionuclides in all other types of samples is routinely performed by analysis on the Ge(Li) 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 an ALPHA-M least-squares code, using multimatrix techniques was used to estimate the activities of the gamma-emitting nuclides analyzed by NaI(Tl). The data obtained by Ge(Li) detectors were resolved by the appropriate analyzer software and the metric minimization routine HYPERMET.

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 14 specific gamma-emitting radionuclides and radionuclide combinations[a]. 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. LLDs for the analysis of the radionuclides listed below[a] are given in table 3B. LLDs 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 Laboratories participate 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. The results received during calendar year 1982 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.

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[a]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; ^{59}Fe; ^{60}Co; ^{40}K; and ^{140}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	
Red Bank	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 M							Q	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

Table 2

ATMOSPHERIC AND TERRESTRIAL MONITORING STATION LOCATIONS

SEQUOYAH NUCLEAR PLANT

Sample Station	Approximate Distance and Direction from Plant
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, TN	10.5 miles (16.9 kilometers) WSW
PM-2 SQ, Chester Frost Park, TN (formally 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 (14.5 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 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 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		0.02								
^{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 = 3.7×10^{-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 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.[a] WARL	EARL[b]	EPA value (±3σ)	TVA AVG. WARL	EARL	EPA value (±3σ)	TVA AVG. WARL	EARL	EPA value (±3σ)	TVA AVG. WARL	EARL
3/82	27±12	23	28	55±9	63	56	16±2.6	16	15	23±9	24	24
9/82	32±14	28	28	67±9	57[c]	52[c]	20±2.6	17[d,g]	14[g]	27±9	22	22

B. Tritium in Urine (pCi/L)

Date	EPA Value (±3σ)	TVA AVERAGE	
		WARL	EARL
5/82	1300±575	1793	1650[e]
12/82	3830±641	3510	4023

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 (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL
1/82	24±10	20	19	32±9	33	28	21±9	20	22	12±2.6	13	12				8.4±2.6[h]	8.7	7.3
2/82													1820±592	2007	1793			
3/82	19±9	19	20	19±9	19	20												
4/82													2860±624	2907	2923	62±11	61	61
5/82	27.5±12	27	38.3	29±9	26	33	22±9	24	22	13±2.6	11	8[g]						
6/82													1830±589	1620	1810	4.4±1.2[h]	5.3	3.6
7/82	16±9	13	32[f]	23±9	20	21												
8/82													2890±624	2903	2793			
9/82	29±13	26	--[f]	40±9	38	--[f]	24.5±9	30	21	14.5±2.6	13.8	14.8				87±15	93	79
10/82													2560±606	2690	2510			
11/82	19±9	19	15[f]	24±9	22	23												
12/82													1990±598	1943	1993	37±10	37	39

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

Date	Chromium - 51			Cobalt - 60			Zinc - 65			Ruthenium - 106			Cesium - 134			Cesium - 137		
	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL	EPA value (±3σ)	TVA WARL	AVG. EARL
2/82	0	<44	<35	20±9	21	22	15±9	16	16	20±9	<40	<30	22±9	21	19	23±9	24	22
6/82	23±9	<44	<35	29±9	32	34	26±9	29	26	0	<40	<30	35±9	31	32	25±9	24	27
10/82	51±9	55[d]	<35[i]	20±9	18[d]	21	24±9	25[d]	25	30±9	39[d]	<36	19±9	19[d]	17	20±9	20[d]	22

Table 4 (Continued)

Results Obtained in Interlaboratory Comparison Program

E. Milk (pCi/L)

Date	Strontium - 89 EPA value (±3σ)	Strontium - 89 TVA WARL	Strontium - 89 AVG. EARL	Strontium - 90 EPA value (±3σ)	Strontium - 90 TVA WARL	Strontium - 90 AVG. EARL	Iodine - 131 EPA value (±3σ)	Iodine - 131 TVA WARL	Iodine - 131 AVG. EARL	Cesium - 137 EPA value (±3σ)	Cesium - 137 TVA WARL	Cesium - 137 AVG. EARL	Barium - 140 EPA value (±3σ)	Barium - 140 TVA WARL	Barium - 140 AVG. EARL	Potassium[j] EPA value (±3σ)	Potassium[j] TVA WARL	Potassium[j] AVG. EARL	Cobalt - 60 EPA value (±3σ)	Cobalt - 60 TVA WARL	Cobalt - 60 AVG. EARL
4/82	25±9	29	28	16±2.6	16	13[k]				28±9	31	30	0	<25	<15	1500±130	1590	1413	30±6	32	29
7/82							5.4±1.4[h]	6.7	5.1												
10/82	0	<10	<10	18.6±2.6	19.5	12.8[k]	42±10	43	42	34±9	34	35	0	<25	<20	1560±135	1563	1639			

F. Foods (pCi/kg, Wet Weight)

Date	Strontium - 89 EPA value (±3σ)	Strontium - 89 TVA WARL	Strontium - 89 AVG. EARL	Strontium - 90 EPA value (±3σ)	Strontium - 90 TVA WARL	Strontium - 90 AVG. EARL	Iodine - 131 EPA value (±3σ)	Iodine - 131 TVA WARL	Iodine - 131 AVG. EARL	Cesium 137 EPA value (±3σ)	Cesium 137 TVA WARL	Cesium 137 AVG. EARL	Barium - 140 EPA value (±3σ)	Barium - 140 TVA WARL	Barium - 140 AVG. EARL	Potassium[j] EPA value (±3σ)	Potassium[j] TVA WARL	Potassium[j] AVG. EARL
7/82	26±9	30	28	20±2.6	26[g,k]	27[k]	94±15	98	98	20±9	24	26	0	<25	<14	2400±208	2810[g]	2733[g]
11/82	0	<10	<40[d]	27.8±2.6	30.6[k]	24[d,k]	25±10	20	29	27±9	28	27	0	<25	<14	2780±242	2670	2903

[a] Western Area Radiological Laboratory, Muscle Shoals, Alabama

[b] Eastern Area Radiological Laboratory, Vonore, Tennessee

[c] No known explanation. Investigation underway.

[d] Analysis completed after report date

[e] Equipment malfunction, analysis completed after report date

[f] Poor analysis. Equipment taken out of service for recalibration. Further results satisfactory.

[g] Previous and Subsequent results satisfactory. No known explanation.

[h] NRC/EPA Low-level ^{131}I study

[i] Experimental detection limit is eing reviewed.

[j] Potassium values are mg/l or mg/kg.

[k] Review of procedure is in progress.

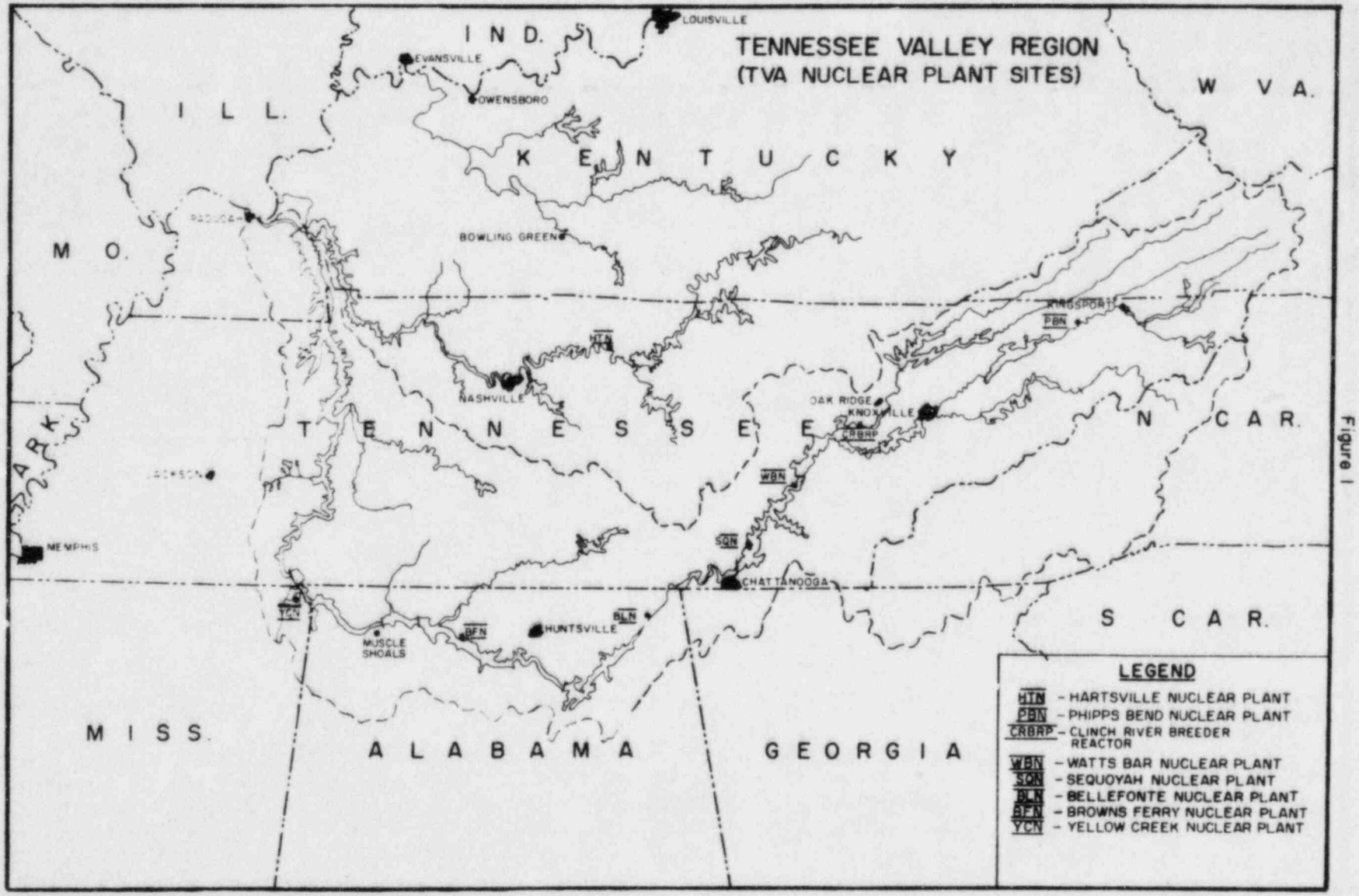

TENNESSEE VALLEY REGION
(TVA NUCLEAR PLANT SITES)
LOUISVILLE
IND.
EVANSVILLE
OWENSBORO
ILL.
W VA.
KENTUCKY
PADUCAH
BOWLING GREEN
MO.
KINGSPORT
PBN
HTN
NASHVILLE
OAK RIDGE
KNOXVILLE
CRBRP
TENNESSEE
N CAR.
ARK.
JACKSON
WBN
MEMPHIS
SQN
CHATTANOOGA
YCN
BLN
HUNTSVILLE
BFN
MUSCLE SHOALS
S CAR.
MISS.
ALABAMA
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

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, Red Bank (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 filter at a 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.

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. During this reporting period ten samples were not obtained because of equipment malfunction. No analyses are performed until three days after sample collection. The samples are composited monthly for analysis of specific gamma-emitting radionuclides and quarterly for ^{89}Sr and ^{90}Sr analysis. Five samples were lost during the strontium analysis. The results are presented in table 6.

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 1971-1982 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 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, and strontium. During this period one sample was not available for any analyses, and four samples were lost or destroyed during strontium analyses. 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. During this reporting period one sample was lost during analysis.

Charcoal filters are collected and analyzed for radioiodine. During this period nine samples were not obtained because of equipment malfunction. 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.

Table 5

MAXIMUM PERMISSIBLE CONCENTRATIONS

FOR NONOCCUPATIONAL EXPOSURE

	MPC	
	In Water pCi/l*	In Air pCi/m³*
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	900
^{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 SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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	0.010	0.02(488/ 510)	SALE CREEK, TN	0.02(50/ 52)	0.02(99/ 104)	
614		0.01- 0.04	10.5 MILES N	0.01- 0.04	0.01- 0.03	
GAMMA (GELI)						
156						
K-40	NOT ESTAB	0.02(123/ 130)	DAISY, TN	0.02(12/ 13)	0.02(23/ 26)	
		0.00- 0.06	5.5 MILES W	0.00- 0.06	0.00- 0.03	
BI-214	0.020	0.04(11/ 130)	LM2 NORTHEAST	0.07(1/ 13)	0.03(2/ 26)	
		0.02- 0.07	0.75 MILES N	0.07- 0.07	0.02- 0.03	
PB-214	0.020	0.04(11/ 130)	LM2 NORTHEAST	0.06(1/ 13)	0.03(2/ 26)	
		0.02- 0.06	0.75 MILES N	0.06- 0.06	0.03- 0.03	
PB-212	NOT ESTAB	0.00(74/ 130)	LM1 SOUTHWEST	0.00(10/ 13)	0.00(10/ 26)	
		0.00- 0.00	0.75 MILES SW	0.00- 0.00	0.00- 0.00	
RA-226	NOT ESTAB	130 VALUES <LLD			0.00(1/ 26)	
					0.00- 0.00	
BE-7	0.050	0.06(71/ 130)	LM1 SOUTHWEST	0.06(9/ 13)	0.06(15/ 26)	
		0.05- 0.08	0.75 MILES SW	0.05- 0.08	0.05- 0.08	
TL-208	NOT ESTAB	0.00(58/ 130)	LM1 SOUTHWEST	0.00(8/ 13)	0.00(10/ 26)	
		0.00- 0.00	0.75 MILES SW	0.00- 0.00	0.00- 0.00	
AC-228	NOT ESTAB	0.00(33/ 130)	HARRISON, TN	0.00(5/ 13)	0.00(3/ 26)	
		0.00- 0.01	8.75 MILES SSW	0.00- 0.01	0.00- 0.00	
PA-234M	NOT ESTAB	0.34(4/ 130)	HARRISON BAY, TN	0.79(1/ 13)	0.18(1/ 26)	
		0.16- 0.79	3.5 MILES SE	0.79- 0.79	0.18- 0.18	
SR 89	0.005	38 VALUES <LLD			5 VALUES <LLD	
43		ANALYSIS PERFORMED				
SR 90	0.001	38 VALUES <LLD			5 VALUES <LLD	
43		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 7

RADIOACTIVITY IN RAINWATER

PCI/L - 0.037 BQ/L

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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	2.400	4.19(59/ 130)	HARRISON, TN	4.94(8/ 13)	4.26(18/ 25)	
155		2.40- 9.18	8.75 MILES SSW	3.42- 9.18	2.75- 7.53	
GAMMA (NAI)						
2		2 VALUES <LLD ANALYSIS PERFORMED			0 VALUES <LLD	
GAMMA (GELI)						
153						
K-40	NOT ESTAB	17.83(65/ 128)	LM1 SOUTHWEST	26.53(7/ 13)	18.52(17/ 25)	
		0.37- 59.02	0.75 MILES SW	1.25- 57.70	1.88- 34.85	
BI-214	NOT ESTAB	6.25(58/ 128)	HARRISON BAY, TN	9.53(5/ 12)	3.52(15/ 25)	
		0.07- 30.97	3.5 MILES SE	0.58- 22.34	0.52- 7.70	
PB-214	NOT ESTAB	5.62(28/ 128)	HARRISON, TN	11.24(2/ 13)	2.29(5/ 25)	
		0.22- 20.30	8.75 MILES SSW	4.79- 17.68	0.77- 3.71	
PB-212	NOT ESTAB	1.89(47/ 128)	WORK, TN	4.26(4/ 12)	2.75(10/ 25)	
		0.10- 8.33	4.5 MILES NNE	2.19- 8.33	0.11- 11.68	
BE-7	NOT ESTAB	46.86(47/ 128)	HARRISON, TN	57.77(4/ 13)	55.30(10/ 25)	
		24.49- 103.29	8.75 MILES SSW	27.77- 95.03	31.05- 75.36	
SR 89	10.000	126 VALUES <LLD			25 VALUES <LLD	
151		ANALYSIS PERFORMED				
SR 90	2.000	126 VALUES <LLD			25 VALUES <LLD	
151		ANALYSIS PERFORMED				
TRITIUM	330.000	130 VALUES <LLD			25 VALUES <LLD	
155		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 8

RADIOACTIVITY IN HEAVY PARTICLE FALLOUT

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

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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 155	0.050	0.12(128/ 129) 0.05- 0.33	LM2 NORTHEAST 0.75 MILES N	0.17(12/ 13) 0.08- 0.33	0.13(26/ 26) 0.06- 0.25	

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 SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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[b] NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS[b] MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
IODINE IN AIR	0.020	0.02(13/ 511)	WORK, TN	0.03(1/ 52)	0.02(3/ 104)	
615		0.02- 0.03	4.5 MILES NNE	0.03- 0.03	0.02- 0.02	

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 SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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
TRITIUM	NOT ESTAB	7.90(52/ 52)	LM1 SOUTHWEST	8.53(26/ 26)	7.28(26/ 26)	
78		0.62- 29.35	0.75 MILES SW	0.62- 29.35	1.33- 20.32	

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 at specified locations is indicated in parentheses (F).

Figure 2

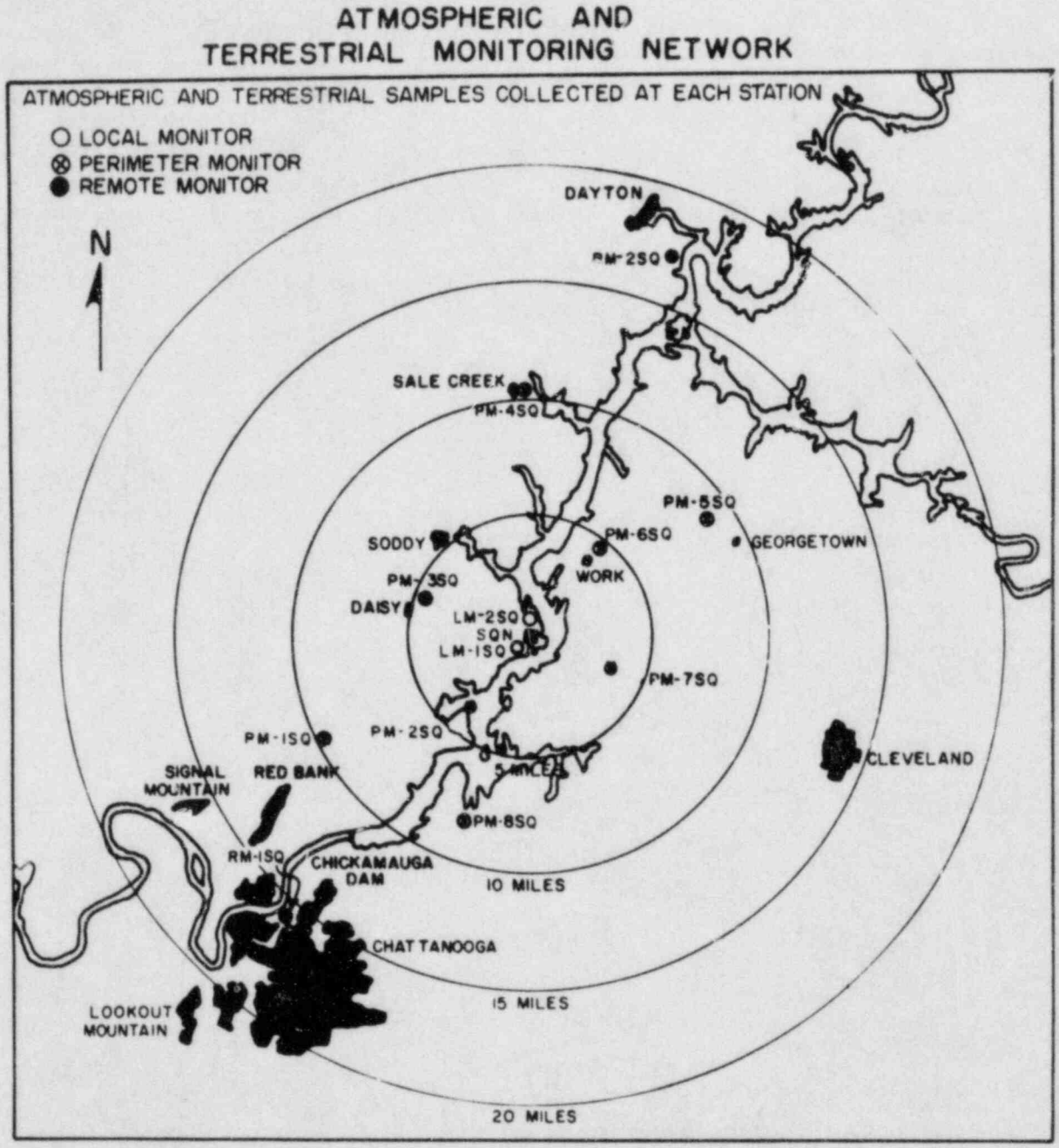
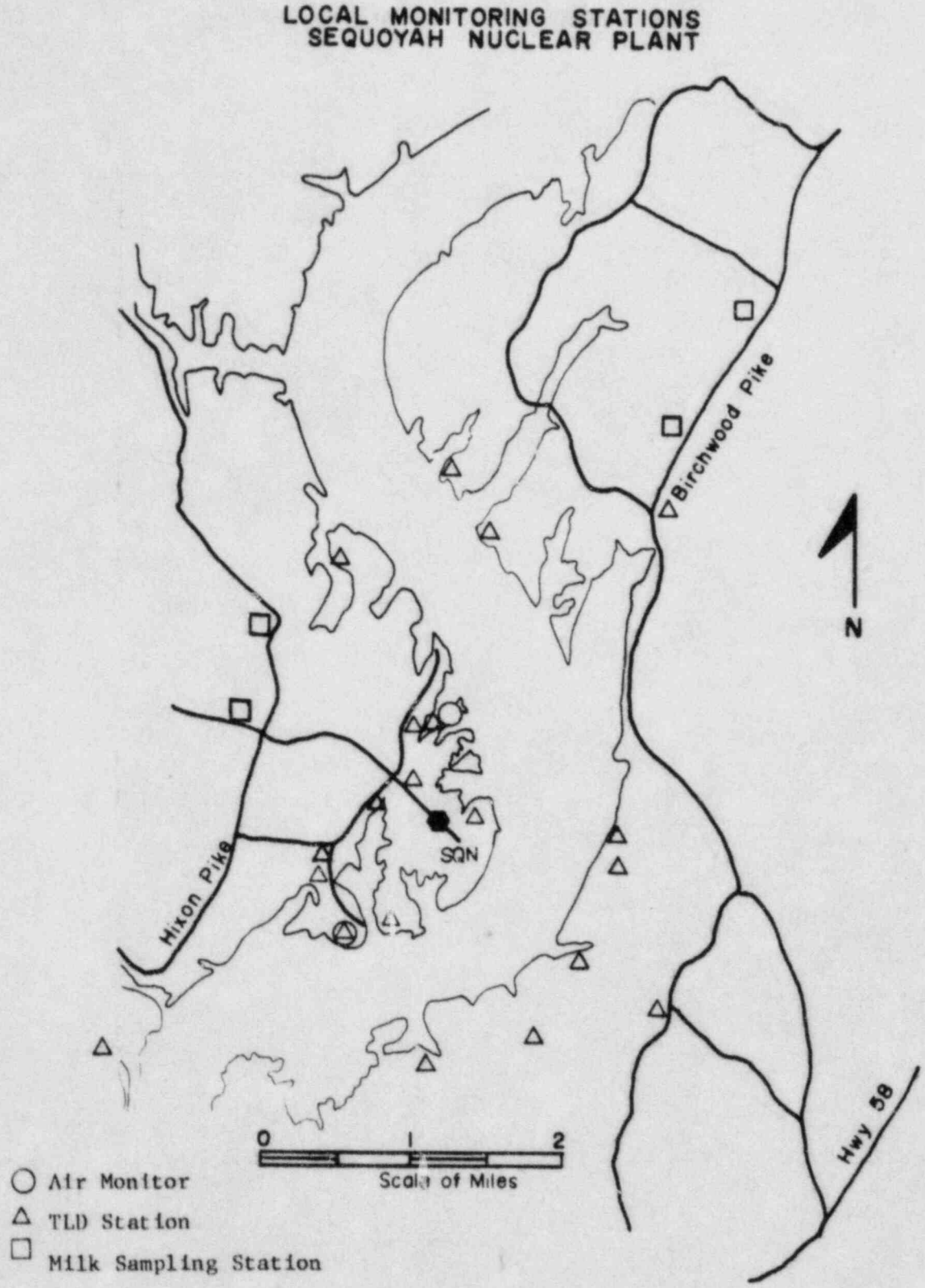
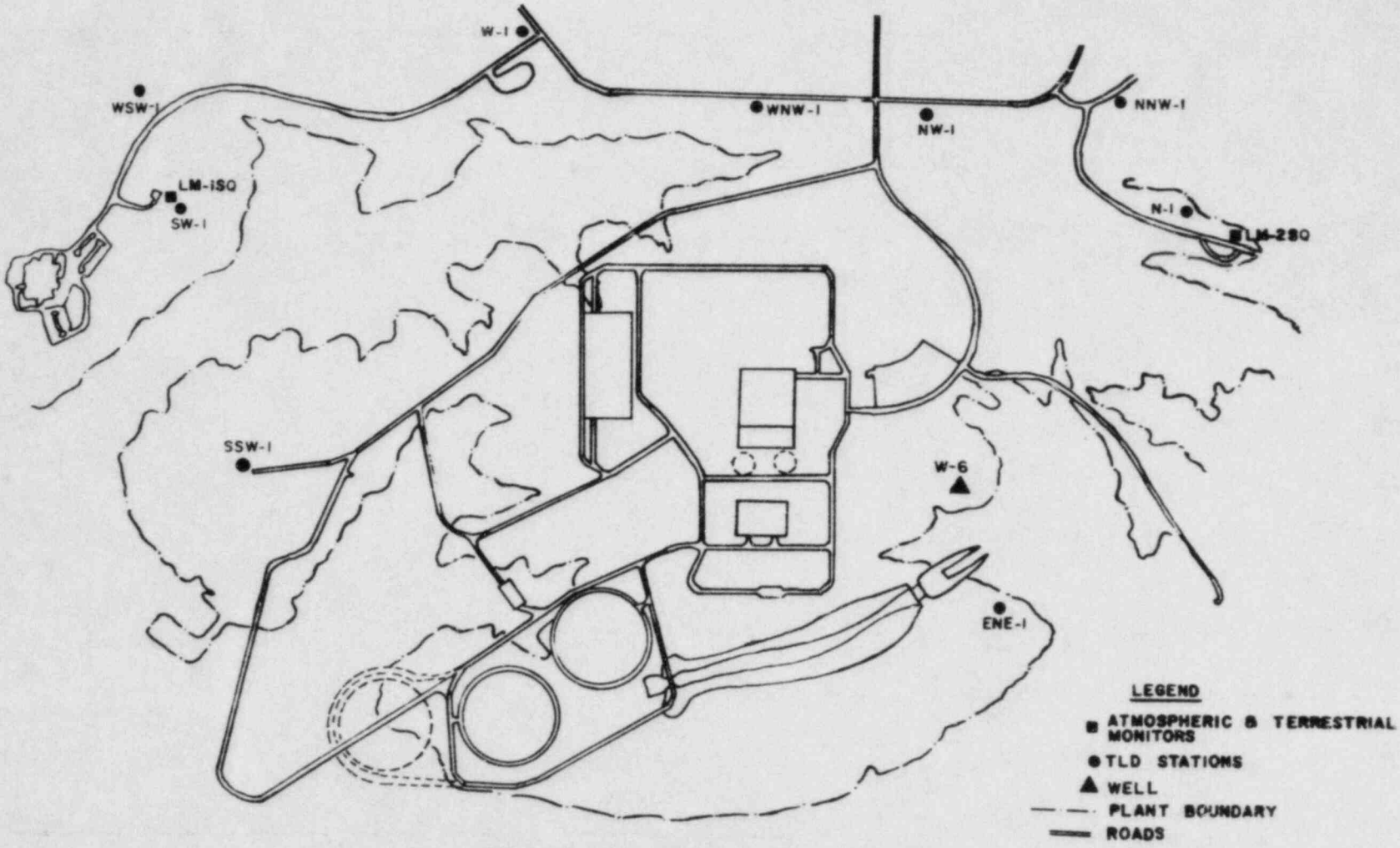

ATMOSPHERIC AND
TERRESTRIAL MONITORING NETWORK
ATMOSPHERIC AND TERRESTRIAL SAMPLES COLLECTED AT EACH STATION
LOCAL MONITOR
PERIMETER MONITOR
REMOTE MONITOR
N
DAYTON
PM-2SQ
SALE CREEK
PM-4SQ
PM-5SQ
SODDY
PM-6SQ
GEORGETOWN
WORK
PM-3SQ
DAISY
LM-2SQ
SQN
LM-1SQ
PM-7SQ
PM-1SQ
PM-2SQ
SIGNAL MOUNTAIN
RED BANK
5 MILES
CLEVELAND
PM-8SQ
RM-1SQ
CHICKAMAUGA DAM
10 MILES
CHATTANOOGA
15 MILES
LOOKOUT MOUNTAIN
20 MILES

FIGURE 3


LOCAL MONITORING STATIONS
SEQUOYAH NUCLEAR PLANT
Birchwood Pike
N
SQN
Hixon Pike
Hwy 58
0
1
2
Scale of Miles
Air Monitor
TLD Station
Milk Sampling Station



SEQUOYAH NUCLEAR PLANT

SITE MONITORING STATIONS

Figure 4

Figure 5

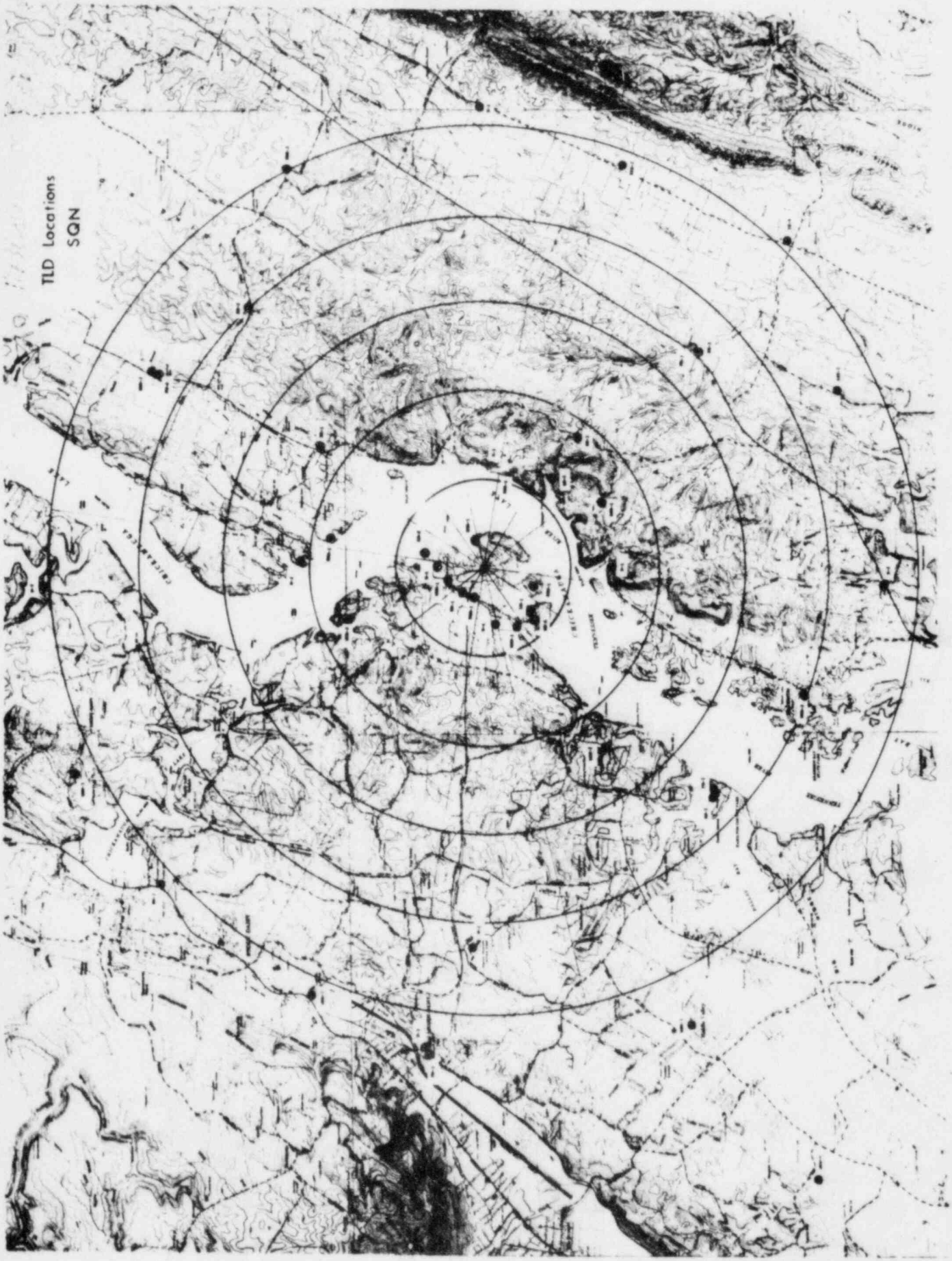
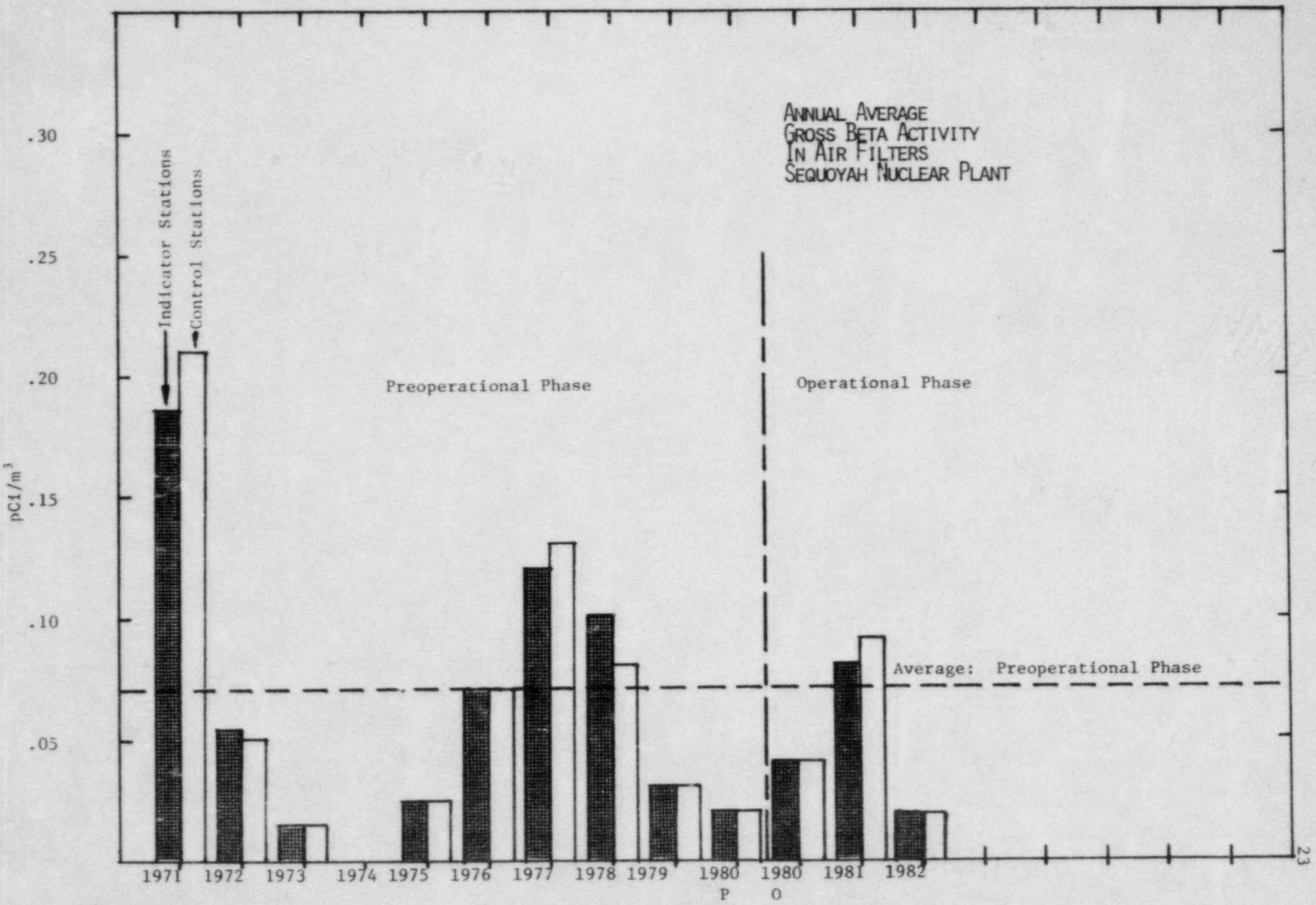


Figure 6


ANNUAL AVERAGE
GROSS BETA ACTIVITY
IN AIR FILTERS
SEQUOYAH NUCLEAR PLANT
Indicator Stations
Control Stations
Preoperational Phase
Operational Phase
Average: Preoperational Phase
pCi/m³
.30
.25
.20
.15
.10
.05
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980 P
1980 O
1981
1982

Terrestrial Monitoring

Milk

Milk is collected weekly from two dairy farms and two other farms within a 5-mile radius of the plant (see figure 3), and from at least one of three control dairy farms. Raw milk is analyzed weekly for ^{131}I, and monthly for gamma-emitting isotopes, and for strontium. The results are shown in table 11. Four samples were lost or destroyed during this reporting period.

As has been noted in the other monitoring 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 preoperation 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 1982. It was determined that there are no milk animals nearer the plant than those in areas from which either milk or vegetation is being sampled. 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 analyzed for gamma-emitting radionuclides. Monthly vegetation sampling is conducted at three additional locations and at three control farms. 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 cattle graze. In addition to the gamma spectral

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[a]Hansen, 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.

analysis, 40 samples were analyzed for ^{89}Sr and ^{90}Sr content. 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 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.

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. One strontium sample was lost during processing. The results are shown in table 15.

Figure 7 shows the trends in gross beta activity in drinking water from 1971 through 1982. The annual averages reported in 1982 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 (Ca_2F: 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, in energy compensating

shields to correct 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 1982. 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.

Poultry and Food Crops

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, lettuce, potatoes, tomatoes, and turnip greens were collected and analyzed for gross beta and specific gamma-emitting radionuclides. Poultry and beef samples were collected and analyzed for gamma-emitting radionuclides. The results are given in tables 17 through 26.

TABLE 11

RADIOACTIVITY IN MILK

PCI/L - 0.037 BQ/L

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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)						
41						
K-40	150.000	1162.84(24/ 24)	LOVELL FARM	1296.23(6/ 6)	1263.55(17/ 17)	
		809.40- 1410.60	2.75 MILES NNE	1235.50- 1410.60	1175.60- 1347.70	
IODINE-131	0.500	205 VALUES <LLD			155 VALUES <LLD	
360		ANALYSIS PERFORMED				
GAMMA (GELI)						
50						
CS-137	5.600	7.85(1/ 28)	H WALKER FARM	7.85(1/ 7)	5.36(1/ 22)	
		7.85- 7.85	1.25 MILES NW	7.85- 7.85	5.36- 5.36	
K-40	NOT ESTAB	1310.55(28/ 28)	LOVELL FARM	1417.57(7/ 7)	1313.53(22/ 22)	
		786.47- 1565.19	2.75 MILES NNE	1305.58- 1565.19	844.40- 1476.74	
BI-214	NOT ESTAB	6.94(18/ 28)	MALONE FARM	12.16(6/ 8)	9.71(12/ 22)	
		0.16- 24.96	3.5 MILES NNE	1.07- 24.96	2.30- 30.53	
PB-214	NOT ESTAB	3.51(10/ 28)	MALONE FARM	4.98(5/ 8)	7.41(8/ 22)	
		0.70- 9.22	3.5 MILES NNE	1.24- 9.22	1.13- 13.93	
PB-212	NOT ESTAB	2.53(12/ 28)	MALONE FARM	3.95(2/ 8)	2.39(6/ 22)	
		0.13- 7.42	3.5 MILES NNE	0.49- 7.42	0.98- 5.05	
TL-208	NOT ESTAB	1.75(5/ 28)	LOVELL FARM	2.05(1/ 7)	2.24(4/ 22)	
		0.87- 2.75	2.75 MILES NNE	2.05- 2.05	0.67- 4.15	
AC-228	NOT ESTAB	6.94(2/ 28)	JONES FARM	8.06(1/ 6)	22 VALUES <LLD	
		5.83- 8.06	1.25 MILES W	8.06- 8.06		
SR 89	10.000	52 VALUES <LLD			39 VALUES <LLD	
91		ANALYSIS PERFORMED				
SR 90	2.000	9.19(52/ 52)	JONES FARM	15.52(13/ 13)	3.11(32/ 39)	
91		2.37- 24.26	1.25 MILES W	6.52- 24.26	2.18- 5.79	

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 1982

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) 94						
CE-144	0.220	0.58(15/ 55)	JONES FARM	0.89(1/ 4)	0.67(6/ 39)	
		0.24- 0.95	1.25 MILES W	0.89- 0.89	0.34- 1.09	
CS-137	0.060	0.10(19/ 55)	JONES FARM	0.13(3/ 4)	0.10(8/ 39)	
		0.06- 0.20	1.25 MILES W	0.09- 0.20	0.08- 0.14	
NB-95	0.050	0.08(7/ 55)	BRADY FARM	0.11(1/ 13)	0.09(6/ 39)	
		0.05- 0.11	2.25 MILES SSW	0.11- 0.11	0.05- 0.12	
K-40	NOT ESTAB	14.65(55/ 55)	LOVELL FARM	19.60(4/ 4)	22.29(39/ 39)	
		1.78- 32.32	2.75 MILES NNE	15.04- 25.54	3.67- 69.92	
BI-214	0.100	0.30(8/ 55)	BRADY FARM	0.73(2/ 13)	0.24(3/ 39)	
		0.11- 1.31	2.25 MILES SSW	0.15- 1.31	0.16- 0.37	
PB-214	NOT ESTAB	0.08(30/ 55)	BRADY FARM	0.17(8/ 13)	0.07(27/ 39)	
		0.00- 0.93	2.25 MILES SSW	0.01- 0.93	0.01- 0.27	
PB-212	NOT ESTAB	0.04(45/ 55)	BRADY FARM	0.06(10/ 13)	0.06(30/ 39)	
		0.00- 0.34	2.25 MILES SSW	0.00- 0.34	0.00- 0.17	
RA-226	NOT ESTAB	0.11(20/ 55)	BRADY FARM	0.47(3/ 13)	0.07(13/ 39)	
		0.01- 1.31	2.25 MILES SSW	0.04- 1.31	0.00- 0.19	
BE-7	NOT ESTAB	7.46(55/ 55)	JONES FARM	8.95(4/ 4)	6.14(39/ 39)	
		1.33- 19.56	1.25 MILES W	1.73- 19.56	1.32- 19.03	
TL-208	NOT ESTAB	0.02(39/ 55)	BRADY FARM	0.03(9/ 13)	0.02(25/ 39)	
		0.00- 0.10	2.25 MILES SSW	0.01- 0.10	0.00- 0.08	
AC-228	NOT ESTAB	0.12(22/ 55)	JONES FARM	0.18(2/ 4)	0.14(19/ 39)	
		0.01- 0.30	1.25 MILES W	0.12- 0.24	0.04- 0.46	
PA-234M	NOT ESTAB	7.04(1/ 55)	BRADY FARM	7.04(1/ 13)	39 VALUES <LLD	
		7.04- 7.04	2.25 MILES SSW	7.04- 7.04		
SR 89	0.250	0.73(8/ 28)	LOVELL FARM	1.40(1/ 4)	0.36(4/ 12)	
40		0.35- 1.40	2.75 MILES NNE	1.40- 1.40	0.31- 0.47	
SR 90	0.050	0.21(22/ 28)	JONES FARM	0.37(4/ 4)	0.14(10/ 12)	
40		0.06- 0.69	1.25 MILES W	0.16- 0.54	0.05- 0.22	

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 SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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		CONTROL LOCATIONS MEAN (F)[b] RANGE[b]		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	0.700	18.25(	10/ 10)	GEORGETOWN, TN	36.31(	1/ 1)	12.93(	4/ 4)	
14		10.60-	36.31	9.0 MILES ENE	36.31-	36.31	9.19-	20.63	
GAMMA (GELI)									
14									
CS-137	0.020	0.51(	10/ 10)	COUNTY PARK, TN	1.11(	1/ 1)	0.50(	4/ 4)	
		0.11-	1.11	3.75 MILES SW	1.11-	1.11	0.33-	0.84	
K-40	0.250	7.07(	10/ 10)	GEORGETOWN, TN	20.94(	1/ 1)	3.76(	4/ 4)	
		2.48-	20.94	9.0 MILES ENE	20.94-	20.94	2.53-	6.88	
BI-214	0.050	0.63(	10/ 10)	LM1 SOUTHWEST	1.06(	1/ 1)	0.67(	4/ 4)	
		0.46-	1.06	0.75 MILES SW	1.06-	1.06	0.58-	0.84	
BI-212	0.100	1.28(	10/ 10)	LM1 SOUTHWEST	1.56(	1/ 1)	0.80(	4/ 4)	
		0.99-	1.56	0.75 MILES SW	1.56-	1.56	0.49-	1.38	
PB-214	0.050	0.92(	10/ 10)	LM1 SOUTHWEST	1.19(	1/ 1)	0.74(	4/ 4)	
		0.54-	1.19	0.75 MILES SW	1.19-	1.19	0.63-	0.92	
PB-212	NOT ESTAB	1.18(	10/ 10)	LM1 SOUTHWEST	1.52(	1/ 1)	0.75(	4/ 4)	
		0.94-	1.52	0.75 MILES SW	1.52-	1.52	0.51-	1.26	
RA-226	0.050	0.83(	10/ 10)	LM1 SOUTHWEST	1.06(	1/ 1)	0.67(	4/ 4)	
		0.46-	1.06	0.75 MILES SW	1.06-	1.06	0.58-	0.84	
RA-224	NOT ESTAB	1.30(	9/ 10)	LM1 SOUTHWEST	1.72(	1/ 1)	0.92(	4/ 4)	
		0.98-	1.72	0.75 MILES SW	1.72-	1.72	0.66-	1.60	
BE-7	0.160	0.17(	2/ 10)	HARRISON BAY, TN	0.18(	1/ 1)	4 VALUES <LLD		
		0.16-	0.18	3.5 MILES SE	0.18-	0.18			
TL-208	0.020	0.35(	10/ 10)	LM1 SOUTHWEST	0.45(	1/ 1)	0.22(	4/ 4)	
		0.28-	0.45	0.75 MILES SW	0.45-	0.45	0.16-	0.37	
AC-228	0.060	1.13(	10/ 10)	LM1 SOUTHWEST	1.40(	1/ 1)	0.73(	4/ 4)	
		0.86-	1.40	0.75 MILES SW	1.40-	1.40	0.49-	1.21	
PA-234M	NOT ESTAB	2.97(	5/ 10)	HARRISON, TN	4.02(	1/ 1)	2.56(	2/ 4)	
		2.12-	4.02	8.75 MILES SSW	4.02-	4.02	2.45-	2.66	
SR 89	1.500	2.54(	2/ 10)	DAISY, TN	3.17(	1/ 1)	1.70(	1/ 4)	
14		1.92-	3.17	5.5 MILES W	3.17-	3.17	1.70-	1.70	
SR 90	0.300	10 VALUES <LLD					0.35(	1/ 4)	
14							0.35-	0.35	

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. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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	2.400	3.95(7/ 26)	SQN WELL #6	3.94(6/ 13)	4.56(6/ 13)	
39		2.64- 8.58	ONSITE NNE	2.64- 8.58	3.27- 5.80	
GAMMA (GELI)						
39						
K-40	NOT ESTAB	19.52(13/ 26)	SQN WELL #6	27.47(4/ 13)	21.72(8/ 13)	
		3.93- 55.93	ONSITE NNE	9.00- 55.93	2.84- 46.93	
BI-214	NOT ESTAB	6.78(18/ 26)	MAYS FARM	8.41(10/ 13)	4.36(7/ 13)	
		0.48- 36.67	0.75 MILES W	0.94- 36.67	0.62- 8.01	
PB-214	NOT ESTAB	6.32(8/ 26)	MAYS FARM	8.35(5/ 13)	5.82(3/ 13)	
		0.01- 33.67	0.75 MILES W	0.01- 33.67	0.97- 10.71	
PB-212	NOT ESTAB	2.46(9/ 26)	SQN WELL #6	2.71(5/ 13)	1.58(6/ 13)	
		0.03- 7.22	ONSITE NNE	0.03- 7.22	0.57- 3.55	
TL-208	NOT ESTAB	1.61(6/ 26)	MAYS FARM	1.75(2/ 13)	0.83(4/ 13)	
		0.42- 3.38	0.75 MILES W	0.90- 2.60	0.05- 1.82	
AC-228	NOT ESTAB	8.04(1/ 26)	SQN WELL #6	8.04(1/ 13)	4.68(1/ 13)	
		8.04- 8.04	ONSITE NNE	8.04- 8.04	4.68- 4.68	
TRITIUM	330.000	8 VALUES <LLD			4 VALUES <LLD	
12		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 SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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	2.400	3.66(14/ 52)	CF INDUSTRIES	4.16(9/ 13)	3.61(13/ 26)	
78		2.42- 6.66	TRM 473.0	2.42- 6.66	2.78- 5.16	
GAMMA (GELI)						
78						
K-40	NOT ESTAB	19.88(24/ 52)	E.I. DUPONT	22.93(5/ 13)	17.45(8/ 26)	
		0.34- 54.18	TRM 470.5	2.35- 54.18	2.42- 29.26	
BI-214	NOT ESTAB	5.27(25/ 52)	CF INDUSTRIES	6.98(5/ 13)	4.11(15/ 26)	
		0.04- 21.57	TRM 473.0	0.04- 21.57	0.14- 12.69	
PB-214	NOT ESTAB	5.31(11/ 52)	CHICKAMAUGA DAM	7.45(1/ 13)	3.26(8/ 26)	
		0.12- 10.39	TRM 465.3	7.45- 7.45	0.46- 5.50	
PB-212	NOT ESTAB	1.96(19/ 52)	E.I. DUPONT	2.70(7/ 13)	3.15(10/ 26)	
		0.08- 8.47	TRM 470.5	0.32- 8.47	0.06- 6.29	
TL-208	NOT ESTAB	0.79(9/ 52)	E.I. DUPONT	1.21(2/ 13)	1.22(5/ 26)	
		0.04- 1.90	TRM 470.5	0.97- 1.45	0.26- 3.13	
AC-228	NOT ESTAB	2.44(4/ 52)	CF INDUSTRIES	4.05(1/ 13)	1.36(1/ 26)	
		0.37- 4.05	TRM 473.0	4.05- 4.05	1.36- 1.36	
SR 89	10.000	15 VALUES <LLD			8 VALUES <LLD	
23		ANALYSIS PERFORMED				
SR 90	2.000	15 VALUES <LLD			8 VALUES <LLD	
23		ANALYSIS PERFORMED				
TRITIUM	330.000	397.60(2/ 16)	CF INDUSTRIES	397.60(2/ 4)	397.10(1/ 8)	
24		378.77- 416.42	TRM 473.0	378.77- 416.42	397.10- 397.10	

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 - 1982
mR/Quarter[a]

Distance miles	Average External Gamma Radiation Levels[b]			
	1st Quarter (Feb-Apr 82)	2nd Quarter (May-Jul 82)	3rd Quarter (Aug-Oct 82)	4th Quarter (Nov 82-Jan 83)
0-1	18.4 ± 1.9	22.0 ± 2.4	19.8 ± 2.0	21.0 ± 1.8
1-2	15.6 ± 3.7	17.0 ± 4.3	16.5 ± 3.3	16.5 ± 4.1
2-4	15.2 ± 3.6	17.0 ± 3.1	15.8 ± 2.7	15.2 ± 3.8
4-6	15.3 ± 2.3	17.0 ± 2.6	15.4 ± 2.6	15.5 ± 2.9
>6	15.4 ± 2.0	16.6 ± 2.0	15.9 ± 2.1	15.7 ± 3.0
Average, 0-2 miles (Onsite)	17.1 ± 3.2	19.6 ± 4.2	18.2 ± 3.1	18.9 ± 3.8
Average, >2 miles (Offsite)	15.2 ± 2.5	16.9 ± 2.5	15.7 ± 2.4	15.5 ± 3.0

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 SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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 2	NOT ESTAB	2170.88(1/ 1) 2170.88- 2170.88	HARRISON BAY, TN 3.5 MILES SE	2170.88(1/ 1) 2170.88- 2170.88	2612.80(1/ 1) 2612.80- 2612.80	
GAMMA (GELI) 2						
K-40	NOT ESTAB	1171.41(1/ 1) 1171.41- 1171.41	HARRISON BAY, TN 3.5 MILES SE	1171.41(1/ 1) 1171.41- 1171.41	1521.08(1/ 1) 1521.08- 1521.08	
PB-212	NOT ESTAB	1.02(1/ 1) 1.02- 1.02	HARRISON BAY, TN 3.5 MILES SE	1.02(1/ 1) 1.02- 1.02	2.92(1/ 1) 2.92- 2.92	
TL-208	NOT ESTAB	2.45(1/ 1) 2.45- 2.45	HARRISON BAY, TN 3.5 MILES SE	2.45(1/ 1) 2.45- 2.45	0.92(1/ 1) 0.92- 0.92	

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 SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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[b] NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS[b] MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	3695.88(1/ 1) 3695.88- 3695.88	1 MILES NW	3695.88(1/ 1) 3695.88- 3695.88	4138.29(1/ 1) 4138.29- 4138.29	
GAMMA (GELI)[2]						
K-40	NOT ESTAB	2099.93(1/ 1) 2099.93- 2099.93	1 MILES NW	2099.93(1/ 1) 2099.93- 2099.93	1986.04(1/ 1) 1986.04- 1986.04	
BI-214	NOT ESTAB	1.09(1/ 1) 1.09- 1.09	1 MILES NW	1.09(1/ 1) 1.09- 1.09	3.68(1/ 1) 3.68- 3.68	

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 SEQUOYAH — DOCKET NO. 50-327,328
LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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	4274.48(1/ 1)	1 MILES NW	4274.48(1/ 1)	3982.90(1/ 1)	
2		4274.48- 4274.48		4274.48- 4274.48	3982.90- 3982.90	
GAMMA (GELI)						
2						
K-40	NOT ESTAB	2055.92(1/ 1)	1 MILES NW	2055.92(1/ 1)	2398.11(1/ 1)	
		2055.92- 2055.92		2055.92- 2055.92	2398.11- 2398.11	
BI-214	NOT ESTAB	1 VALUES <LLD			6.19(1/ 1)	
					6.19- 6.19	
PB-212	NOT ESTAB	0.22(1/ 1)	1 MILES NW	0.22(1/ 1)	1.00(1/ 1)	
		0.22- 0.22		0.22- 0.22	1.00- 1.00	
TL-208	NOT ESTAB	1.09(1/ 1)	1 MILES NW	1.09(1/ 1)	1 VALUES <LLD	
		1.09- 1.09		1.09- 1.09		

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 TENNESSEE — REPORTING PERIOD 1982

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	25.000	4029.56(1/ 1) 4029.56- 4029.56	1 MILES NW	4029.56(1/ 1) 4029.56- 4029.56	3230.09(1/ 1) 3230.09- 3230.09	
GAMMA (GELI)[2]						
CO-58	5.000	13.75(1/ 1) 13.75- 13.75	1 MILES NW	13.75(1/ 1) 13.75- 13.75	1 VALUES <LLD	
K-40	NOT ESTAB	2017.68(1/ 1) 2017.68- 2017.68	1 MILES NW	2017.68(1/ 1) 2017.68- 2017.68	1711.86(1/ 1) 1711.86- 1711.86	
PB-212	NOT ESTAB	0.47(1/ 1) 0.47- 0.47	1 MILES NW	0.47(1/ 1) 0.47- 0.47	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).

TABLE 21

RADIOACTIVITY IN LETTUCE

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

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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	3089.94(1/ 1)	1 MILES NW	3089.94(1/ 1)	1618.87(1/ 1)	
2		3089.94- 3089.94		3089.94- 3089.94	1618.87- 1618.87	
GAMMA (GELI)						
2						
CS-137	5.000	6.92(1/ 1)	1 MILES NW	6.92(1/ 1)	1 VALUES <LLD	
		6.92- 6.92		6.92- 6.92		
K-40	NOT ESTAB	1641.72(1/ 1)	1 MILES NW	1641.72(1/ 1)	1340.14(1/ 1)	
		1641.72- 1641.72		1641.72- 1641.72	1340.14- 1340.14	
BI-214	NOT ESTAB	7.54(1/ 1)	1 MILES NW	7.54(1/ 1)	0.23(1/ 1)	
		7.54- 7.54		7.54- 7.54	0.23- 0.23	
PB-214	NOT ESTAB	4.34(1/ 1)	1 MILES NW	4.34(1/ 1)	1 VALUES <LLD	
		4.34- 4.34		4.34- 4.34		
PB-212	NOT ESTAB	23.64(1/ 1)	1 MILES NW	23.64(1/ 1)	1 VALUES <LLD	
		23.64- 23.64		23.64- 23.64		
BE-7	NOT ESTAB	123.53(1/ 1)	1 MILES NW	123.53(1/ 1)	1 VALUES <LLD	
		123.53- 123.53		123.53- 123.53		
TL-208	NOT ESTAB	5.23(1/ 1)	1 MILES NW	5.23(1/ 1)	1 VALUES <LLD	
		5.23- 5.23		5.23- 5.23		

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 POTATOES

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1982

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	8272.19(1/ 1)	1 MILES NW	8272.19(1/ 1)	7013.91(1/ 1)	
2		8272.19- 8272.19		8272.19- 8272.19	7013.91- 7013.91	
GAMMA (GELI)						
3						
K-40	NOT ESTAB	3206.34(1/ 1)	1 MILES NW	3206.34(1/ 1)	4677.61(1/ 1)	
		3206.34- 3206.34		3206.34- 3206.34	4677.61- 4677.61	

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 23

RADIOACTIVITY IN TOMATOES

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

NAME OF FACILITY SEQUOYAH DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE REPORTING PERIOD 1982

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	4598.31(1/ 1)	JONES FARM	4598.31(1/ 1)	4325.58(1/ 1)	
2		4598.31- 4598.31	1.25 MILES W	4598.31- 4598.31	4325.58- 4325.58	
GAMMA (GELI)						
2						
K-40	NOT ESTAB	2627.26(1/ 1)	JONES FARM	2627.26(1/ 1)	2557.51(1/ 1)	
		2627.26- 2627.26	1.25 MILES W	2627.26- 2627.26	2557.51- 2557.51	

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 24

RADIOACTIVITY IN TURNIP GREENS

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

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

TYPE AND TOTAL NUMBER OF ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN (F) RANGE[b]	LOCATION WITH HIGHEST ANNUAL MEAN[b] NAME DISTANCE AND DIRECTION	MEAN (F) RANGE[b]	CONTROL LOCATIONS[b] MEAN (F) RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS BETA	25.000	2481.12(1/ 1) 2481.12- 2481.12	HARRISON BAY, TN 3.5 MILES SE	2481.12(1/ 1) 2481.12- 2481.12	3673.23(1/ 1) 3673.23- 3673.23	
GAMMA (GELI)[2]						
K-40	NOT ESTAB	1813.64(1/ 1) 1813.64- 1813.64	HARRISON BAY, TN 3.5 MILES SE	1813.64(1/ 1) 1813.64- 1813.64	1490.29(1/ 1) 1490.29- 1490.29	
BI-214	NOT ESTAB	0.53(1/ 1) 0.53- 0.53	HARRISON BAY, TN 3.5 MILES SE	0.53(1/ 1) 0.53- 0.53	1 VALUES <LLD	
PB-214	NOT ESTAB	0.57(1/ 1) 0.57- 0.57	HARRISON BAY, TN 3.5 MILES SE	0.57(1/ 1) 0.57- 0.57	1 VALUES <LLD	
PB-212	NOT ESTAB	1 VALUES <LLD			5.55(1/ 1) 5.55- 5.55	
BE-7	NOT ESTAB	44.11(1/ 1) 44.11- 44.11	HARRISON BAY, TN 3.5 MILES SE	44.11(1/ 1) 44.11- 44.11	1 VALUES <LLD	
TL-208	NOT ESTAB	1 VALUES <LLD			0.79(1/ 1) 0.79- 0.79	
AC-228	NOT ESTAB	1 VALUES <LLD			1.92(1/ 1) 1.92- 1.92	

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 25

RADIOACTIVITY IN POULTRY

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

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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 NAME DISTANCE AND DIRECTION	MEAN (F)[b] RANGE[b]	CONTROL LOCATIONS MEAN (F)[b] RANGE[b]	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
K-40	NOT ESTAB	2290.62(1/ 1)	H WALKER FARM	2290.62(1/ 1)	1392.21(1/ 1)	
		2290.62- 2290.62	1.25 MILES NW	2290.62- 2290.62	1392.21- 1392.21	
BI-214	NOT ESTAB	1.49(1/ 1)	H WALKER FARM	1.49(1/ 1)	1 VALUES <LLD	
		1.49- 1.49	1.25 MILES NW	1.49- 1.49		
PB-214	NOT ESTAB	4.93(1/ 1)	H WALKER FARM	4.93(1/ 1)	1 VALUES <LLD	
		4.93- 4.93	1.25 MILES NW	4.93- 4.93		

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 26

RADIOACTIVITY IN BEEF

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

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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)						
K-40	NOT ESTAB	2146.59(1/ 1) 2146.59- 2146.59	JONES FARM 1.25 MILES W	2146.59(1/ 1) 2146.59- 2146.59	1183.95(1/ 1) 1183.95- 1183.95	
BI-214	NOT ESTAB	1 VALUES <LLD			1.97(1/ 1) 1.97- 1.97	
PB-214	NOT ESTAB	1 VALUES <LLD			4.68(1/ 1) 4.68- 4.68	

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 7

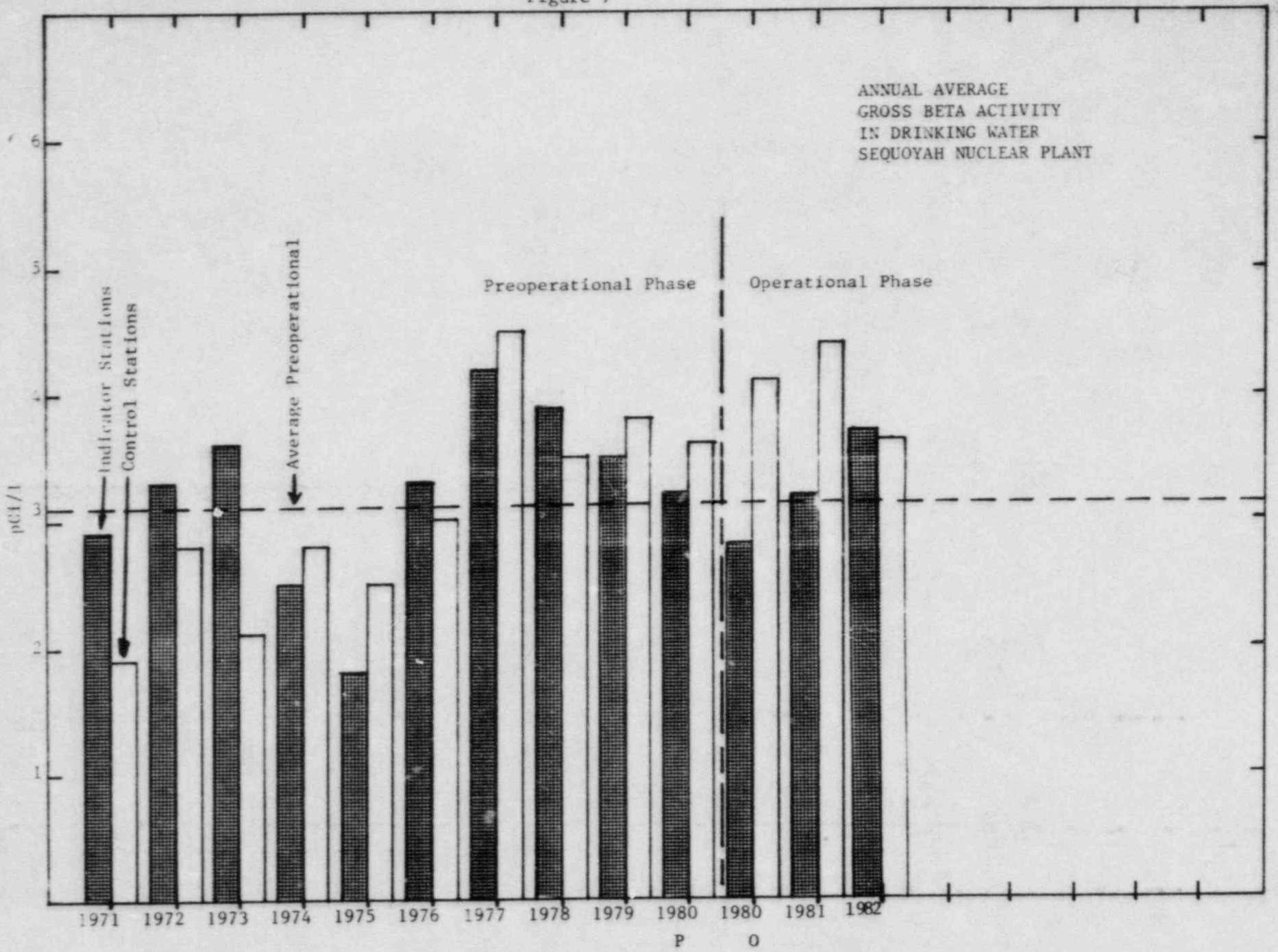

ANNUAL AVERAGE
GROSS BETA ACTIVITY
IN DRINKING WATER
SEQUOYAH NUCLEAR PLANT
Preoperational Phase
Operational Phase
Indicator Stations
Control Stations
Average Preoperational
pCi/l
6
5
4
3
2
1
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1980
1981
1982
P
O

FIGURE 8

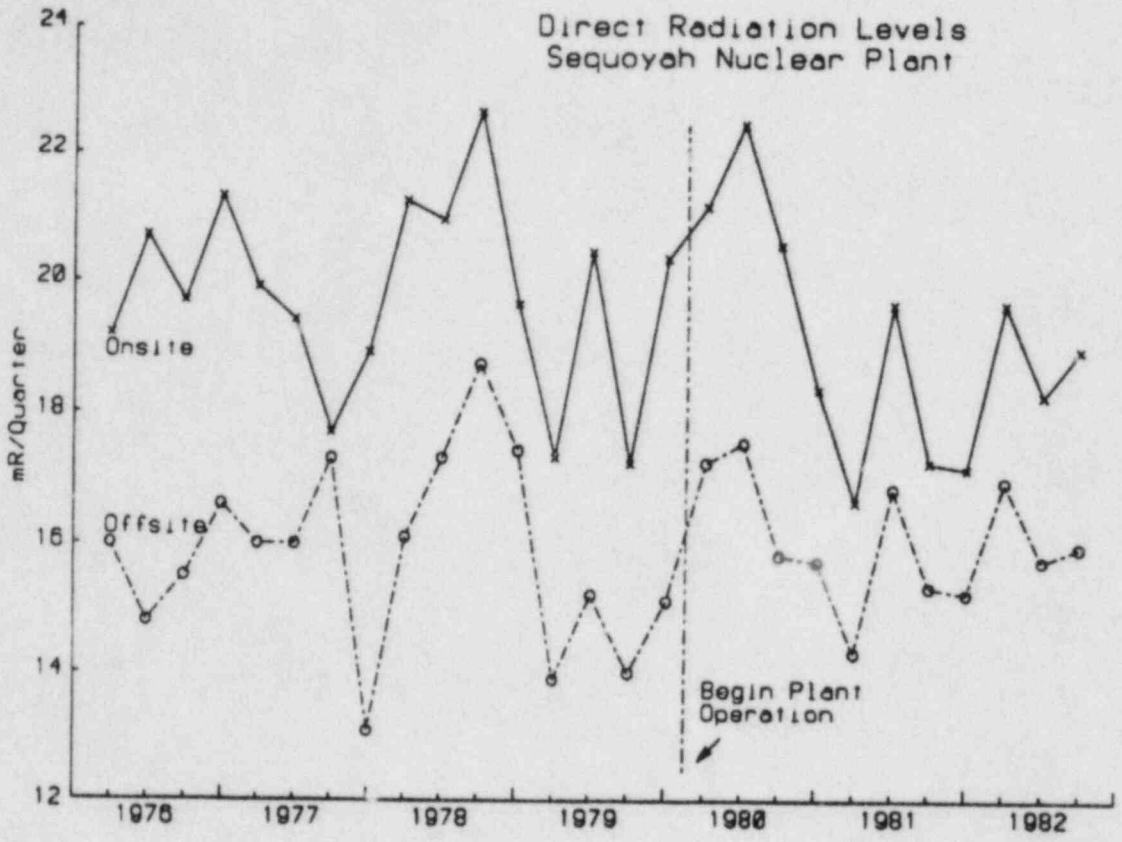
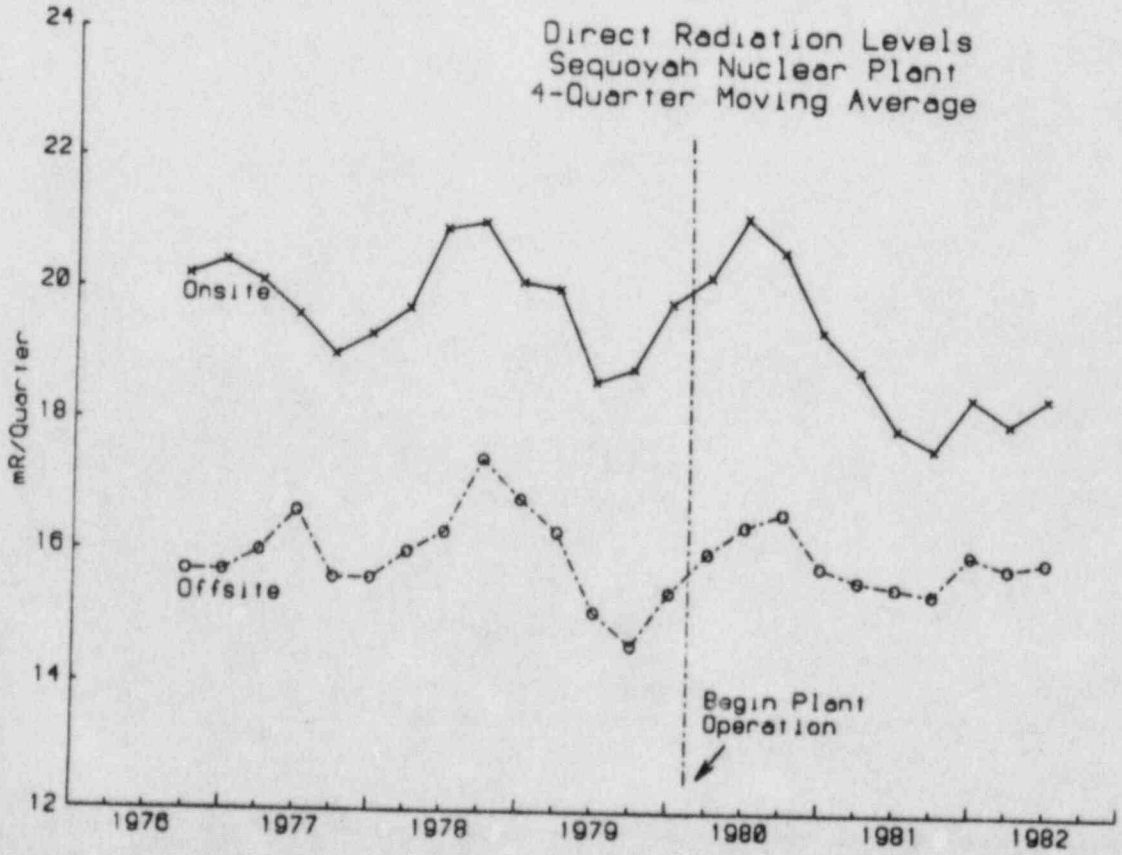


FIGURE 9



Reservoir Monitoring

Samples are collected from the Tennessee River as detailed in table 27. 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 28. Figure 11 presents a plot of the gross beta activity in surface water from 1971 through 1982. 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.

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 500 grams oven-dry weight for analytical purposes. All samples were analyzed for gamma, gross alpha, and gross beta activity. In addition, two samples of each species were analyzed for ^{89}Sr, and ^{90}Sr. 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 29 through 32.

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 33.

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 34.

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 35 and 36.

Table 27

SAMPLING SCHEDULE - RESERVOIR MONITORING

Tennessee River (Mile)	Biological Samples				Water Samples
	Benthic Fauna	Sediment	Shoreline Sediment	Fish[a]	
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 28

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 1982

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	3.31(2/ 26)	TRM 483.4	3.31(2/ 13)	2.91(3/ 13)	
39		3.29- 3.34		3.29- 3.34	2.09- 4.00	
GROSS BETA	2.400	3.30(20/ 26)	TRM 473.2	3.33(9/ 13)	3.76(12/ 13)	
39		2.42- 4.99		2.57- 4.87	2.83- 5.87	
GAMMA (GELI)						
39						
K-40	NOT ESTAB	16.41(10/ 26)	TRM 483.4	17.93(7/ 13)	25.06(5/ 13)	
		2.39- 35.66		2.39- 35.66	3.42- 67.73	
BI-214	NOT ESTAB	3.53(8/ 26)	TRM 473.2	4.32(2/ 13)	4.00(6/ 13)	
		0.50- 5.77		3.29- 5.35	0.74- 7.13	
PB-214	NOT ESTAB	3.06(3/ 26)	TRM 473.2	3.06(3/ 13)	0.76(2/ 13)	
		0.25- 6.85		0.25- 6.85	0.56- 0.93	
PB-212	NOT ESTAB	0.98(12/ 26)	TRM 483.4	1.24(7/ 13)	2.17(3/ 13)	
		0.12- 4.10		0.12- 4.10	0.39- 5.07	
SR 89	10.000	9 VALUES <LLD			4 VALUES <LLD	
13		ANALYSIS PERFORMED				
SR 90	2.000	9 VALUES <LLD			4 VALUES <LLD	
13		ANALYSIS PERFORMED				
TRITIUM	330.000	377.12(4/ 9)	TRM 483.4	378.78(2/ 5)	440.88(1/ 4)	
13		347.73- 403.21		378.77- 378.78	440.88- 440.88	

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 29

RADIOACTIVITY IN WHITE CRAPP[illegible]FISH)

PCI/G - 0.037 B[illegible](DRY WGT ..()

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1982

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	2.01(4/ 4)		CHICKAMAUGA RES	2.64(2/ 2)		3.05(2/ 2)		
6		0.31-	2.68	TRM 471-530	2.60-	2.68	2.32-	3.78	
GROSS BETA	0.100	31.31(4/ 4)		NICKAJACK RES	31.69(2/ 2)		29.55(2/ 2)		
6		30.64-	32.27	TRM 425-471	31.11-	32.27	28.04-	31.05	
GAMMA (GELI)									
6									
CS-137	0.020	0.14(4/ 4)		CHICKAMAUGA RES	0.17(2/ 2)		0.13(2/ 2)		
		0.09-	0.18	TRM 471-530	0.17-	0.18	0.10-	0.16	
K-40	NOT ESTAB	17.63(4/ 4)		NICKAJACK RES	18.62(2/ 2)		15.46(2/ 2)		
		16.54-	19.60	TRM 425-471	17.63-	19.60	14.27-	16.66	
BI-214	0.020	0.03(1/ 4)		CHICKAMAUGA RES	0.03(1/ 2)		0.15(1/ 2)		
		0.03-	0.03	TRM 471-530	0.03-	0.03	0.15-	0.15	
PB-214	NOT ESTAB	0.01(2/ 4)		NICKAJACK RES	0.01(2/ 2)		0.11(2/ 2)		
		0.00-	0.01	TRM 425-471	0.00-	0.01	0.04-	0.15	
RA-226	NOT ESTAB	0.00(1/ 4)		NICKAJACK RES	0.00(1/ 2)		0.15(1/ 2)		
		0.00-	0.00	TRM 425-471	0.00-	0.00	0.15-	0.15	
PA-234M	NOT ESTAB	2.82(1/ 4)		NICKAJACK RES	2.82(1/ 2)		2 VALUES <LLD		
		2.82-	2.92	TRM 425-471	2.82-	2.82			
SR 89	0.500	1.51(3/ 4)		CHICKAMAUGA RES	2.27(1/ 2)		1.07(1/ 2)		
6		0.80-	2.27	TRM 471-530	2.27-	2.27	1.07-	1.07	
SR 90	0.100	4 VALUES <LLD					0.20(1/ 2)		
6							0.20-	0.20	

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 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 1982

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		CONTROL LOCATIONS MEAN (F)[b] RANGE		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.100	1.76	4/ 4)	NICKAJACK RES	2.63	2/ 2)		1.10	2/ 2)	
6		0.57-	2.72	TRM 425-471	2.54-	2.72		0.58-	1.62	
GROSS BETA	0.100	23.62	4/ 4)	NICKAJACK RES	28.03	2/ 2)		18.37	2/ 2)	
6		17.94-	30.43	TRM 425-471	25.63-	30.43		18.22-	18.52	
GAMMA (GELI)										
6										
CO-60	0.010	4 VALUES <LLD						0.03	1/ 2)	
								0.03-	0.03	
CS-137	0.020	0.06	4/ 4)	NICKAJACK RES	0.06	2/ 2)		0.09	2/ 2)	
		0.04-	0.06	TRM 425-471	0.06-	0.06		0.03-	0.15	
K-40	NOT ESTAB	11.44	4/ 4)	NICKAJACK RES	12.43	2/ 2)		10.61	2/ 2)	
		9.71-	12.66	TRM 425-471	12.19-	12.66		7.87-	13.35	
BI-214	0.020	0.04	2/ 4)	NICKAJACK RES	0.05	1/ 2)		2 VALUES <LLD		
		0.02-	0.05	TRM 425-471	0.05-	0.05				
PB-214	NOT ESTAB	0.02	1/ 4)	NICKAJACK RES	0.02	1/ 2)		2 VALUES <LLD		
		0.02-	0.02	TRM 425-471	0.02-	0.02				
RA-226	NOT ESTAB	0.00	1/ 4)	CHICKAMAUGA RES	0.00	1/ 2)		2 VALUES <LLD		
		0.00-	0.00	TRM 471-530	0.00-	0.00				
TL-208	NOT ESTAB	0.01	1/ 4)	NICKAJACK RES	0.01	1/ 2)		0.00	1/ 2)	
		0.01-	0.01	TRM 425-471	0.01-	0.01		0.00-	0.00	
SR 89	0.500	0.94	2/ 4)	NICKAJACK RES	0.94	2/ 2)		0.78	1/ 2)	
6		0.74-	1.14	TRM 425-471	0.74-	1.14		0.78-	0.78	
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 31

RADIOACTIVITY IN SMALLMOUTH BUFFALO (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 1982

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	0.97(4/ 4)	NICKAJACK RES	1.07(2/ 2)	0.82(2/ 2)	
6		0.24- 1.50	TRM 425-471	0.81- 1.34	0.80- 0.84	
GROSS BETA	0.100	24.12(4/ 4)	NICKAJACK RES	25.21(2/ 2)	17.50(2/ 2)	
6		16.96- 33.45	TRM 425-471	16.96- 33.45	10.93- 24.07	
GAMMA (GELI)						
6						
CS-137	0.020	0.04(4/ 4)	CHICKAMAUGA RES	0.05(2/ 2)	0.10(1/ 2)	
		0.02- 0.07	TRM 471-530	0.03- 0.06	0.10- 0.10	
K-40	NOT ESTAB	12.02(4/ 4)	CHICKAMAUGA RES	12.99(2/ 2)	9.64(2/ 2)	
		8.46- 16.82	TRM 471-530	9.17- 16.82	4.60- 14.67	
BI-214	0.020	0.02(1/ 4)	NICKAJACK RES	0.02(1/ 2)	0.04(1/ 2)	
		0.02- 0.02	TRM 425-471	0.02- 0.02	0.04- 0.04	
PB-214	NOT ESTAB	0.01(2/ 4)	CHICKAMAUGA RES	0.01(1/ 2)	0.01(2/ 2)	
		0.01- 0.01	TRM 471-530	0.01- 0.01	0.00- 0.03	
PB-212	NOT ESTAB	4 VALUES <LLD			0.01(1/ 2)	
					0.01- 0.01	
SR 89	0.500	1.48(2/ 4)	CHICKAMAUGA RES	1.82(1/ 2)	2 VALUES <LLD	
6		1.13- 1.82	TRM 471-530	1.82- 1.82		
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 32

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 1982

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	0.98(	2/ 4)	CHICKAMAUGA RES	1.07(	1/ 2)	1.63(	2/ 2)	
6		0.90-	1.07	TRM 471-530	1.07-	1.07	1.07-	2.20	
GROSS BETA	0.100	20.46(	4/ 4)	CHICKAMAUGA RES	26.62(	2/ 2)	14.96(	2/ 2)	
6		14.17-	39.06	TRM 471-530	14.17-	39.06	13.68-	16.05	
GAMMA (GELI)									
6									
CS-137	0.020	0.04(	4/ 4)	CHICKAMAUGA RES	0.05(	2/ 2)	0.09(	1/ 2)	
		0.03-	0.06	TRM 471-530	0.03-	0.06	0.09-	0.09	
K-40	NOT ESTAB	6.05(	4/ 4)	NICKAJACK RES	6.08(	2/ 2)	7.34(	2/ 2)	
		6.66-	9.44	TRM 425-471	6.72-	9.44	6.24-	8.44	
BI-214	0.020	0.06(	3/ 4)	CHICKAMAUGA RES	0.07(	2/ 2)	0.07(	1/ 2)	
		0.02-	0.12	TRM 471-530	0.02-	0.12	0.07-	0.07	
PB-214	NOT ESTAB	0.05(	3/ 4)	CHICKAMAUGA RES	0.05(	2/ 2)	0.04(	2/ 2)	
		0.02-	0.09	TRM 471-530	0.02-	0.09	0.02-	0.07	
PB-212	NOT ESTAB	0.00(	1/ 4)	CHICKAMAUGA RES	0.00(	1/ 2)	0.02(	1/ 2)	
		0.00-	0.00	TRM 471-530	0.00-	0.00	0.02-	0.02	
RA-226	NOT ESTAB	0.02(	2/ 4)	NICKAJACK RES	0.02(	1/ 2)	0.07(	1/ 2)	
		0.02-	0.02	TRM 425-471	0.02-	0.02	0.07-	0.07	
SR 89	0.500	1.60(	3/ 4)	CHICKAMAUGA RES	3.18(	1/ 2)	2 VALUES <LLD		
6		0.68-	3.18	TRM 471-530	3.18-	3.18			
SR 90	0.100	0.16(	2/ 4)	CHICKAMAUGA RES	0.16(	2/ 2)	0.13(	2/ 2)	
6		0.15-	0.18	TRM 471-530	0.15-	0.18	0.10-	0.15	

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 33

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 1982

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	0.350	4.29(6/ 6)	TRM 472.80	5.28(2/ 2)	3.47(2/ 2)	
		1.22- 5.73		4.83- 5.73	3.37- 3.57	
GROSS BETA	0.700	30.17(6/ 6)	TRM 472.80	36.56(2/ 2)	32.07(2/ 2)	
		10.51- 37.59		35.61- 37.51	30.60- 33.54	
GAMMA (GELI)						
CE-144	0.060	6 VALUES <LLD			0.12(1/ 2)	
					0.12- 0.12	
CO-60	0.010	0.19(6/ 6)	TRM 480.82	0.30(2/ 2)	0.20(2/ 2)	
		0.03- 0.37		0.24- 0.37	0.20- 0.21	
CS-137	0.020	1.96(6/ 6)	TRM 472.80	3.42(2/ 2)	1.74(2/ 2)	
		0.07- 3.97		2.86- 3.97	1.66- 1.83	
CO-58	0.010	0.02(1/ 6)	TRM 483.4	0.02(1/ 2)	2 VALUES <LLD	
		0.02- 0.02		0.02- 0.02		
K-40	NOT ESTAB	13.68(6/ 6)	TRM 480.82	16.48(2/ 2)	14.99(2/ 2)	
		5.01- 18.26		14.69- 18.26	14.84- 15.15	
BI-214	0.020	1.26(6/ 6)	TRM 480.82	1.65(2/ 2)	1.13(2/ 2)	
		0.17- 2.28		1.02- 2.28	1.00- 1.27	
BI-212	0.100	1.99(6/ 6)	TRM 472.80	2.26(2/ 2)	2.37(2/ 2)	
		0.35- 2.79		2.25- 2.26	1.57- 3.17	
PB-214	NOT ESTAB	1.32(6/ 6)	TRM 480.82	1.55(2/ 2)	1.18(2/ 2)	
		0.20- 1.94		1.17- 1.94	1.10- 1.27	
PB-212	NOT ESTAB	1.51(6/ 6)	TRM 480.82	1.61(2/ 2)	1.49(2/ 2)	
		0.23- 2.45		1.50- 1.72	1.39- 1.59	
RA-226	NOT ESTAB	1.26(6/ 6)	TRM 480.82	1.65(2/ 2)	1.13(2/ 2)	
		0.17- 2.28		1.02- 2.28	1.00- 1.27	
RA-224	NOT ESTAB	1.51(3/ 6)	TRM 483.4	1.54(2/ 2)	1.90(2/ 2)	
		0.29- 2.80		0.29- 2.80	1.53- 2.27	
TL-208	0.020	0.50(6/ 6)	TRM 480.82	0.54(2/ 2)	0.45(2/ 2)	
		0.07- 0.83		0.45- 0.63	0.42- 0.49	
AC-228	0.060	1.47(6/ 6)	TRM 480.82	1.64(2/ 2)	1.46(2/ 2)	
		0.22- 2.53		1.42- 1.85	1.33- 1.59	
PA-234M	NOT ESTAB	2.81(2/ 6)	TRM 480.82	3.58(1/ 2)	3.15(1/ 2)	
		2.03- 3.58		3.58- 3.58	3.15- 3.15	
SR 89	1.500	1.84(2/ 6)	TRM 472.80	2.06(1/ 2)	2.59(1/ 2)	
		1.61- 2.06		2.06- 2.06	2.59- 2.59	
SR 90	0.300	6 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 34

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 1982

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	NOT ESTAB	3.02(4/ 4)		GOLD POINT	3.98(2/ 2)		3.32(2/ 2)		
6		1.68- 4.17		TRM 478	3.80- 4.17		2.69- 3.94		
GROSS BETA	0.700	18.75(4/ 4)		GOLD POINT	27.75(2/ 2)		15.87(2/ 2)		
6		7.91- 35.82		TRM 478	19.68- 35.82		12.67- 19.07		
GAMMA (GELI)									
6									
CS-134	0.030	0.26(2/ 4)		HARRISON FLATS	0.27(1/ 2)		2 VALUES <LLD		
		0.25- 0.27		TRM 477	0.27- 0.27				
CS-137	0.020	0.26(2/ 4)		GOLD POINT	0.36(1/ 2)		0.02(1/ 2)		
		0.17- 0.36		TRM 478	0.36- 0.36		0.02- 0.02		
K-40	NOT ESTAB	9.07(4/ 4)		GOLD POINT	15.55(2/ 2)		6.63(2/ 2)		
		2.02- 23.30		TRM 478	7.79- 23.30		5.42- 7.84		
BI-214	0.020	0.85(4/ 4)		GOLD POINT	0.91(2/ 2)		0.77(2/ 2)		
		0.66- 1.11		TRM 478	0.70- 1.11		0.44- 1.10		
BI-212	0.100	1.17(2/ 4)		GOLD POINT	1.75(1/ 2)		1.11(2/ 2)		
		0.58- 1.75		TRM 478	1.75- 1.75		0.63- 1.60		
PB-214	NOT ESTAB	1.03(4/ 4)		GOLD POINT	1.04(2/ 2)		0.86(2/ 2)		
		0.74- 1.34		TRM 478	0.74- 1.34		0.52- 1.21		
PB-212	0.020	1.06(4/ 4)		GOLD POINT	1.42(2/ 2)		1.05(2/ 2)		
		0.54- 1.58		TRM 478	1.27- 1.58		0.62- 1.48		
A-226	NOT ESTAB	0.85(4/ 4)		GOLD POINT	0.91(2/ 2)		0.77(2/ 2)		
		0.66- 1.11		TRM 478	0.70- 1.11		0.44- 1.10		
RA-224	NOT ESTAB	1.15(2/ 4)		GOLD POINT	1.64(1/ 2)		1.25(2/ 2)		
		0.67- 1.64		TRM 478	1.64- 1.64		0.70- 1.80		
TL-208	0.020	0.33(4/ 4)		GOLD POINT	0.45(2/ 2)		0.31(2/ 2)		
		0.16- 0.48		TRM 478	0.41- 0.48		0.20- 0.42		
AC-228	0.060	0.96(4/ 4)		GOLD POINT	1.41(2/ 2)		0.98(2/ 2)		
		0.50- 1.46		TRM 478	1.36- 1.46		0.60- 1.36		
PA-234M	NOT ESTAB	4 VALUES <LLD					2.68(1/ 2)		
							2.68- 2.68		
SR 89	1.500	4 VALUES <LLD					2 VALUES <LLD		
6		ANALYSIS PERFORMED							
SR 90	0.300	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 35

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 1962

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	4.18(4/ 4)	TRM 480.82	6.65(2/ 2)	2.69(2/ 2)	
6		1.52- 9.92		3.38- 9.92	1.42- 3.96	
GROSS BETA	0.100	8.25(4/ 4)	TRM 480.82	10.76(2/ 2)	6.62(2/ 2)	
6		5.74- 15.16		6.35- 15.16	4.66- 8.58	
GAMMA (GELI)						
6						
CO-60	0.080	0.32(4/ 4)	TRM 480.82	0.34(2/ 2)	0.21(1/ 2)	
		0.24- 0.44		0.24- 0.44	0.21- 0.21	
CS-137	0.080	0.27(1/ 4)	TRM 480.82	0.27(1/ 2)	0.20(1/ 2)	
		0.27- 0.27		0.27- 0.27	0.20- 0.20	
CO-58	0.070	0.80(3/ 4)	TRM 480.82	1.43(1/ 2)	2 VALUES <LLD	
		0.39- 1.43		1.43- 1.43		
K-40	NOT ESTAB	2.94(4/ 4)	TRM 483.4	3.03(2/ 2)	3.70(2/ 2)	
		1.55- 4.17		2.34- 3.72	2.94- 4.47	
BI-214	NOT ESTAB	0.59(4/ 4)	TRM 483.4	0.65(2/ 2)	0.55(2/ 2)	
		0.19- 1.09		0.22- 1.09	0.32- 0.78	
PB-214	NOT ESTAB	0.53(4/ 4)	TRM 480.82	0.59(2/ 2)	0.48(2/ 2)	
		0.07- 0.91		0.27- 0.91	0.20- 0.77	
PB-212	NOT ESTAB	0.25(3/ 4)	TRM 480.82	0.33(2/ 2)	0.05(2/ 2)	
		0.09- 0.45		0.21- 0.45	0.03- 0.06	
RA-226	NOT ESTAB	0.84(1/ 4)	TRM 480.82	0.84(1/ 2)	2 VALUES <LLD	
		0.84- 0.84		0.84- 0.84		
TL-208	NOT ESTAB	0.06(3/ 4)	TRM 480.82	0.08(2/ 2)	0.04(1/ 2)	
		0.00- 0.13		0.04- 0.13	0.04- 0.04	
AC-228	NOT ESTAB	0.28(2/ 4)	TRM 480.82	0.28(2/ 2)	0.31(1/ 2)	
		0.04- 0.52		0.04- 0.52	0.31- 0.31	

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 36

RADIOACTIVITY IN CLAM SHELL

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

NAME OF FACILITY SEQUOYAH — DOCKET NO. 50-327,328

LOCATION OF FACILITY HAMILTON TENNESSEE — REPORTING PERIOD 1962

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 MEAN (F)[b] RANGE	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROSS ALPHA	0.700	4 VALUES <LLD			2 VALUES <LLD	
6		ANALYSIS PERFORMED				
GROSS BETA	0.700	4.53(4/ 4)	TRM 480.82	4.58(2/ 2)	3.65(2/ 2)	
6		4.28- 4.88		4.28- 4.88	3.31- 3.99	
GAMMA (GELI)						
6						
CO-60	0.010	0.02(4/ 4)	TRM 480.82	0.02(2/ 2)	0.02(2/ 2)	
		0.01- 0.03		0.02- 0.03	0.02- 0.02	
CS-137	0.020	0.02(1/ 4)	TRM 480.82	0.02(1/ 2)	2 VALUES <LLD	
		0.02- 0.02		0.02- 0.02		
CO-58	0.010	0.04(1/ 4)	TRM 480.82	0.04(1/ 2)	2 VALUES <LLD	
		0.04- 0.04		0.04- 0. 4		
K-40	NOT ESTAB	0.16(4/ 4)	TRM 483.4	0.17(2/ 2)	0.15(2/ 2)	
		0.11- 0.22		0.11- 0.22	0.10- 0.21	
MN-54	0.010	0.03(2/ 4)	TRM 480.82	0.03(2/ 2)	2 VALUES <LLD	
		0.02- 0.05		0.02- 0.05		
BI-214	0.050	0.14(4/ 4)	TRM 483.4	0.15(2/ 2)	0.09(2/ 2)	
		0.10- 0.18		0.12- 0.18	0.09- 0.10	
BI-212	0.100	0.22(4/ 4)	TRM 483.4	0.24(2/ 2)	0.19(1/ 2)	
		0.15- 0.27		0.21- 0.27	0.19- 0.19	
PB-214	0.050	0.15(4/ 4)	TRM 483.4	0.16(2/ 2)	0.11(2/ 2)	
		0.11- 0.18		0.13- 0.18	0.09- 0.12	
PB-212	NOT ESTAB	0.15(4/ 4)	TRM 483.4	0.15(2/ 2)	0.10(2/ 2)	
		0.13- 0.17		0.13- 0.17	0.10- 0.10	
RA-226	0.050	0.14(4/ 4)	TRM 483.4	0.15(2/ 2)	0.09(2/ 2)	
		0.10- 0.18		0.12- 0.18	0.09- 0.10	
TL-208	0.020	0.04(4/ 4)	TRM 480.82	0.05(2/ 2)	0.03(2/ 2)	
		0.03- 0.05		0.04- 0.05	0.03- 0.03	
AC-228	0.060	0.23(4/ 4)	TRM 483.4	0.24(2/ 2)	0.16(2/ 2)	
		0.18- 0.27		0.22- 0.27	0.14- 0.18	
PA-234M	NOT ESTAB	1.05(1/ 4)	TRM 480.82	1.05(1/ 2)	2 VALUES <LLD	
		1.05- 1.05		1.05- 1.05		
SR 89	5.000	4 VALUES <LLD			12.98(1/ 2)	
6					12.98- 12.98	
SR 90	1.000	1.49(1/ 4)	TRM 483.4	1.49(1/ 2)	2 VALUES <LLD	
6		1.49- 1.49		1.49- 1.49		

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

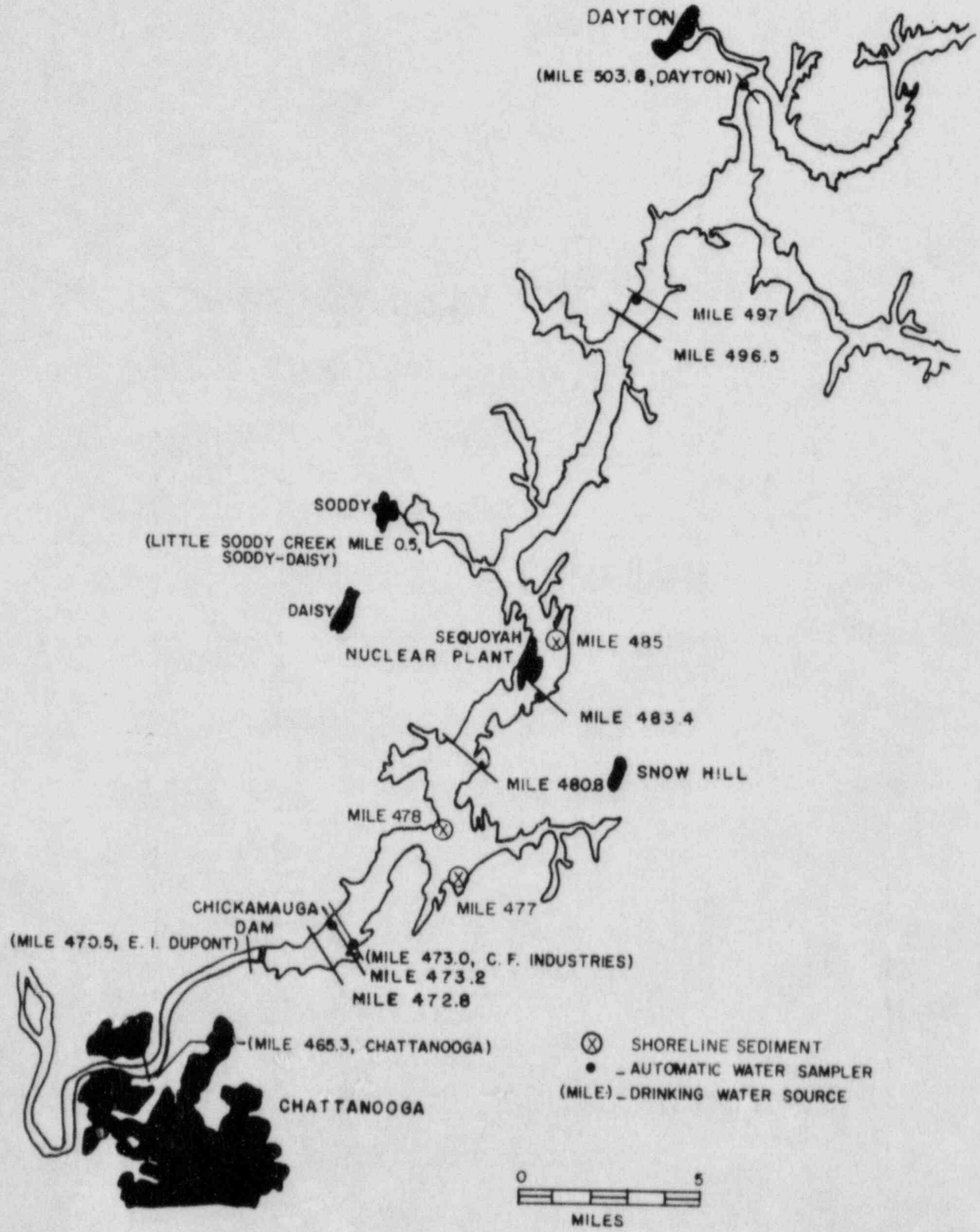
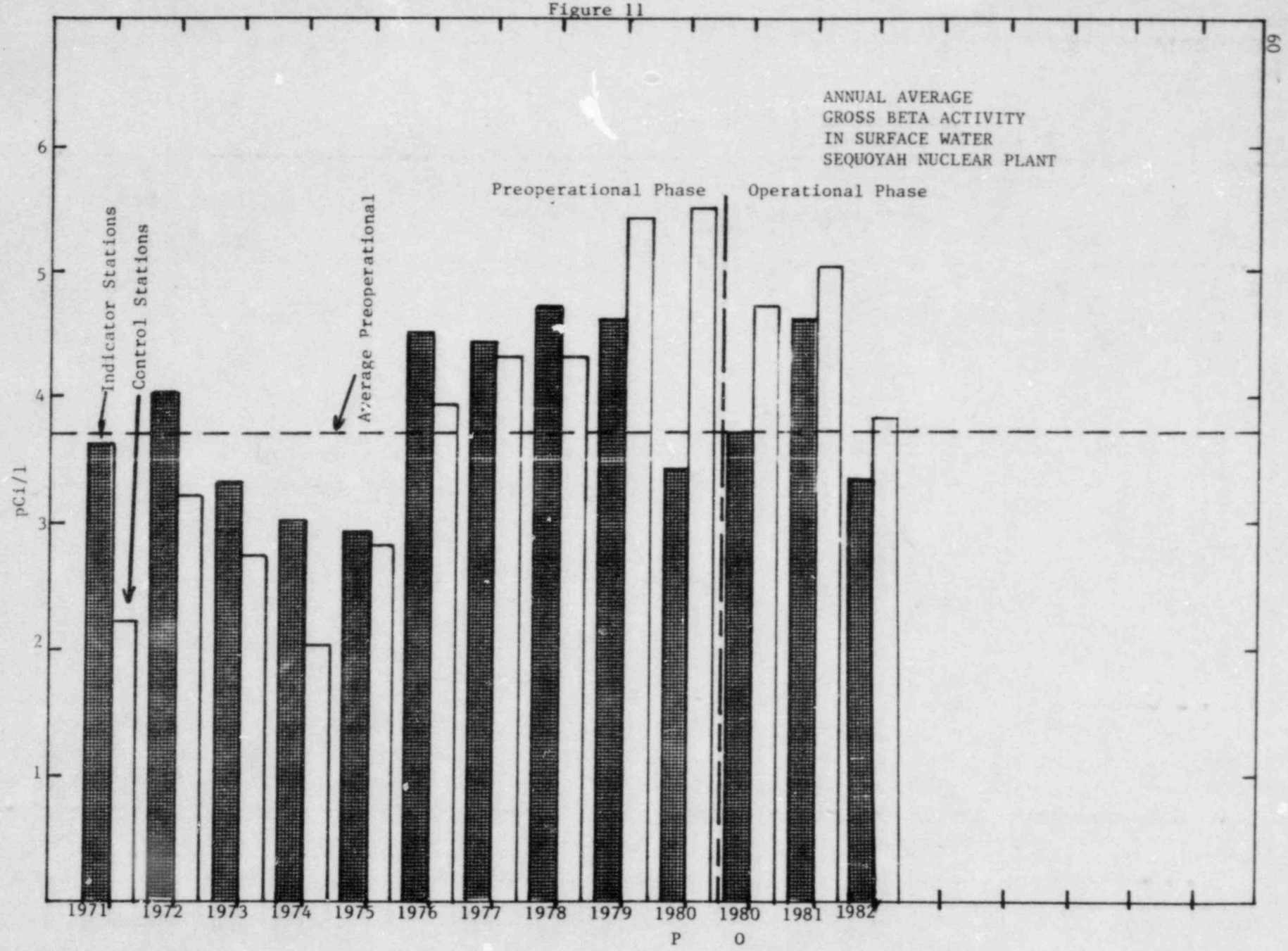


Figure 11


ANNUAL AVERAGE
GROSS BETA ACTIVITY
IN SURFACE WATER
SEQUOYAH NUCLEAR PLANT
Preoperational Phase
Operational Phase
Indicator Stations
Control Stations
Average Preoperational
pCi/l
6
5
4
3
2
1
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1980
1981
1982
P
O

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.

Doses were also estimated for the potential exposure to individuals participating in water-related recreational activities downstream from SQN. The small concentrations of cesium-134 and cesium-137 measured in shoreline sediment samples were estimated to produce an exposure of less than 10 percent of the limit allowed by the NRC for water-related pathways. Concentrations of cesium-137 smiliar to those at the downstream shoreline were observed in stream-channel sediment samples from above the plant, indicating that at least a part of the calculated exposure was not due to plant operations.

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 outlined by the NRC. No increases of radioactivity have been seen in water samples. These media will be monitored closely for indications of increases.