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Enclosure 3
Annual Radiological Environmental Operating Report (Annual REMP Report)

FirstEnergy Nuclear Operating Company
FENOC

Beaver Valley Power Station - Units 1 & 2
Unit 1 License No. DPR-66
Unit 2 License No. NPF-73

Annual
Radiological Environmental Operating Report
Calendar Year - 2003

EXECUTIVE SUMMARY

This document is a detailed report of the 2003 Beaver Valley Power Station Radiological Environmental Monitoring Program (REMP). Radioactivity levels in the vicinity of Unit 1 and Unit 2 from January 1 through December 31, 2003 in air, water, shoreline sediment, milk, fish, food crops, vegetation, soil, and direct radiation measurement have been analyzed, evaluated, and summarized. The results of the REMP are intended to supplement the results of the radiological effluent monitoring by verifying that the measurable concentration of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurement and modeling of the environmental exposure pathways.

Radiation and radioactivity in the environment is monitored within a 10 mile radius of the site. Two types of samples are taken. The first type, control samples, are collected from areas that are beyond measurable influence of Beaver Valley Power Station. These samples are used as reference data. Normal background radiation levels, or radiation present due to causes other than Beaver Valley Power Station, can thus be compared to the environment surrounding the nuclear power station. Indicator samples are the second sample type obtained. These samples show how much radiation is contributed to the environment by the site. Indicator samples are taken from areas close to the station where any plant contribution will be at the highest concentration. In 2003, samples were taken from over 90 different locations around Beaver Valley Power Station that included the aquatic, atmospheric and terrestrial environments. More than 2000 analyses were performed on these samples. The environmental program for 2003 is outlined in Table 2-1.

In 1974 and 1975, prior to station operation, samples were collected and analyzed to determine the amount of radioactivity present in the area. The resulting values are used as a "pre-operational baseline". Current analysis results from the indicator samples are compared to both current control sample values and the pre-operational baseline to determine if changes in radioactivity levels are attributable to station operations. The 2003 analytical results and pre-operational baseline results are summarized in Table 2-2 and Table 2-3.

A report is required to be submitted to the Nuclear Regulatory Commission when the level of radioactivity in an environmental sampling medium exceeds the limits specified in the Offsite Dose Calculation Manual (ODCM) when averaged over any calendar quarter. Also, when more than one of the radionuclides are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{Concentration (1)}}{\text{Limit Level (1)}} + \frac{\text{Concentration (2)}}{\text{Limit Level (2)}} + \ldots \geq 1.0$$

Based on the analytical results of environmental samples during 2003, the Beaver Valley Power Station reporting levels were not exceeded.

Positive results attributable to the Beaver Valley Power Station were consistent with station data of authorized radioactive discharges and were within limits permitted by the NRC license. Other radioactivity detected was attributable to naturally occurring radionuclides, previous nuclear weapons tests, other man-made sources, and to the normal statistical fluctuation for activities near the lower limit of detection (LLD).

In 2003, the radioactivity releases from BVPS Units 1 and 2 did not exceed the effluent limits identified in the Beaver Valley Power Station Operating License Technical Specification/Offsite Dose Calculation Manual (ODCM). Based on the estimated dose to individuals from the natural background radiation exposure, the incremental increase in total body dose to the 50 mile population (approximately 4 million), from the operation of Beaver Valley Power Station Units 1 and 2, is less than 0.0001% of the annual background dose. The National Academy of Sciences 1990 BEIR Report shows that the typical dose to an individual from background (natural radiation exposure including radon) is an estimated average of 296 mrem per year.

Analytical results are divided into four ODCM required categories based on exposure pathways: Airborne, direct radiation, ingestion and waterborne. Each of these pathways is described below:

- The airborne exposure pathway includes airborne iodine and airborne particulates. The 2003 results were similar to previous years. There was no notable increase in natural products and no detectable fission products or other radionuclides in the airborne particulate media during the year.

- The direct exposure pathway measures environmental radiation doses by use of thermoluminescent dosimeters (TLDs). TLD results have indicated a stable trend and compare well with previous years.

- The ingestion exposure pathway includes milk, fish, and food product (leafy vegetable) samples. For milk samples, strontium-90 (Sr-90), attributable to past atmospheric nuclear weapons testing, was detected at levels similar to the past five years. The gamma spectroscopy counting only indicated positive results for potassium-40 (K-40) at average environmental levels. Iodine-131 (I-131) was detected in four (4) milk samples at slightly above LLD levels. No other radionuclides were identified.

  The fish samples taken indicated below LLD levels in each of the samples. Vegetation samples revealed naturally occurring K-40 at average environmental levels.

- The waterborne exposure pathway includes drinking water, surface (river) water, and river sediment. Water samples were analyzed for tritium and gamma-emitting radionuclides. Tritium was not identified in any of the twenty samples analyzed. Gamma analysis of samples indicated no gamma-emitting radionuclides above detection limits. I-131 analysis of weekly samples (158 total) indicated 116 positive results. Five (5) of the seven (7) positive results that exceeded the reporting level were surface water samples. It was also noted that the surface water samples, which are upstream of the plant and considered outside the influence of the site had similar results to the downstream drinking water samples.

Sediment samples are taken from three locations, upstream of the site, at the discharge point of liquid releases and downstream of the site. Analysis of samples indicated naturally occurring radionuclides K-40 and Ra-226 in all results. Small amounts of cesium-137 (Cs-137) from previous nuclear weapons tests was also detected in six of the six samples (including the Control location) at levels consistent with previous years. The samples from the discharge point of the site also indicated small amounts of other radionuclides, including cobalt-58 (Co-58), and cobalt-60 (Co-60) which are consistent with authorized station liquid discharges. Co-58 and Co-60 were not detected at the control location upstream of the plant.

In addition to the required samples discussed above, groundwater, precipitation, soil, and feedcrops were also taken. Results were consistent with previous years and no degrading trends were identified.

The environmental monitoring program outlined in the Beaver Valley Power Station ODCM for Units 1 and 2 was followed throughout 2003. The REMP results demonstrate the adequacy of radioactive effluent control at the Beaver Valley Power Station and that the operations of Units 1 and 2 did not adversely affect the surrounding environment.

It should be noted that the radiological environmental monitoring program includes sampling sites in addition to the required sites set forth in the ODCM. These include five (5) air sampling sites, one (1) surface water site, three (3) ground water sites, three (3) precipitation sites, two (2) sediment sites, one (1) local large dairy, and one (1) milk animal feed site.

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SECTION 1 - INTRODUCTION

A. Scope and Objectives of the Program

The environmental program consists of environmental monitoring for radioactivity in the vicinity of the Beaver Valley Power Station. Environmental sampling and analyses included air, water, milk, vegetation, river sediments, fish, and ambient radiation levels in areas surrounding the site. The results of these media are assessed to determine impacts of the plant operation on the environment. The Annual Radiological Environmental Report for the Beaver Valley Power Station summarizes the radiological environmental program conducted by the FirstEnergy Nuclear Operating Company in 2003.

B. Description of the Beaver Valley Site

The Beaver Valley Power Station is located on the south bank of the Ohio River in the Borough of Shippingport, Beaver County, Pennsylvania, on a 501 acre tract of land. The site is approximately one mile from Midland, Pennsylvania; five miles from East Liverpool, Ohio; and twenty-five miles from Pittsburgh, Pennsylvania. Figure 1-1 shows the site location in relation to the principal population centers. Population density in the immediate vicinity of the site is relatively low. The population within a five mile radius of the plant is approximately 15,493 and the only area within the radius of concentrated population is the Borough of Midland, Pennsylvania, with a population of approximately 3,321.

The site lies in a valley along the Ohio River. It extends from the river (elevation 665 feet above sea level) to a ridge along the border south of the Beaver Valley Power Station at an elevation of 1,160 feet. Plant ground level is approximately 735 feet above sea level.

The Beaver Valley Power Station is on the Ohio River at river mile 34.8, at a location on the New Cumberland Pool that is 3.3 river miles downstream from Montgomery Lock and Dam, and 19.4 miles upstream from New Cumberland Lock and Dam. The Pennsylvania-Ohio-West Virginia border is located 5.2 river miles downstream from the site. The river flow is regulated by a series of dams and reservoirs on the Beaver, Allegheny, Monongahela and Ohio Rivers and their tributaries. For 2003, the flow ranged from a minimum monthly average of 36,280 cubic feet per second (CFS) to a maximum monthly average of 79,591 CFS. The mean flow for 2003 was 52,271 CFS.

Water temperature of the Ohio River varies from 32°F to 84°F, the minimum temperatures occur in January and/or February and maximum temperatures in July and August. Water quality in the Ohio River at the site location is affected primarily by the water quality of the Allegheny, Monongahela and Beaver rivers.

The climate of the area may be classified as humid continental. Total annual precipitation for 2003 was 44.4 inches. Yearly temperatures varied from a low of -1.4°F to a high of 88.0°F with an annual average temperature of 50.2°F. The predominant wind direction is typically from the southwest in summer and from the west southwest in winter.

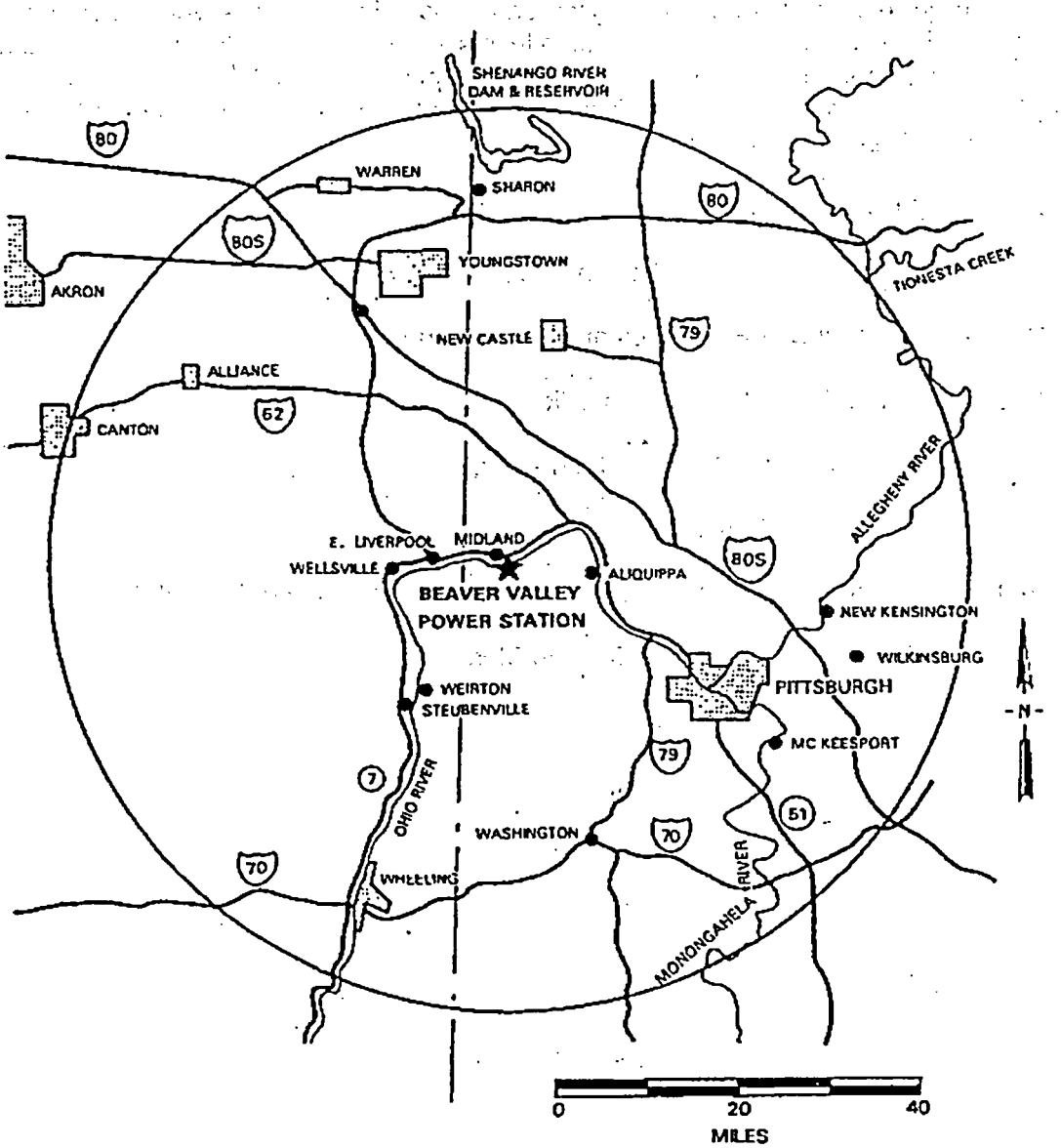
The basic features of the Beaver Valley Power Station Units 1 and 2 are tabulated below:

	Beaver Valley Unit 1	Beaver Valley Unit 2
Maximum Power Level	2689 – megawatts thermal	2689 – megawatts thermal
Type of Power	PWR	PWR
No. of Reactor Coolant Loops	3	3
No. of Steam Generators & Type	3 - Vertical	3 - Vertical
Steam Used by Main Turbine	Saturated	Saturated

The units utilize two separate systems (primary and secondary) for transferring heat from the source (the reactor) to the receiving component (turbine-generator). Because the two systems are isolated from each other, primary and secondary waters do not mix; therefore, radioactivity in the primary system water is normally isolated from the secondary system. Reactor coolant in the primary system is pumped through the reactor core and steam generators by means of reactor coolant pumps. Heat is given up from the primary system to the secondary system in the steam generators, where steam is formed and delivered to the main unit turbine, which drives the electrical generator. The steam is condensed after passing through the turbine, and returned to the steam generators to begin another steam/water cycle.

Figure 1-1

Geographical Map and Principal Communities in 50-mile Radius of the Beaver Valley Power Station



SECTION 2 - ENVIRONMENTAL MONITORING PROGRAM

A. Environmental Radioactivity Monitoring Program

1. Program Description

The program consists of monitoring water, air, soil, river bottoms, vegetation and foodcrops, cows milk, ambient radiation levels in areas surrounding the site, and aquatic life as summarized in Table 2-1. Further description of each portion of the program (Sampling Methods, Sample Analysis, Discussion and Results) are included in Sections 2-B through 2-I of this report.

2-B - Air Monitoring

2-C - Monitoring of Sediments and Soils

2-D - Monitoring of Feedcrops and Food Products

2-E - Monitoring of Local Cows Milk

2-F - Environmental Radiation Monitoring

2-G - Monitoring of Fish

2-H - Monitoring of Surface, Drinking, Ground Waters and Precipitation

2-I - Estimates of Radiation Dose to Man

Table 2-1
Operational Radiological Environmental Monitoring Program

Type of Sample		Sample Points	Sector	Miles	Sample Point Description	Sample Frequency	Sample Preparation	Analysis
1	Air Particulate and Radioiodine	13	11	1.4	Meyer's Farm	Continuous sampling with sample collection at least weekly	Weekly AP	Gross Beta (b)
		30	4	0.5	Shippingport (S.S.)		Weekly Charcoal	I-131
		46.1	3	2.3	Industry, Rt. 68 – Garage		Quarterly Composite (c)	Gamma - scan
		32	15	0.8	Midland (S.S.)			
		48(a)	10	16.3	Weirton, W.Va., - Weirton Water Tower, Collier Way			
		51	5	8.0	Aliquippa (S.S.)			
		47	14	4.9	East Liverpool, Oh. - Water Treatment Plant			
		27	7	6.1	Brunton's Farm			
		28	1	8.6	Sherman's Farm			
		29B	3	8.0	Beaver Valley Geriatric Center			
2	Direct Radiation	30	4	0.5	Shippingport (S.S.)	Continuous (TLD)	Quarterly (i)	Gamma Dose
		13	11	1.4	Meyer's Farm			
		46	3	2.5	Industry, Midway Dr.			
		32	15	0.8	Midland (S.S.)			
		48(a)	10	16.3	Weirton, W.Va. - Weirton Water Tower, Collier Way			
		45.1	6	1.9	Raccoon Twp., Kennedy's Corners			
		51	5	8.0	Aliquippa (S.S.)			
		47	14	4.9	East Liverpool, Oh. - Water Treatment Plant			
		70	1	3.4	North of Western Beaver School – Engle Rd.			
		80	9	8.2	Raccoon Park Office (Rt. 18)			
		81	9	3.6	Millcreek United Pres. Church			
		82	9	6.9	Hanover Municipal Bldg.			
		83	10	4.2	735 Mill Creek Rd.			
		14	11	2.5	Hookstown			
		84	11	8.3	Hancock Parks & Recreation Complex			
		85	12	5.7	Rts. 8 & 30 Intersection			
		86	13	6.2	E. Liverpool, Oh. 1090 Ohio Ave.			
		92	12	2.8	Georgetown Rd. (S.S.)			

Table 2-1 (Continued)
Operational Radiological Environmental Monitoring Program

	Types of Sample	Sample Points	Sector	Miles	Sample Point Description	Sample Frequency	Sample Preparation	Analysis
2	Direct Radiation (continued)	87	14	7.0	Calcutta, Oh. – Calcutta Smith's Ferry Rd. & Valley Dr.	Continuous (TLD)	Quarterly (i)	Gamma-Dose
		88	15	2.8	Midland Heights – 110 Summit Rd.			
		89	15	4.8	Ohioville, 488 Smith's Ferry Rd.			
		90	16	5.2	Opposite Fairview School			
		10	3	1.0	Shippingport Boro			
		45	5	2.2	Rt. 18 & Anderson St.			
		60	13	2.5	444 Hill Rd.			
		93	16	1.1	Midland, Sunrise Hills			
		95	10	2.3	832 McCleary Rd.			
		28	1	8.6	Sherman's Farm			
		71	2	6.0	Brighton Twp. First West.			
		72	3	3.3	Industry, Logan Park			
		29B	3	8.0	Beaver Valley Geriatric Center			
		73	4	2.5	618 Squirrel Run Rd.			
		74	4	7.0	CCBC – 137 Poplar Ave.			
		75	5	4.1	117 Holt Road			
		76	6	3.8	Raccoon Elementary School			
		77	6	5.6	3614 Green Garden Rd			
		59	6	1.0	236 Green Hill Rd.			
		78	7	2.7	Raccoon Mun. Bldg.			
		27	7	6.1	Brunton's Farm			
		79	8	4.4	Rt. 151 & Pross Ln.			
		15	14	3.7	Georgetown Post Office			
		46.1	3	2.3	Industry, Rt. 168 – Garage			
		91	2	3.9	Pine Grove Rd and Doyle Rd			
		94	8	2.2	McCleary Rd. & Pole Cat Hollow Rd.			
3	Surface Water	49(a)	3	5.0	Upstream Side of Montgomery Dam	Weekly Grab Sample (h)	Weekly Sample from Site 49	I-131
		2.1	14	1.5	Downstream (Midland) J&L	Weekly, Intermittent Composite Sample (h)	Monthly composite of Weekly Sample (c)	Gamma-scan
		5	14	4.9	East Liverpool, Oh. - Water Treatment Plant (raw water)	Daily Grab Sample Only - Collected Weekly (h)		
							Quarterly Composite (c)	H-3

Table 2-1 (Continued)

Operational Radiological Environmental Monitoring Program

	Type of Sample	Sample Points	Sector	Miles	Sample Point Description	Sample Frequency	Sample Preparation	Analysis
4	Groundwater	14	11	2.5	Hookstown	Semi-Annual	Semi-Annual	Gamma-scan H-3
		15	14	3.7	Georgetown			
		11	3	0.8	Shippingport Boro			
5	Drinking	4	15	1.3	Midland, Water Treatment Plant	Intermittent (d) Sample Collected Weekly	Weekly Composite	I-131
							Monthly Composite (d)	Gamma-scan
							Quarterly Composite (d)	H-3
		5	14	4.9	East Liverpool, Oh. - Water Treatment Plant			
6	Shoreline Sediment	2A	13	0.2	BVPS Outfall Discharge	Semi-Annual	Semi-Annual	Gamma-scan
		49(a)	3	5.0	Upstream side of Montgomery Dam			
		50	12	11.8	Upstream side of New Cumberland Dam			
7	Milk	25	10	2.1	Searight's Farm	Weekly (e)	Weekly sample from Searight's only	I-131
		*				Biweekly (f) when animals are on pasture; monthly at other times.	Biweekly (grazing) Monthly (indoors)	Gamma-scan Sr-89, Sr-90, I-131
		*						
		*						
		96(a)	10	10.4	Windsheimer's Farm			
		27	7	6.1	Brunton's Farm			

* BVPS ODCM, Appendix C, Table 3.12-1 requires three (3) dairies to be selected on basis of highest potential thyroid dose using milch census data. See Section 2-E for specific locations sampled.

Table 2-1 (Continued)

Operational Radiological Environmental Monitoring Program

	Type of Sample	Sample Points	Sector	Miles	Sample Point Description	Sample Frequency	Sample Preparation	Analysis
8	Fish	2A	13	0.2	BVPS Outfall Discharge	Semi-Annual	Composite of edible parts by species (g)	Gamma-scan
		49(a)	3	5.0	Upstream side of Montgomery Dam			
9	Food Crops					Annual at harvest if available	Composite of each sample species	Gamma-scan I-131 on green leafy vegetables
	(Shippingport)	10	3	1.0	Three locations within 5 miles selected by BVPS.			
	(Georgetown)	15	14	3.7				
	(Industry)	46	3	2.5				
		48(a)	10	16.3	Weirton, W.Va.			
10	Feedstuff and Summer Forage	25	10	2.1	Searight's Farm	Monthly	Monthly	Gamma-scan
11	Soil	13	11	1.4	Meyer's Farm	Every 3 years (1994, 1997, etc.)	12 Core Samples 3" Deep (2" Dia. at each location) (approx. 10' radius)	Gamma-scan
		30	4	0.5	Shippingport (S.S.)			
		46	3	2.5	Industry, Midway Dr.			
		32	15	0.8	Midland (S.S.)			
		48A(a)	10	15.6	Weirton, W.Va. – Weirton Water Tower, E. Belleview Dr.			
		51	5	8.0	Aliquippa (S.S.)			
		47	14	4.9	E. Liverpool, Oh. - Water Treatment Plant			
		27	7	6.1	Brunton's Farm			
		22	8	0.3	South of BVPS Transmission Line			
		29A	3	8.3	Nicol's Farm			
12	Precipitation	30	4	0.5	Shippingport (S.S.)	Weekly grab samples when available	Quarterly Composite (c)	Gamma-scan, H-3
		47	14	4.9	East Liverpool, Oh. - Water Treatment Plant			
		48	10	16.3	Weirton, W.Va. - Weirton Water Tower, Collier Way			

Table 2-1 - Notations

Operational Radiological Environmental Monitoring Program (Continued)

Notes:

(a) Control sample station: These are locations which are presumed to be outside the influence of plant effluents.

(b) Particulate samples are not counted within 24 hours after filter change. Perform gamma isotopic analysis on each sample when gross beta is > 10 times the yearly mean of control samples.

(c) Analysis composites are well mixed actual samples prepared of equal portions from each shorter term samples from each location.

(d) Composite samples are collected at intervals not exceeding 2 hours.

(e) Weekly milk sample from Searight's Dairy is analyzed for I-131 only.

(f) Milk samples are collected bi-weekly when animals are in pasture and monthly at other times.

(g) The fish samples will contain whatever species are available. If the available sample size permits, then the sample will be separated according to species and compositing will provide one sample of each species. If the available size is too small to make separation by species practical, then edible parts of all fish in the sample will be mixed to give one sample.

(h) Composite samples are obtained by collecting an aliquot at intervals not exceeding 2 hours at location 2.1. A weekly grab sample is obtained from daily composited grab samples obtained by the water treatment plant operator at location 5. For location 49, a weekly grab sample is obtained by a field technician.

(i) Two (2) TLDs are collected quarterly from each monitoring location.

2. Summary of Results

All results of this monitoring program are summarized in Table 2-2. This table is prepared in the format specified by NRC Regulatory Guide 4.8 and in accordance with Beaver Valley Power Station Offsite Dose Calculation Manual. Summaries of results of analysis of each media are discussed in Sections 2-B through 2-H and an assessment of radiation doses are given in Section 2-I. Table 2-3 summarizes Beaver Valley Power Station preoperational ranges for the various sampling media during the years 1974 and 1975. Comparisons of preoperational data with operational data indicate the ranges of values are generally in good agreement for both periods of time.

Activity detected was attributed to naturally occurring radionuclides, BVPS effluents, previous nuclear weapons tests or to the normal statistical fluctuation for activities near the lower limit of detection (LLD).

The conclusion from all program data is that the operation of the Beaver Valley Power Station has resulted in no significant changes to the environment.

3. Quality Control Program

The Quality Control Program implemented by the Beaver Valley Power Station to assure reliable performance by the contractor and the supporting QC data are presented and discussed in Section 4 of this report.

4. Program Changes

The following changes were implemented in the 2003 sampling program.

None

Table 2-2
Environmental Monitoring Program Results

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY
Name of Facility Beaver Valley Power Station Unit 1 and 2 Docket No. 50-334/50-412
Location of Facility Beaver, Pennsylvania Reporting Period Annual 2003
(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	Location with Highest Annual Mean ** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						Weirton, WV No. 48	
Water Precipitation (pCi/l)	Gamma (12)						
	Mn-54	5	LLD	--	--	--	0
	Fe-59	10	LLD	--	--	--	0
	Co-58	5	LLD	--	--	--	0
	Co-60	5	LLD	--	--	--	0
	Zn-65	10	LLD	--	--	--	0
	Zr/Nb-95	5	LLD	--	--	--	0
	Cs-134	5	LLD	--	--	--	0
	Cs-137	5	LLD	--	--	--	0
	Ba/La-140	10	LLD	--	--	--	0
	H-3 (12)	200	366 (5/12) (137-617)	30, Shippingport, (S.S.) 0.5 mi ENE	423 (4/4) (228-617)	LLD	0

* Nominal Lower Limit of Detection (LLD)
** Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f)
*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 Docket No. 50-334/50-412

Location of Facility Beaver, Pennsylvania Reporting Period Annual 2003

(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						Georgetown, PA No. 15	
Groundwater (pCi/l)	H-3 (6)	200	LLD	--	--	LLD	0
	Gamma (6)						
	Mn-54	5	LLD	--	--	--	0
	Fe-59	10	LLD	--	--	--	0
	Co-58	5	LLD	--	--	--	0
	Co-60	5	LLD	--	--	--	0
	Zn-65	10	LLD	--	--	--	0
	Zr/Nb-95	5	LLD	--	--	--	0
	Cs-134	5	LLD	--	--	--	0
	Cs-137	5	LLD	--	--	--	0
	Ba/La-140	10	LLD	--	--	--	0

* Nominal Lower Limit of Detection (LLD)

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

*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

Table 2-2 (Continued)

Environmental Monitoring Program Results

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 Docket No. 50-334/50-412

Location of Facility Beaver, Pennsylvania Reporting Period Annual 2003

(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
Drinking Water (pCi/l)	I-131 (106)	0.5	0.78 (73/106) (0.30-2.50)	4, Midland Water Treatment Plant 1.3 mi NNW	0.80 (37/53) (0.30-2.10)	--	0
	H-3 (8)	200	LLD		LLD	--	0
	Gamma (24)						
	Mn-54	5	LLD	--	--	--	0
	Fe-59	10	LLD	--	--	--	0
	Co-58	5	LLD	--	--	--	0
	Co-60	5	LLD	--	--	--	0
	Zn-65	10	LLD	--	--	--	0
	Zr/Nb-95	5	LLD	--	--	--	0
	Cs-134	5	LLD	--	--	--	0
	Cs-137	5	LLD	--	--	--	0
	Ba/La-140	10	LLD	--	--	--	0

* Nominal Lower Limit of Detection (LLD)

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

*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

Table 2-2 (Continued)

Environmental Monitoring Program Results

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 **Docket No.** 50-334/50-412

Location of Facility Beaver, Pennsylvania **Reporting Period** Annual 2003

(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						49, Upstream side of Montgomery Dam	
Surface Water (pCi/l)	I-131 (52)	0.5	0.90 (43/52) (0.20-3.90)	One Sample Locatic		One sample location	0
	H-3 (12)	200	LLD	--	--	LLD	0
	Gamma (36)						
	Mn-54	5	LLD	--	--	--	0
	Fe-59	10	LLD	--	--	--	0
	Co-58	5	LLD	--	--	--	0
	Co-60	5	LLD	--	--	--	0
	Zn-65	10	LLD	--	--	--	0
	Zr/Nb-95	5	LLD	--	--	--	0
	Cs-134	5	LLD	--	--	--	0
	Cs-137	5	LLD	--	--	--	0
	Ba/La-140	15	LLD	--	--	--	0
	Ra-226	(a)	LLD	--	--	--	0
	Th-228	(a)	LLD	--	--	--	0

(a) LLD for this nuclide for water not required by ODCM.

* Nominal Lower Limit of Detection (LLD)

** Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is cated in parentheses (f)

*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

Table 2-2 (Continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 **Docket No.** 50-334/50-412

Location of Facility Beaver, Pennsylvania **Reporting Period** Annual 2003

(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						Montgomery Dam No. 49	
Sediment (pCi/g) (dry weight)	Gamma (6)						
	K-40	(a)	11.51 (6/6) (8.95-15.18)	49, Upstream side of Montgomery Dam 5.0 mi NE	13.48 (2/2) (11.77-15.18)	Same as High Location	0
	Co-58	(a)	0.59 (2/6) (0.27-0.91)	2A, BVPS Outfall 0.2 mi W	0.59 (2/2) (0.27-0.91)	None Detected	0
	Co-60	(a)	0.62 (2/6) (0.22-1.01)	2A, BVPS Outfall 0.2 mi W	0.62 (2/2) (0.22-1.01)	None Detected	0
	Cs-134	0.06	--	--	--	None Detected	0
	Cs-137	0.08	0.15 (6/6) (0.09-0.40)	50, Upstream Side of New Cumberland Dam 11.8 mi WSW	0.25 (2/2) (0.10-0.40)	0.12 (2/2) 0.11-0.13	0
	Ra-226	(a)	1.96 (6/6) (1.39-2.29)	49, Upstream side of Montgomery Dam 5.0 mi NE	2.21 (2/2) (2.13-2.29)	Same as High Location	0

(a) LLD for this nuclide for Sediment not required by ODCM

* Nominal Lower Limit of Detection (LLD)

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

*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 Docket No. 50-334/50-412
Location of Facility Beaver, Pennsylvania Reporting Period Annual 2003
(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						Windsheimer No. 96 10.4 mi SSW	
Milk (pCi/l)	I-131 (163)	0.5	0.8 (18/163) (0.4-3.5)	25, Searight's Farm 2.1 mi SSW	1.6 (4/52) (0.4-3.5)	0.4 (1/20)	0
	Sr-89 (131)	2.0	--	--	--	--	
	Sr-90 (131)	0.7	1.7 (124/131) (0.6-4.1)	69 Collins 3.5 mi SE	2.8 (18/18) (1.2-4.1)	1.2 (19/20) (0.8-1.5)	0
	Gamma (131)						
	K-40	(a)	1420 (131/131) (1069/2027)	69 Collins 3.5 mi SE	1658 (18/18) (1502-2027)	1387 (20/20) (1260-1520)	0
	Cs-134	5	LLD	--	--	--	0
	Cs-137	5	LLD	--	--	--	0
	Ba/La-140	10	LLD	--	--	--	0

(a) LLD for this nuclide for Milk not required by ODCM

* Nominal Lower Limit of Detection (LLD)
** Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f)
*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

Table 2-2 (Continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 **Docket No.** 50-334/50-412

Location of Facility Beaver, Pennsylvania **Reporting Period** Annual 2003

(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						Weirton, WV No. 48 (b)	
Food and Garden Crops (pCi/g) (wet weight)	I-131 (4)	0.06	LLD	--	--	--	0
	Gamma (4)						
	K-40	(a)	2.01 (4/4) (1.8-2.2)	48, Weirton, WV, Weirton Water Tower, 16.3 SSW (b)	2.2 (1/1)	1.8 (1/1)	0
	Cs-134	0.06	LLD	--	--	--	0
	Cs-137	0.06	LLD	--	--	--	0

(a) LLD for this nuclide for Food and Garden Crops not required by ODCM
(b) Exact location depends on availability of food products

* Nominal Lower Limit of Detection (LLD)
** Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f)
*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

Table 2-2 (Continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 **Docket No.** 50-334/50-412

Location of Facility Beaver, Pennsylvania **Reporting Period** Annual 2003
(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
				Upstream Montgomery Dam No. 49			
Fish (pCi/g) (wet weight)	Gamma (9)						
	Mn-54	0.05	LLD	--	--	--	0
	Fe-59	0.10	LLD	--	--	--	0
	Co-58	0.05	LLD	--	--	--	0
	Co-60	0.05	LLD	--	--	--	0
	Zn-65	0.10	LLD	--	--	--	0
	Cs-134	0.05	LLD	--	--	--	0
	Cs-137	0.06	LLD	--	--	--	0

* Nominal Lower Limit of Detection (LLD)
** Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f)
*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

Table 2-2 (Continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 **Docket No.** 50-334/50-412

Location of Facility Beaver, Pennsylvania **Reporting Period** Annual 2003
(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						Weirton, WV No. 48	
External Radiation (mR/day)	Gamma (176)	0.05	0.20 (176/176) (0.13-0.26)	84, Hancock Co. Parks & Recreation Center 8.3 mi SW	0.23 (4/4) (0.23-0.24)	0.21 (4/4) (0.20-0.22)	0
Feed and Forage (pCi/g) (wet)	Gamma (12)						
	Be-7	(a)	3.9 (7/12) (0.7-9.8)	One sample location	--	One sample location	0
	K-40	(a)	6.6 (12/12) (1.6-6.6)	One sample location	--	One sample location	0
	I-131	(a)	None Detected	One sample location	--	One sample location	0
	Cs-134	(a)	None Detected	One sample location	--	One sample location	0
	Cs-137	(a)	None Detected	One sample location	--	One sample location	0

(a) LLD for this nuclide for Feed and Forage not required by ODCM

* Nominal Lower Limit of Detection (LLD)
** Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f)
*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 Docket No. 50-334/50-412
Location of Facility Beaver, Pennsylvania Reporting Period Annual 2003
(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						Weirton, WV No. 48	
Air Particulate and Radioiodine	Gross Beta (520)	2	26 (520/520) (13-48)	51, Aliquippa (S.S.) 8.0 mi E	29 (52/52) (14-48)	25 (52/52) (15-39)	0
(X10-3 pCi/Cu.M.)	I-131(520)	< 0.04	LLD	--	--	--	0
	Gamma (40)						
	Be-7	(a)	66 (40/40) (45-78)	51, Aliquippa (S.S.) 8.0 mi E	66 (4/4) (54-73)	62 (4/4) (51-74)	0
	Cs-134	0.5	LLD	--	--	--	0
	Cs-137	0.5	LLD	--	--	--	0

(a) LLD for this nuclide for Air Particulate not required by ODCM

* Nominal Lower Limit of Detection (LLD)
** Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses (f)
*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name of Facility Beaver Valley Power Station Unit 1 and 2 **Docket No.** 50-334/50-412

Location of Facility Beaver, Pennsylvania **Reporting Period** Annual 2003
(County, State)

Medium of Pathway Sampled (Unit of Measurement)	Type and Total Number of Analysis Performed	Lower Limit of Detection * (LLD)	All Indicator Locations ** Mean (f) ** Range	Location with Highest Annual Mean Name Distance and Directions	** Mean (f) ** Range	Control Locations ** Mean (f) ** Range	Number of Nonroutine Reported Measurements***
						Weirton, WV No. 48A	
Soil (pCi/g) (dry weight)	Gamma (10)						
	K-40	(a)	12.3 (10/10) (9.0-16.5)	22, South of BVPS, Transmission Line 0.3 mi SSE	16.5 (1/1) --	15.0 (1/1) --	0
	Cs-134	0.06	LLD	--	--	--	0
	Cs-137	0.08	0.22 (10/10) (0.14-0.34)	32, Midland, PA 0.8 mi NW	0.34 (1/1) --	0.17 (1/1) --	0
	Ra-226	(a)	2.00 (10/10) (1.38-2.69)	29A, Nichol's 8.3 mi NE	2.69 (1/1) --	2.32 (1/1) --	0
	Th-228	(a)	LLD	--	--	--	0

(a) LLD for this nuclide for Sediment not required by ODCM

* Nominal Lower Limit of Detection (LLD)

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

*** Nonroutine reported measurements are defined in Regulatory Guide 4.8 (December 1975).

Table 2-3

Pre-Operational Environmental Radiological Monitoring Program Summary

Name of Facility Beaver Valley Power Station **Docket No.** 50-334

Location of Facility Beaver, Pennsylvania **Reporting Level** CY 1974 - 1975
(County) (State)

Pre-Operational Program Summary (Combined 1974 - 1975)

Medium or Pathway Sampled (Unit of Measurement)	Analysis and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean, (f) Range		
Sediments pCi/g (dry)	Gross Alpha	(0)	--		--	
	Gross Beta	(33)	1	18	(33/33)	5 - 30
	Sr-90	(0)	--		--	
	U-234, 235, 238	(0)	--		--	
	Gamma	(33)	--	13	(33/33)	2 - 30
	K-40		1.5	13	(33/33)	2 - 30
	Cs-137		0.1	0.4	(21/33)	0.1 - 0.6
	Zr/Nb-95		0.05	0.8	(12/33)	0.2 - 3.2
	Ce-144		0.3	0.5	(3/33)	0.4 - 0.7
	Ru-106(a)		0.3	1.5	(3/33)	1.3 - 1.8
	Others		--		< LLD	
Foodstuff pCi/g (dry)	Gamma	(8)	--		--	
	K-40		1	33	(8/8)	10 - 53
	Cs-137		0.1	0.2	(1/8)	--
	Zr/Nb-95		0.05	0.2	(1/8)	--
	Ru-106(a)		0.3	0.8	(1/8)	--
	Others		--		< LLD	
Feedstuff pCi/g (dry)	Gross Beta	(80)	0.05	19	(80/80)	8 - 50
	Sr-89	(81)	0.025	0.2	(33/81)	0.04 - 0.93
	Sr-90	(81)	0.005	0.4	(78/81)	0.02 - 0.81
	Gamma	(81)	--		--	
	K-40		1	19	(75/81)	5 - 46
	Cs-137		0.1	0.5	(6/81)	0.2 - 1.6
	Ce-144		0.3	1.5	(5/81)	0.9 - 2.6
	Zr/Nb-95		0.05	0.8	(13/81)	0.2 - 1.8
	Ru-106(a)		0.3	1.4	(12/81)	0.6 - 2.3
	Others		--		< LLD	
Soil pCi/g (dry) (Template Samples)	Gross Alpha	(0)	--		--	
	Gross Beta	(64)	1	22	(64/64)	14 - 32
	Sr-89	(64)	0.25	0.4	(1/64)	--
	Sr-90	(64)	0.05	0.3	(48/64)	0.1 - 1.3
	U-234, 235, 238	(0)	--		--	
	Gamma	(64)	--		--	
	K-40		1.5	13	(63/64)	5 - 24
	Cs-137		0.1	1.5	(56/64)	0.1 - 6.8
	Ce-144		0.3	1.1	(7/64)	0.2 - 3
	Zr/Nb-95		0.05	0.3	(13/64)	0.1 - 2
	Ru-106(a)		0.3	1.1	(3/64)	0.5 - 2
	Others		--		< LLD	

(f) Fraction of detectable measurements at specified location.

Table 2-3 (Continued)

Pre-Operational Environmental Radiological Monitoring Program Summary

Name of Facility Beaver Valley Power Station **Docket No.** 50-334

Location of Facility Beaver, Pennsylvania **Reporting Level** CY 1974 - 1975
(County) (State)

Pre-Operational Program Summary (Combined 1974 - 1975)

Medium or Pathway Sampled (Unit of Measurement)	Analysis and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean, (f) Range		
Soil	Gross Alpha	(0)	--		--	
pCi/g (dry)	Gross Beta	(8)	1	21	(8/8)	16 - 28
(Core Samples)	Sr-89	(8)	0.25		< LLD	
	Sr-90	(8)	0.05	0.2	(5/8)	0.08 - 0.5
	Gamma	(8)	--		--	
	K-40		1.5	13	(8/8)	7 - 20
	Cs-137		0.1	1.2	(7/8)	0.2 - 2.4
	Co-60		0.1	0.2	(1/8)	--
	Others		--		< LLD	
Surface Water	Gross Alpha	(40)	0.3	0.75	(5/40)	0.6 - 1.1
pCi/l	Gross Beta	(120)	0.6	4.4	(120/120)	2.5 - 11.4
	Gamma	(1)	10 - 60		< LLD	
	Tritium	(121)	100	300	(120/121)	180 - 800
	Sr-89	(0)	--		--	
	Sr-90	(0)	--		--	
	C-14	(0)	--		--	
Drinking Water	I-131	(0)	--		--	
pCi/l	Gross Alpha	(50)	0.3	0.6	(4/50)	0.4 - 0.8
	Gross Beta	(208)	0.6	3.8	(208/208)	2.3 - 6.4
	Gamma	(0)	--		--	
	Tritium	(211)	100	310	(211/211)	130 - 1000
	C-14	(0)	--		--	
	Sr-89	(0)	--		--	
	Sr-90	(0)	--		--	
Ground Water	Gross Alpha	(19)	0.3		< LLD	
pCi/l	Gross Beta	(76)	0.6	2.9	(73/75)(b)	1.3 - 8.0
	Tritium	(81)	100	440	(77/81)	80 - 800
	Gamma	(1)	10 - 60		< LLD	
Air Particulates and Gaseous	Gross Alpha	(188)	0.001	0.003	(35/188)	0.002 - 0.004
pCi/m^3	Gross Beta	(927)	0.006	0.07	(927/927)	0.02 - 0.32
	Sr-89	(0)	--		--	
	Sr-90	(0)	--		--	
	I-131	(816)	0.04	0.08	(2/816)	0.07 - 0.08
	Gamma	(197)	--		--	
	Zr/Nb-95		0.005	0.04	(122/197)	0.01 - 0.16
	Ru-106		0.010	0.04	(50/197)	0.02 - 0.09
	Ce-141		0.010	0.02	(3/197)	0.01 - 0.04
	Ce-144		0.010	0.02	(44/197)	0.01 - 0.04
	Others				< LLD	

(f) Fraction of detectable measurements at specified location.

Table 2-3 (Continued)

Pre-Operational Environmental Radiological Monitoring Program Summary

Name of Facility Beaver Valley Power Station **Docket No.** 50-334

Location of Facility Beaver, Pennsylvania **Reporting Level** CY 1974 - 1975
(County) (State)

Pre-Operational Program Summary (Combined 1974 - 1975)

Medium or Pathway Sampled (Unit of Measurement)	Analysis and Total Number of Analysis Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean, (f) Range		
Milk pCi/l	I-131 Sr-89 Sr-90 Gamma Cs-137 Others	(91) (134) (134) (134)	0.25 5 1 -- 10	0.6 7 5.3 13	(4/91) (4/134) (132/134) -- (19/134) < LLD	0.3 - 0.8 6 - 11 1.5 - 12.8 11 - 16
External Radiation mR/day	γ - Monthly γ - Quarterly γ - Annual	(599) (195) (48)	0.5 mR* 0.5 mR* 0.5 mR*	0.20 0.20 0.19	(599/599) (195/195) (48/48)	0.08 - 0.51 0.11 - 0.38 0.11 - 0.30
Fish pCi/g (wet)	Gross Beta Sr-90 Gamma K-40 Others	(17) (17) (17)	0.01 0.005 0.5 -- --	1.9 0.14 2.4 	(15/17) (17/17) (17/17) < LLD	1.0 - 3.2 0.02 - 0.50 1.0 - 3.7

* LLD in units of mR - Lower end of useful integrated exposure detectability range for a passive radiation detector (TLD).

(a) May include Ru-106, Ru-103, Be-7.

(b) One outlier not included in mean. (Water taken from dried-up spring with high sediment and potassium content. Not considered typical groundwater sample).

(f) Fraction of detectable measurements at specified location.

B. Air Monitoring

1. Characterization of Air and Meteorology

The air in the vicinity of the site contains pollutants typical for an industrial area. Air flow is generally from the southwest in summer and from the northwest in the winter.

2. Air Sampling Program and Analytical Techniques

a. Program

The air is sampled for gaseous radioiodine and radioactive particulates at each of ten (10) offsite air sampling stations. The locations of these stations are listed in Table 2-1 and shown on a map in Figure 2-1.

Samples are collected at each of these stations by continuously drawing two cubic feet per minute of atmosphere air through a glass fiber filter and through a charcoal cartridge. The former collects airborne particulates; the latter is for radioiodine sampling. Samples are collected for analysis on a weekly basis.

The charcoal is used in the weekly analysis of airborne I-131. The filters are analyzed each week for gross beta, then composited by station for quarterly analysis by gamma spectrometry. In order to reduce interference from natural radon and thoron radioactivities, all filters are allowed to decay for a few days after collection prior to counting for beta in a low background counting system.

b. Procedures

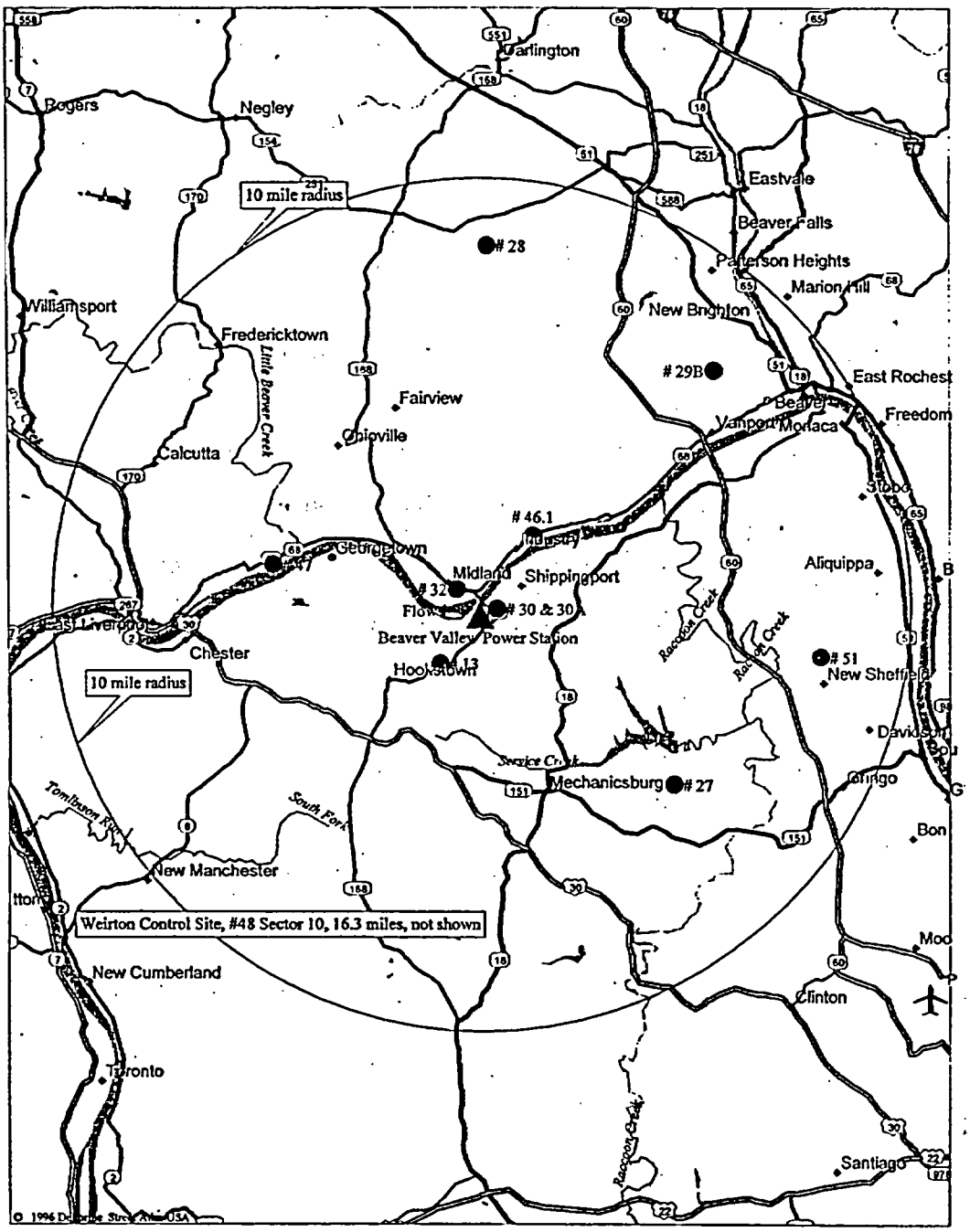
Gross beta analysis is performed by placing the filter paper from the weekly air sample in a 2" planchet and counting it in a low background, gas flow proportional counter.

Gamma emitters are determined by stacking all the filter papers from each monitoring station collected during the quarter and scanning this composite on a high resolution germanium gamma spectrometer.

Radioiodine (I-131) analysis is performed by a gamma scan of the charcoal in a weekly charcoal cartridge.

Figure 2-1

Air Sampling Stations



Site No.	Sector	Distance (miles)	Location	Site No.	Sector	Distance (miles)	Location
13	11	1.4	Meyer's Farm	32	15	0.8	Midland (S.S.)
27	7	6.1	Brunton's Farm	46.1	3	2.3	Industry Rt. 68 – Garage
28	1	8.6	Sherman's Farm	47	14	4.9	East Liverpool, Oh. - Water Treatment Plant
29B	3	8.0	Beaver Valley Geriatric Center	48	10	16.3	Weirton, W.Va. – Weirton Water Tower, Collier Way
30	4	0.5	Shippingport (S.S.)	51	5	8.0	Aliquippa (S.S.)
30A	4	0.5	Shippingport (S.S.)				

3. Results and Conclusions

A summary of data is presented in Table 2-2.

a. Airborne Radioactive Particulates

A total of five hundred thirty (520) weekly samples from ten (10) locations were analyzed for gross beta. Results were comparable to previous years. Figure 2-2 illustrates the weekly average concentration of gross beta in air particulates.

The weekly air particulate samples were composited to forty (40) quarterly samples which were analyzed by gamma spectrometry. Naturally occurring beryllium-7 (Be-7) was present in all samples. No other radionuclides were detected. Results are listed in the summary Table 2-2.

Based on the analytical results, the operation of Beaver Valley Power Station did not contribute any measurable increase in air particulate radioactivity during 2003.

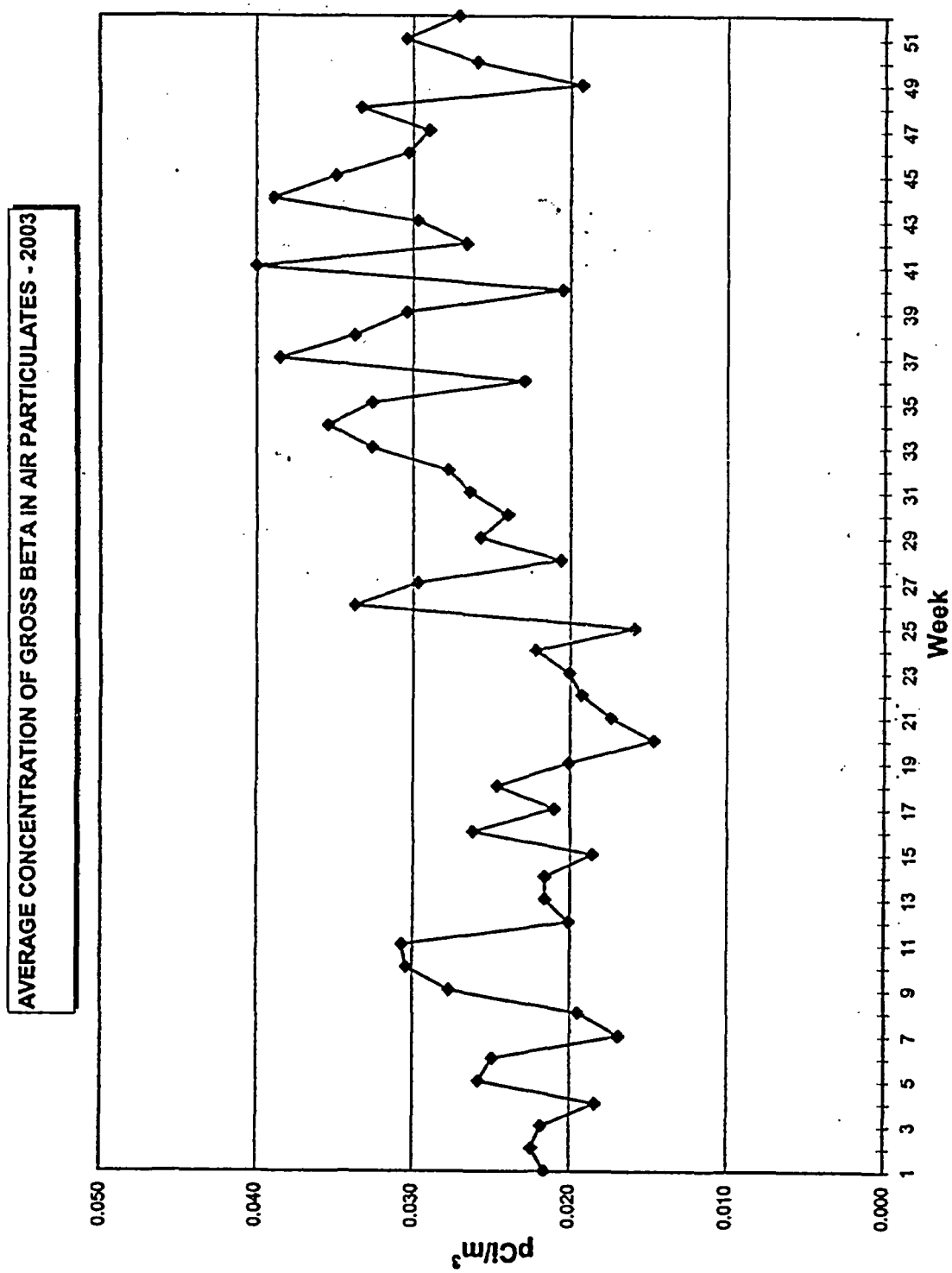
b. Radioiodine

A total of five hundred thirty (520) weekly charcoal filter samples were analyzed for I-131. No detectable concentrations were present at any locations.

Based on analytical results, the operation of Beaver Valley Power Station did not contribute any measurable increase in airborne radioiodine during 2003.

Figure 2-2

Average Concentration of Gross Beta in Air Particulates



C. Monitoring of Sediments and Soils

1. Characterization of Stream Sediments and Soils

The stream sediments consist largely of sand and silt. Soil samples may vary from sand and silt to a heavy clay with variable amounts of organic material.

2. Sampling Program and Analytical Techniques

a. Program

River bottom sediments were collected semi-annually above the Montgomery Dam, in the vicinities of the Beaver Valley discharge and above the New Cumberland Dam. A Ponar or Eckman dredge is used to collect the sample. The sampling locations are also listed in Table 2-1 and are shown in Figure 2-3.

Soil samples were collected at each of ten (10) locations during 2003. At each location, 12 core samples (3" diameter by 2" deep) are gathered at prescribed points on a 10 foot radius circle. Each location is permanently marked with reference pins. Each set of samples is systematically selected by moving along the radius in such a manner as to assure representative undisturbed samples. Sampling locations are listed in Table 2-1 and are shown in Figure 2-3.

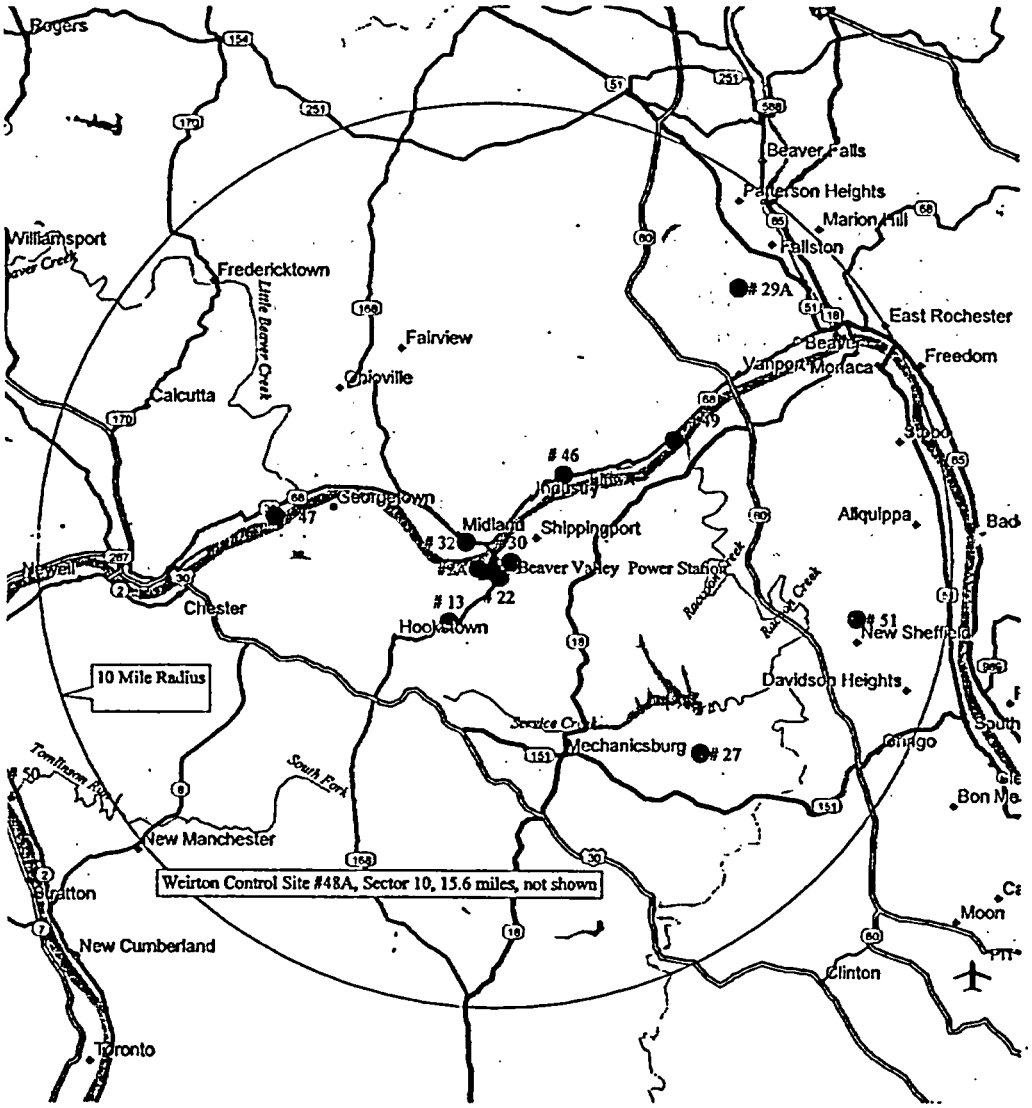
Bottom sediments and soils are analyzed for gamma-emitting radionuclides.

b. Analytical Procedures

Gamma analysis of sediment or soil is performed in a 300 ml plastic bottle which is counted by a gamma spectrometer.

Figure 2-3

Environmental Monitoring Locations - Shoreline Sediments and Soil



SOIL SAMPLING LOCATIONS							
Site No.	Sector	Distance (miles)	Location	Site No.	Sector	Distance (miles)	Location
13	11	1.4	Meyer's Farm	32	15	0.8	Midland (S.S.)
22	8	0.3	South of BVPS Transmission Line	46	3	2.5	Industry, Midway Dr.
27	7	6.1	Brunton's Farm	47	14	4.9	East Liverpool, Oh. - Water Treatment Plant
29A	3	8.3	Nicols Farm	48A	10	15.6	Weirton, W.Va. - Weirton Water Tower, E. Belleview Dr.
30	4	0.5	Shippingport (S.S.)	51	5	8.0	Aliquippa (S.S.)

SEDIMENT SAMPLING LOCATIONS							
Site No.	Sector	Distance (miles)	Location	Site No.	Sector	Distance (miles)	Location
2A	13	0.2	BVPS Outfall Discharge	50	12	11.8	Upstream Side of New Cumberland Dam
49	3	5.0	Upstream Side of Montgomery Dam				

3. Results and Conclusions

A summary of sediment analysis is presented in Table 2-2.

a. Sediment

A total of six (6) samples were analyzed by gamma spectrometry. Naturally occurring K-40 was detected in all six samples. Ra-226 was detected in all six samples. Small amounts of Cs-137 from previous nuclear weapons tests were detected in all six river sediment samples, including two upstream above Montgomery Dam, which is unaffected by plant effluents. Small amounts of Co-58 and Co-60 were detected in the Beaver Valley Power Station discharge area and are attributable to station releases. The activity detected in the station discharge area is consistent with station data of authorized radioactive discharges which were within limits permitted by the NRC license. Co-58 and Co-60 were not detected at the control location upstream from and beyond the influence of the plant.

The positive results detected are attributable to authorized releases from the Beaver Valley Power Station and are characteristic of the effluent. These results confirm that the station assessments, prior to authorizing radioactive discharges, are adequate and that the radiological environmental monitoring program is sufficiently sensitive.

b. Soil

A total of ten (10) samples were analyzed by gamma spectrometry. Naturally occurring K-40 and Ra-226 were detected in every sample. Small amounts of Cs-137 from previous nuclear weapons tests were detected in all ten samples including the control station (Weirton, WV). When compared against pre-operational values and previous samples, the Cs-137 is trending down.

D. Monitoring of Feedcrops and Food Products

1. Characterization of Farm Products

According to the latest data from the Agricultural Statistics 2002-2003, there were approximately 650 farms in Beaver County. Total cash receipts from the sale of agricultural crops and livestock was $23,584,000. The principal source of revenue was in dairy products which was estimated at $5,930,000. Revenues from other farm products were estimated as follows:

Field Crops	$1,818,000
Fruits	$256,000
Horticulture and Mushrooms	$4,621,000
Vegetables and Potatoes	$528,000
Poultry and Meat Products	$3,067,000

2. Sampling Program and Analytical Techniques

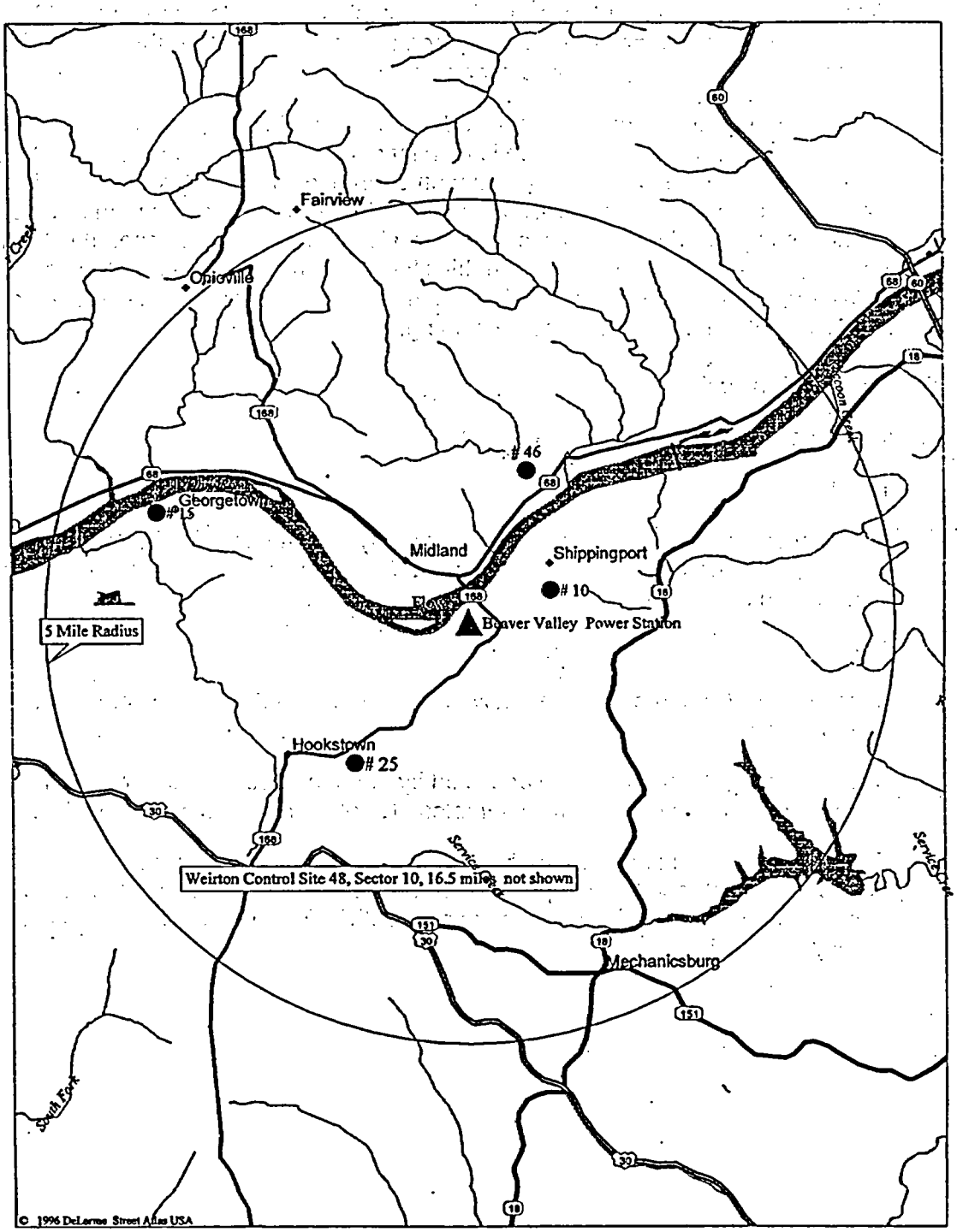
a. Program

Representative samples of cattle feed are collected monthly from the nearest dairy (Searight). See Figure 2-4. Each sample is analyzed by gamma spectrometry.

Food products (vegetables) were collected at garden locations during the summer of 2003. Leafy vegetables, i.e., cabbage, were obtained from Shippingport, Georgetown, Industry, PA, and Weirton, W.Va. All samples were analyzed for gamma emitters by gamma spectroscopy. Samples were also analyzed by radiochemical analysis for I-131.

Figure 2-4

Environmental Monitoring Program - Feedcrop and Food Product Locations



Sample Type	Site No.	Location
Food	10	Shippingport
Food	15	Georgetown
Food	46	Industry
Food	48	Weirton, W.Va.
Feed	25	Searight's Dairy

b. Procedures

Gamma emitters in feed are determined by scanning a dried, homogenized sample with the gamma spectroscopy system. A high resolution germanium detector is utilized with this system. Food samples are loaded into tared 300 or 150 ml plastic bottles or 1-liter Marinelli containers, weighed and the net weight of the sample is determined prior to scanning for gamma emitters.

I-131 in food crops is determined by radiochemistry. Stable iodide carrier is first added to a chopped sample which is then leached with sodium hydroxide solution, evaporated to dryness and fused in a muffle furnace. The melt is dissolved in water, filtered and treated with sodium hypochlorite. The iodate is then reduced to iodine with hydroxylamine hydrochloride and is extracted into toluene. It is then back-extracted as iodide into sodium bisulfite solution and is precipitated as palladium iodide. The precipitate is weighed for chemical yield and is mounted on a nylon planchet for low level beta counting.

3. Results and Conclusions

A summary of data is presented in Table 2-2.

a. Feed

A total of twelve (12) samples were analyzed by gamma spectroscopy. Only naturally occurring nuclides were identified, for example: K-40 in all the samples and Be-7 in seven (7).

b. Food

A total of four (4) samples were analyzed for I-131. No detectable concentrations were present.

A total of four (4) samples were analyzed by gamma spectrometry. Naturally occurring K-40 was present in all samples. No other nuclides were identified.

c. The data from food and feed analyses were consistent with previous data. Based on the analytical results, the operation of the Beaver Valley Power Station did not contribute any measurable increase in radioactivity in the foods and feeds in the vicinity of the site.

E. Monitoring of Local Cows Milk

1. Description - Milch Animal Locations

Samples of fresh milk are obtained from milch animals at locations and frequencies noted in Table 2-1. This milk is analyzed for its radioiodine content, gamma emitters, and strontium-89 and strontium-90.

Detailed field surveys are performed during the grazing season to locate and enumerate milch animals within a five (5) mile radius of the site. Survey data for the most recent survey conducted is shown in Section 3, Land Use Census.

2. Sampling Program and Analytical Techniques

a. Program

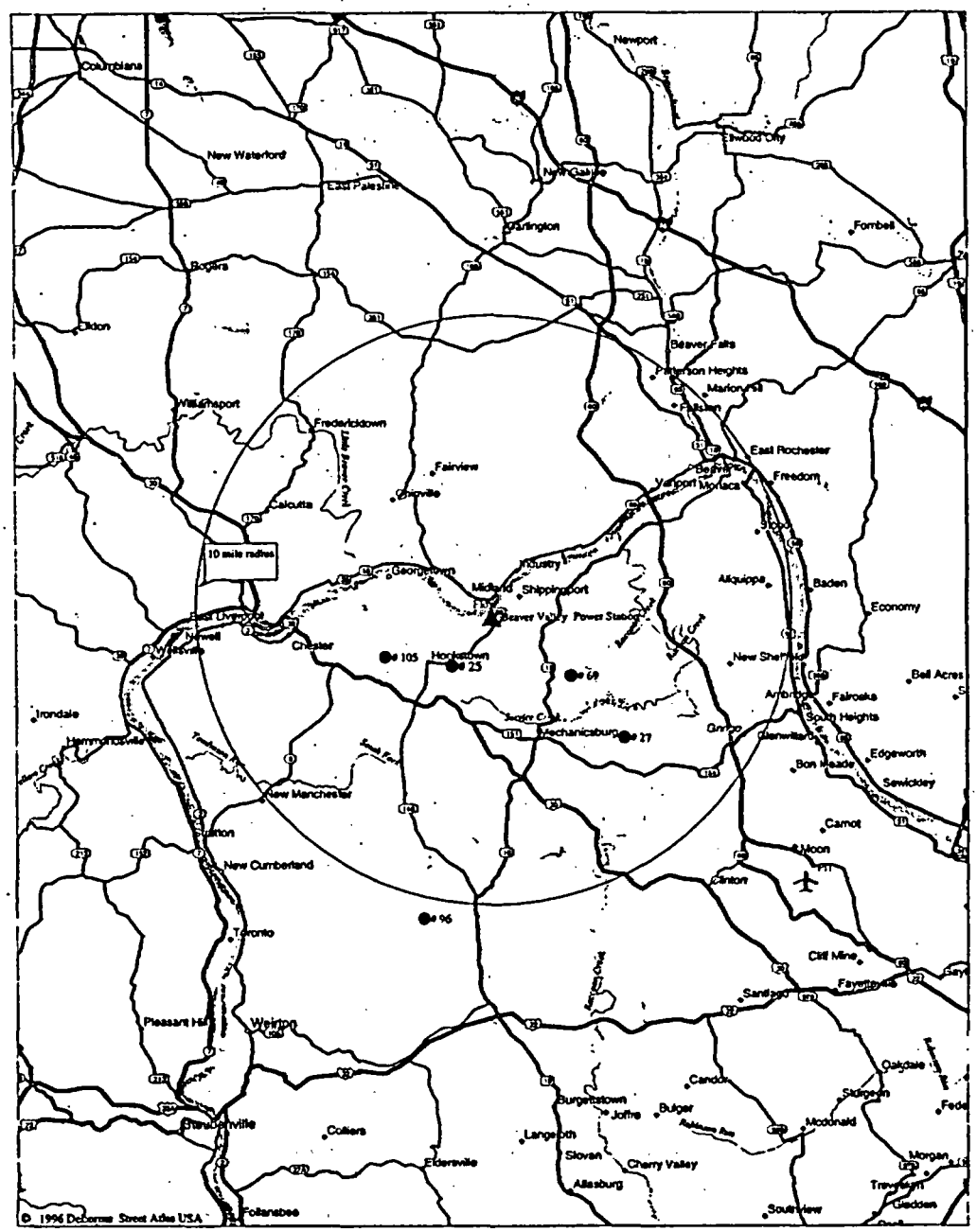
Milk was collected from two (2) reference dairy farms (Searight's and Brunton's) within a 10-mile radius of the site and from one (1) control location (Windsheimer's) outside of the 10-mile radius. Additional dairies, which represent the highest potential milk pathway for radioiodine based on milch animal surveys and meteorological data, were selected and sampled. These dairies are subject to change based upon availability of milk or when more recent data (milch animal census) indicate other locations are more appropriate. The location of each is shown in Figure 2-5 and described below.

Site	Dairy	Approximate Number of Animals being Milked	Direction and Distance from Midpoint of Unit 1 Reactor	Collection Period
25	Searight	34 Cows	2.10 miles SSW	Jan. - Dec.
27	Brunton	94 Cows	6.12 miles SE	Jan. - Dec.
69*	Collins	5 Goats	3.53 miles SE	Jan. – Dec.
96	Windsheimer	66 Cows	10.4 miles SSW	Jan. - Dec.
103*	Halstead	60 Cows	5.17 miles SSW	Aug. – Dec.
105*	Ambrose	20 Cows	3.89 miles WSW	Jan. - Dec.
* Highest potential pathway dairies				

The sample from Searight Dairy is collected and analyzed weekly for radioiodine using a procedure with a high sensitivity. Samples from each of the other selected dairies are collected monthly when cows are indoors, and bi-weekly when cows are grazing. This monthly or bi-weekly sample is analyzed for Sr-89, Sr-90, gamma emitters including Cs-137 (by high resolution germanium gamma spectroscopy) and I-131 (high sensitivity analysis).

Figure 2-5

Environmental Monitoring Locations - Milk



Site No.	Sector	Distance (miles)	Location	Site No.	Sector	Distance (miles)	Location
25	10	2.1	Searight's Farm	103*	10	5.2	Halstead Farm
27	7	6.1	Brunton's Farm	105*	12	3.8	Ambrose Farm
69*	7	3.4	Collins				
96	10	10.4	Windsheimer's Farm				

* Dairies selected based on highest deposition factors.

b. Procedure

Radioiodine (I-131) analysis in milk was performed using chemically prepared samples and analyzed with a low-level beta counting system.

Gamma emitters are determined by gamma spectroscopy of a 1 liter Marinelli container of milk.

Strontium milk samples are prepared by adding stable strontium carrier and evaporating to dryness, then ashing in a muffle furnace, followed by precipitating phosphates. Strontium is purified in all samples by the Argonne method using 3 grams of extraction material in a chromatographic column. Stable yttrium carrier is added and the sample is allowed to stand for a minimum of 5 days for the ingrowth of yttrium-90 (Y-90). Yttrium is then precipitated as hydroxide, is dissolved and re-precipitated as oxalate. The yttrium oxalate is mounted on a nylon planchet and is counted in a low-level beta counter to infer Sr-90 activity. Sr-89 activity is determined by precipitating strontium carbonate ($SrCO_3$) from the sample after yttrium separation. This precipitate is mounted on a nylon planchet and is covered with an 80 mg/cm^2 aluminum absorber for low level beta counting. Chemical yields of strontium and yttrium are determined gravimetrically.

3. Results and Conclusions

A summary of data is presented in Table 2-2.

a. A total of one hundred thirty-one (131) samples were analyzed for Sr-89 and Sr-90. Sr-90 was detected in one hundred twenty-four (124) samples at levels attributable to previous nuclear weapons tests and are within the normally expected range.

b. A total of one hundred thirty-one (131) samples were analyzed by gamma spectroscopy. Naturally occurring K-40 was present in all samples. No other radionuclides were identified.

c. A total of one hundred and sixty-three (163) samples were analyzed for I-131 during 2003. Of the eighteen (18) positive I-131 results, fourteen (14) were less than or equal to 1.0 pCi/l LLD value. Three (3) of the remaining values were less than or equal to 0.6 above the LLD value.

d. Based on all the analytical results and the above investigation, the operation of the Beaver Valley Power Station did not contribute any measurable increase in radioactivity in the milk in the vicinity of the site.

F. Environmental Radiation Monitoring

1. Description of Regional Background Radiation and Sources

The terrain in the vicinity of the Beaver Valley Power Station generally consists of rough hills with altitude variations of 300-400 feet. Most of the land is wooded.

The principal geologic features of the region are nearly flat-laying sedimentary beds of the Pennsylvania Age. Beds of limestone alternate with sandstone and shale with abundant interbedded coal layers. Pleistocene glacial deposits partially cover the older sedimentary deposits in the northwest. Most of the region is underlain by shale, sandstone, and some coal beds of the Conemaugh Formation. Outcrops of sandstone, shale, and limestone of the Allegheny Formation exist within the Ohio River Valley and along major tributary streams.

Based on surveys reported in previous annual reports, exposure rates ranged from 6-12 μR/hr. Results for 2003 indicated that background radiation continued in this range.

2. Locations and Analytical Procedures

Ambient external radiation levels around the site were measured using thermoluminescent dosimeters (TLDs).

In 2003 there were a total of forty-four (44) offsite environmental TLD locations. The locations of the TLDs are shown in Figure 2-6.

The TLDs were annealed at the Contractor Central Laboratory shortly before placing the TLDs in their field locations. The radiation dose accumulated in-transit between the Central Laboratory, the field location, and the Central Laboratory was corrected by transit controls maintained in lead shields at both the Central Laboratory and the field office. All dosimeters were exposed in the field in a special environmental holder.

3. Results and Conclusions

Data obtained with the contractor TLD during 2002 are summarized in Table 2-2.

The annual exposure rate of all offsite TLDs averaged 0.197 mR/day in 2003. As in previous years, there was some variation among locations and seasons as would be expected. In 2003, ionizing radiation dose determinations from TLDs averaged 71.6 mR for the year. This is comparable to previous years. There was no evidence of anomalies that could be attributed to the operation of the Beaver Valley Power Station. The TLDs confirm that changes from natural radiation levels, if any, are negligible.

Figure 2-6

TLD Locations

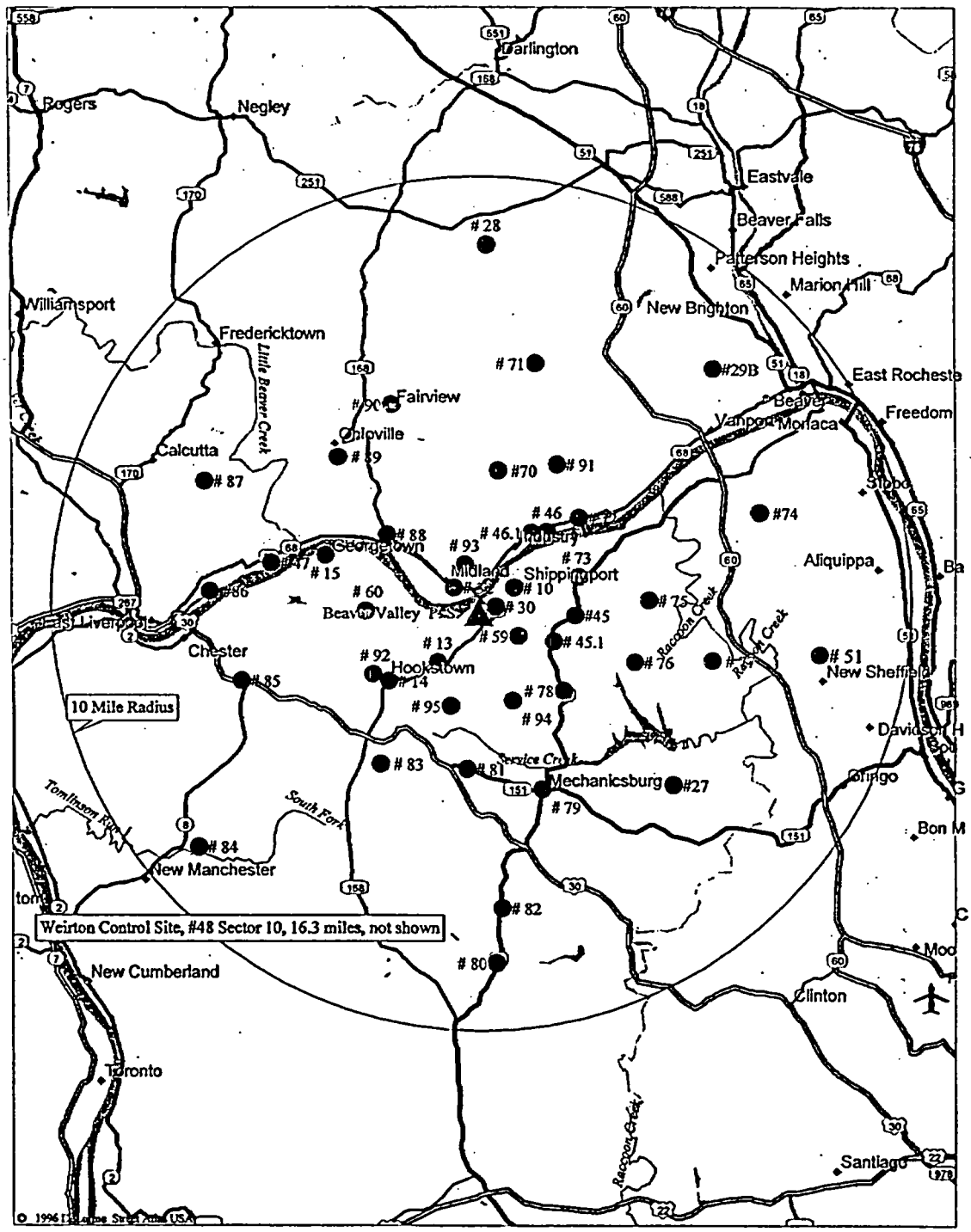


Figure 2-6 (Continued)

TLD Locations

SOUTHEAST							
Site No.	Sector	Distance (miles)	Location	Site No.	Sector	Distance (miles)	Location
27	7	6.1	Brunton's Farm	78	7	2.7	Raccoon Municipal Bldg
45.1	6	1.9	Raccoon Twp., Kennedy's Corners	79	8	4.4	Rt. 151 and Pross Ln.
51	5	8.0	Aliquippa (S.S.)	80	9	8.2	Raccoon Park
59	6	1.0	236 Green Hill Rd.	82	9	6.9	Hanover Municipal Building
76	6	3.8	Raccoon Elementary School	94	8	2.2	McCleary Road & Pole Cat Hollow Rd.
77	6	5.6	Raccoon Twp. (Green Garden Road)				

NORTHWEST							
Site No.	Sector	Distance (miles)	Location	Site No.	Sector	Distance (miles)	Location
15	14	3.7	Georgetown Post Office	87	14	7.0	Calcutta, Oh. – Calcutta Smiths Ferry Rd. & Valley Dr.
32	15	0.8	Midland (S.S.)	88	15	2.8	Midland Heights – 110 Summit Rd.
47	14	4.9	E. Liverpool, Oh. - Water Treatment Plant	89	15	4.8	Ohioville, 488 Smith Ferry Rd.
60	13	2.5	444 Hill Rd.	90	16	5.2	Opposite Fairview School
86	13	6.2	E. Liverpool, Oh. - 1090 Ohio Ave.	93	16	1.1	Midland Sunrise Hills

NORTHEAST							
Site No.	Sector	Distance (miles)	Location	Site No.	Sector	Distance (miles)	Location
10	3	1.0	Shippingport Boro	70	1	3.4	North of Western Beaver School – Engle Rd.
28	1	8.6	Sherman's Farm	71	2	6.0	Brighton Twp., First Western Bank
29B	3	8.0	Beaver Valley Geriatric Center	72	3	3.3	Industry, Logan Park
30	4	0.5	Shippingport (S.S.)	73	4	2.5	618 Squirrel Run Rd.
45	5	2.2	Rt. 18 & Anderson St.	74	4	7.0	CCBC, 137 Poplar Ave.
46	3	2.5	Industry Midway Dr.	75	5	4.1	117 Holt Road
46.1	3	2.3	Industry, Rt. 68 & Garage	91	2	3.9	Pine Grove Road & Doyle Road

SOUTHWEST							
Site No.	Sector	Distance (miles)	Location	Site No.	Sector	Distance (miles)	Location
13	11	1.4	Meyer's Farm	84	11	8.3	Hancock Co. Parks & Recreation Complex
14	11	2.5	Hookstown	85	12	5.7	Routes 8 & 30 Intersection
48	10	16.3	Weirton, W.Va. - Weirton Water Tower, Collier Way	92	12	2.8	Georgetown Road (S.S.)
81	9	3.6	Millcreek United Pres. Church	95	10	2.3	832 McCleary Road
83	10	4.2	735 Mill Creek Road				

G. Monitoring of Fish

1. Description

During 2003, fish collected for the radiological monitoring program included carp, channel catfish, brown bullhead catfish, sauger and sheepshead.

2. Sampling Program and Analytical Techniques

a. Program

Fish samples are collected semi-annually in the New Cumberland pool of the Ohio River at the Beaver Valley effluent discharge point and upstream of the Montgomery Dam. The edible portion of each different species caught is analyzed by gamma spectroscopy. Fish sampling locations are shown in Figure 2-7.

b. Procedure

A sample is prepared in a standard tared 300 ml plastic bottle and scanned for gamma emitting nuclides with gamma spectrometry system which utilizes a high resolution germanium detector.

3. Results and Conclusions

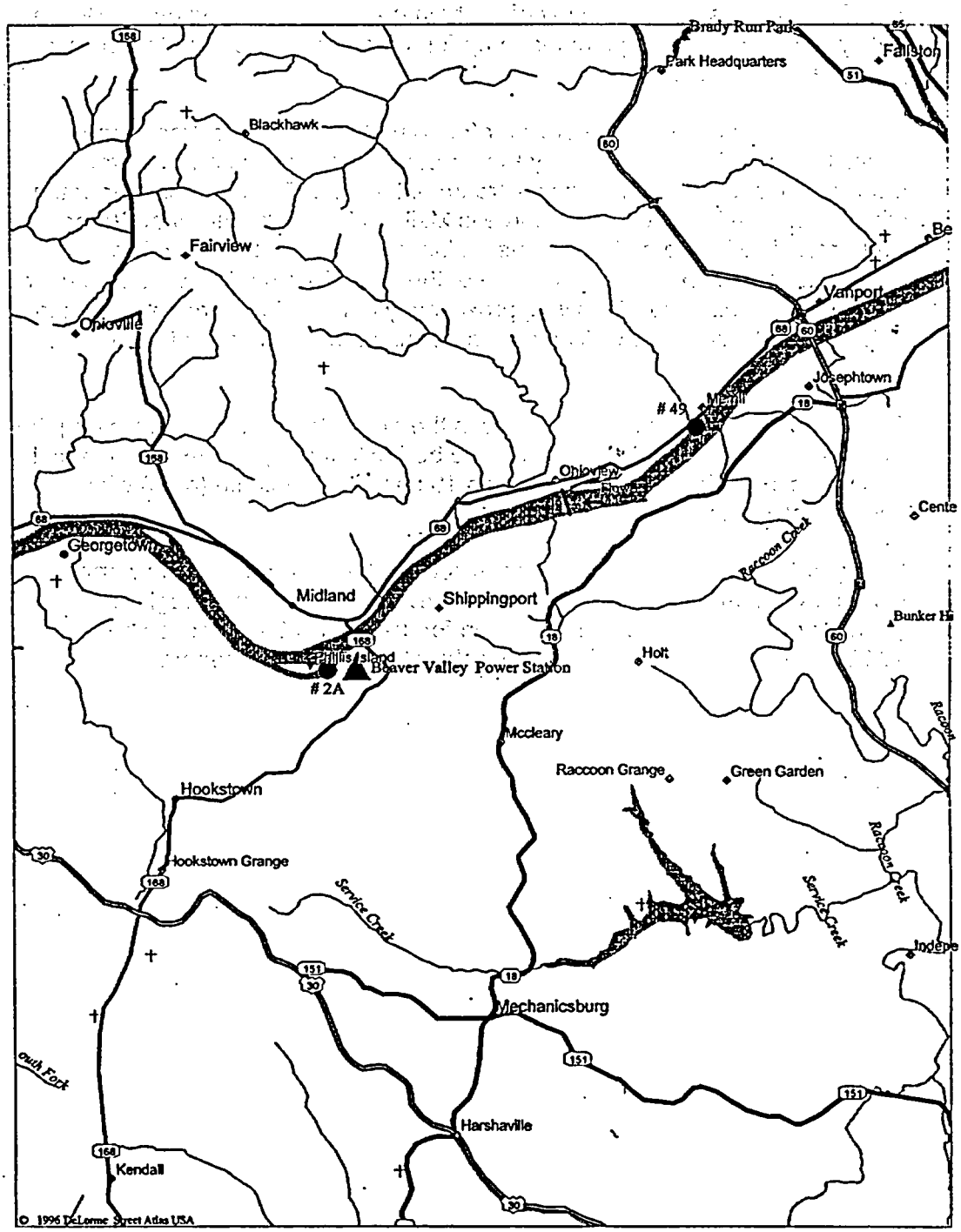
A summary of the results of the fish monitoring data is provided in Table 2-2.

A total of nine (9) samples were analyzed by gamma spectroscopy. No gamma emitting radionuclides were detected.

Based on the analytical results, the operation of the Beaver Valley Power Station did not contribute any measurable increase in radioactivity in the Ohio River fish population.

Figure 2-7

Environmental Monitoring Program - Fish Sampling Locations



Site No.	Sector	Distance (miles)	Location
2A	13	0.2	BVPS Outfall Discharge
49	3	5.0	Upstream side of Montgomery Dam

H. Monitoring of Surface, Drinking, Ground Waters and Precipitation

1. Description of Water Sources

The Ohio River is the main body of water in the area. It is used by the Beaver Valley Power Station for plant make-up for the cooling tower and for receiving plant liquid effluents.

Ohio River water is a source of water for some towns both upstream and downstream of the Beaver Valley Power Station site. It is used by several municipalities and industries downstream of the site. The nearest user of the Ohio River as a potable water source is Midland Borough Municipal Water Authority. The intake of the treatment plant is approximately 1.5 miles downstream and on the opposite side of the river. The next downstream user is East Liverpool, Ohio which is approximately 6 miles downstream. The heavy industries in Midland, as well as others downstream use river water for cooling purposes.

Groundwater occurs in large volumes in the gravel terraces which lie along the river, and diminishes considerably in the bedrock underlying the site. Normal well yields in the bedrock are less than 10 gallons per minute (gpm) with occasional wells yielding up to 60 gpm.

In general, the BVPS site experiences cool winters and moderately warm summers with ample annual precipitation evenly distributed throughout the year. The average annual precipitation for the area is 36.23 inches based on 1941 to 1970 data collected at the Pittsburgh International Airport.

2. Sampling and Analytical Techniques

a. Surface (Raw River) Water

The sampling program of river water includes three (3) sampling points along the Ohio River. Raw water samples are normally collected at the East Liverpool (Ohio) Water Treatment Plant [River Mile 41.2] daily and composited into a weekly sample. One automatic river water sampler is located at J&L Steel's river water intake [River Mile 36.2]. The automatic sampler takes a 20-40 ml sample every 15 minutes and samples are collected on a weekly basis. A weekly grab sample is taken upstream of the Montgomery Dam [River Mile 29.6]. The weekly grab sample and automatic water sample are composited into monthly samples from each location. In addition, a quarterly composite sample is prepared for each sample point.

The weekly grab samples upstream of the Montgomery Dam are analyzed for I-131.

The monthly composites are analyzed for gamma emitters. The quarterly composites are analyzed for H-3.

Locations of each sample point are shown in Figure 2-8.

b. Drinking Water (Public Supplies)

Drinking (treated) water is collected at both Midland (PA) and East Liverpool (OH) Water Treating Plants. An automatic sampler at each location collects 20-40 ml every 20 minutes which is composited into a weekly sample. The weekly sample from each location is analyzed for I-131.

Monthly composites of the weekly samples are analyzed by gamma spectrometry. Quarterly composites are analyzed for H-3. Locations of each sample point are shown in Figure 2-8.

c. Groundwater

Semi-annual grab samples were collected from three (3) locations (see Figure 2-8) within four (4) miles of the site. These locations are:

One (1) well in Shippingport, PA

One (1) well in Hookstown, PA

One (1) well in Georgetown, PA

Each ground water sample is analyzed for tritium and by gamma spectroscopy.

d. Precipitation

Precipitation is collected at Shippingport, Pa., East Liverpool, Oh. and Weirton, W.Va. Precipitation, when available, is collected each week and then composited into quarterly samples. The quarterly composites are analyzed for H-3 and gamma emitters. Locations of each sample point are shown in Figure 2-8.

e. Procedures

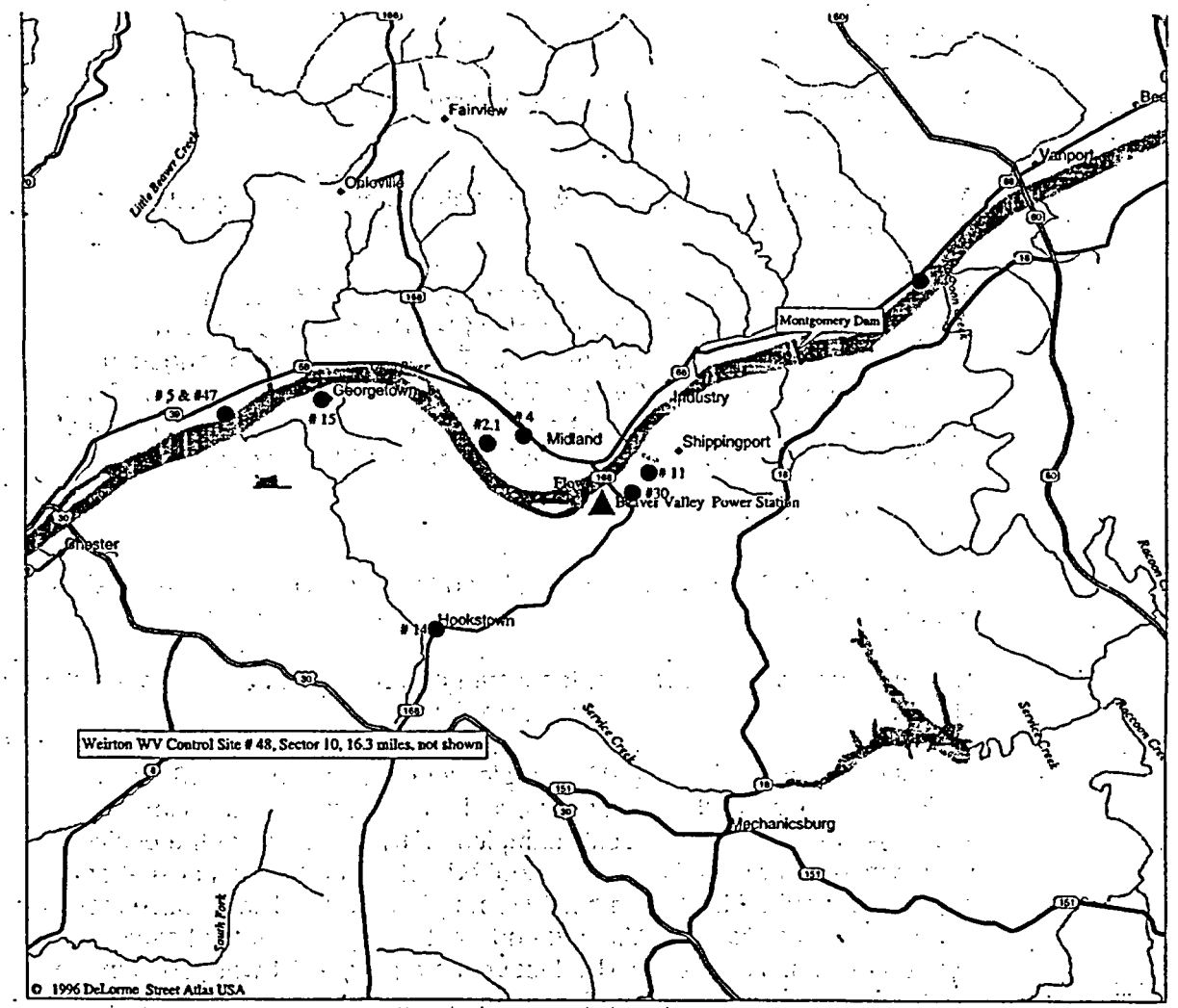
Gamma analysis is performed on water samples by placing one liter of the sample into a Marinelli container and counting the sample on a high resolution germanium gamma spectrometry system.

Tritium is determined in water samples by liquid scintillation counting.

Radioiodine (I-131) analysis in water was normally performed using chemically prepared samples and analyzed with a low-level beta counting system.

Figure 2-8

Environmental Monitoring Stations Locations - Ground, Surface Water, Drinking Water and Precipitation



Sample Type	Site No.	Sector	Distance (miles)	Description
Surface	2.1	14	1.5	Downstream Midland - J&L
Surface	5	14	4.9	E. Liverpool, Oh. – Water Treatment Plant
Surface	49	3	5.0	Upstream side of Montgomery Dam
Drinking	4	15	1.3	Midland - Water Treatment Plant
Drinking	5	14	4.9	E. Liverpool, Oh. - Water Treatment Plant
Ground	11	3	0.8	Shippingport Boro

Sample Type	Site No.	Sector	Distance (miles)	Description
Ground	14	11	2.5	Hookstown
Ground	15	14	3.7	Georgetown
Precipitation	30	4	0.5	Shippingport (S.S.)
Precipitation	47	14	4.9	E. Liverpool, Oh., - Water Treatment Plant
Precipitation	48	10	16.3	Weirton, W.Va. – Weirton Water Tower, Collier Way

3. Results and Conclusions

A summary of results of all analyses of water samples (surface, drinking, ground and precipitation) are provided by sample type and analysis in Table 2-2. These are discussed below.

a. Surface Water

A total of twelve (12) samples were analyzed quarterly for H-3. None of the twelve results were positive.

A total of thirty-six (36) samples were analyzed by gamma spectrometry. No nuclides were detected.

A total of fifty-two (52) samples were analyzed for I-131 using a radiochemical method. Positive levels of I-131 were measured in forty-three (43) of the weekly samples. The positive results ranged in values from 0.20 to 3.90 pCi/liter. This is similar to previous years. These positive results were detected at a Control location five miles upstream of BVPS and is considered outside the influence of BVPS operation.

b. Drinking Water

A total of eight (8) samples were analyzed for H-3. All results were below the LLD.

A total of twenty-four (24) samples were analyzed by gamma spectrometry. No gamma-emitting radionuclides were detected.

A total of one hundred-six (106) samples were analyzed for I-131 using a radiochemical method. Positive levels of I-131 were measured in seventy-three (73) of the weekly samples. Fifty-eight (58) of the positive values were at or were below the required LLD. The thirteen (13) at or above the required LLD were below reportable levels. The positive results were detected at both the Midland and East Liverpool plants at similar concentrations. As discussed in last year's report, I-131 was found in the upstream surface water control location in similar concentrations and frequencies. Additional calculations based on plant effluent data indicated that sample concentrations at the water plants would be less than LLD.

c. Groundwater

A total of six (6) samples were each analyzed for H-3 and by gamma spectrometry. No gamma-emitting radionuclides were detected. All six tritium results were less than LLD.

d. Precipitation

A total of twelve (12) samples were analyzed for H-3 and by gamma spectrometry. Five (5) positive tritium results detected were within normal levels. No gamma emitting radionuclides were detected.

e. Deviations from required sampling schedule and analysis

None

f. Summary

The data from water analyses demonstrates that the Beaver Valley Power Station did not contribute a significant increase of radioactivity in local river, drinking, well waters or precipitation. The analytical results confirm that the station assessments, prior to authorizing radioactive discharges, are adequate and that the environmental monitoring program is sufficiently sensitive.

I. Estimates of Radiation Dose to Man

1. Pathways to Man - Calculational Models

The radiation doses to man as a result of Beaver Valley operations were calculated for both gaseous and liquid effluent pathways using codes for the ARERAS/MIDAS computer system equivalent to NRC computer codes XOQDOQ2, GASPAR, and LADTAP. Dose factors listed in the ODCM were used to calculate doses from radioactive noble gases in discharge plumes. Beaver Valley effluent data, based on sample analysis were used as the radionuclide activity input.

Radionuclides contained in the Annual Radioactive Effluent Release Report (noble gases, particulates, radioiodines and tritium) were included as source terms when they were detected above the LLD values. All LLD values reported by Beaver Valley Power Station are equal to or lower than those required by the ODCM.

All gaseous effluent releases were included in dose assessments. The release activities are based on laboratory analysis. Meteorological data collected by the Beaver Valley Power Station Meteorology System was used as input to code equivalent to XOQDOQ2 which in turn provided input for the GASPAR equivalent. Except when more recent or specific data was available, all inputs were the same as used in the Beaver Valley Power Station Environmental Statements or in Regulatory Guide 1.109. The airborne pathways evaluated were beta and gamma doses from noble gas plumes inhalation, the "cow-milk-child", and other ingestion pathways.

All potentially radioactive liquid effluents are released by batch mode after analysis by gamma spectrometry using intrinsic germanium detectors. Each batch is diluted by cooling tower blowdown water prior to discharge into the Ohio River at the Beaver Valley Power Station outfall (River Mile 35.0). The actual data from these analyses are tabulated and used as the radionuclide activity input term in code equivalent to LADTAP. Except when more recent or specific data for the period is available, all other input are obtained from the Beaver Valley Power Station Environmental Statement or Regulatory Guide 1.109. Pathways, which were evaluated, are drinking water, fish consumption, and shoreline recreation.

2. Results of Calculated Population Dose to Man - Liquid Releases

The 2003 calculated dose to the entire population of about 4 million people within 50 miles of the plant is presented in Table 2-4.

Table 2-4

Comparison of Natural Radiation Exposure Versus Calculated Population Dose to Man - Liquid Releases

TYPICAL DOSE TO INDIVIDUALS FROM NATURAL RADIATION EXPOSURE(a)		
Ambient Gamma Radiation	:	58
Radionuclides in Body	:	40
Global Fallout	:	< 1
Radon	:	198
TOTAL mRem/year	:	296

(a) National Academy of Sciences, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," BEIR Report, 1990

Population Dose from BVPS Liquid Releases		
Organ	**Man-Millirems**	**Largest Isotope Contributor**
Total Body	189	H-3 180 Man-Millirems
GI-LLI	209	H-3 180 Man-Millirems

3. Results of Calculated Population Dose to Man - Atmospheric Releases

The results of the calculated 50 mile population dose for BVPS airborne radioactive effluents during 2003 are provided in Table 2-5. The doses include the contribution of all pathways.

Table 2-5

Comparison of Natural Background Exposure Versus Calculated Population Dose to Man - Atmospheric Releases

TYPICAL DOSE TO INDIVIDUALS FROM NATURAL RADIATION EXPOSURE(a)		
Ambient Gamma Radiation	:	58
Radionuclides in Body	:	40
Global Fallout	:	< 1
Radon	:	198
TOTAL mRem/year	:	296

(a) National Academy of Sciences, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," BEIR Report, 1990

Population Dose from BVPS Atmospheric Releases	
Organ	**50-Mile Population Dose man-rem**
TOTAL BODY	0.650
THYROID	0.670

4. Conclusions

Based upon the estimated dose to individuals from the natural background radiation exposure in Tables 2-4 and 2-5, the incremental increase in total body dose to the 50-mile population (approximately 4 million people), from the operation of Beaver Valley Power Station - Unit 1 and 2, is less than 0.0001% of the annual background dose.

The calculated doses to the public from the operation of Beaver Valley Power Station - Unit 1 and 2, are below BVPS annual limits and resulted in only a small incremental dose to that which area residents already received as a result of natural background. The doses constituted no meaningful risk to the public.

SECTION 3 - LAND USE CENSUS

A land use census was conducted August 21 through September 11, 2003 to comply with BV-1 and BV-2 Technical Specification 6.8.6b Item 2 and the ODCM Appendix C CONTROL 3.12.2. The census results are summarized in Table 3-1.

Table 3-1

Location of Nearest Residence, Garden, and Milch Animal

SECTOR	RESIDENCE (miles)	GARDEN (miles) [1]	MILCH ANIMALS (miles) [2]
N	1.58	2.77	None
NNE	1.62	None	None
NE	0.37	2.66	None
ENE	0.54	1.01	None
E	0.40	2.21	3.39
ESE	0.89	1.71	None
SE	1.10	2.44	2.31
SSE	2.16	2.16	3.16
S	1.42	2.35	None
SSW	0.81	2.02	2.10
SW	1.50	1.55	2.16
WSW	1.44	2.85	3.38
W	2.25	None	None
WNW	2.75	None	4.83
NW	0.89	1.03	4.92
NNW	0.91	1.19	2.38

(1) Gardens greater than 500 square feet producing fresh leafy vegetables

(2) Within five miles

SECTION 4 - SPLIT SAMPLE, SPIKE SAMPLE, AND INTERLABORATORY COMPARISON PROGRAM

A. Split Sample and Spike Sample Program

Beaver Valley conducts a split sample program. Split samples (milk (1), surface water (3), sediment (1), fish (1), food crops (2)) and co-located sample data (air particulate (4), air iodine (4), TLDs (24)) are shared with Pennsylvania Department of Environmental Protection (PADEP) in support of nuclear power plant monitoring program.

The NRC criteria listed in NRC Inspection Procedure 84750, 12/4/90, Inspection Guidance 84750-03 is used as the acceptance criteria for comparisons of results of spiked samples between the Contractor Lab and the Independent Lab. These comparisons are performed by dividing the comparison standard (Independent Lab result) by its associated uncertainty to obtain the resolution. The comparison standard value is multiplied by the ratio values obtained from the following table to find the acceptance band for the result to be compared. Note that in the case where the counting precision of the standard yields a resolution of less than 4, a valid comparison cannot be made. Values identified with an '*' in Tables 4-1 through 4-3 do not meet acceptance criteria.

Resolution	Ratio
< 4	--
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.8 - 1.25
> 200	0.85 - 1.18

B. Interlaboratory Comparison Program

Participation in an Interlaboratory Comparison Program is required by BV-1 and BV-2 Technical Specification 6.8.6b, Item 3. For 2003, this requirement was fulfilled by the Contractor Lab (Environmental, Inc. – Northbrook, IL) analyzing high quality (NIST traceable) spiked samples supplied by a Beaver Valley Power Station contracted vendor (Analytics – Atlanta, GA).

1. Contractor Lab

The high quality (NIST traceable) spiked samples include air particulate, charcoal filters water, and milk. The samples were submitted to the Contractor Lab for analysis. The "spiked to" values are used for calculating comparison acceptance criteria. Values identified with an '*' do not meet acceptance criteria explained above.

A total of 52 nuclide analyses were performed on water samples with no (0) analyses or 0.0% not meeting acceptance criteria. A total of 48 nuclides analyses were performed on milk samples with one (1) analyses or 2.1% not meeting acceptance criteria.

- Comparison of results of the spiked milk and water samples showed good results. As part of the offsite radiological environmental monitoring program spiked water and milk QC samples are prepared by a vendor and are sent to the vendor lab BVPS uses for sample analysis. The analysis lab does not know the concentration of the radionuclides in the milk and water sample (there are 12 radionuclides in each spiked milk sample and 13 radionuclides in each spiked water sample) prior to analysis. In the first, second, and third quarters, all results for both water and milk were found acceptable. In the fourth quarter, only the Sr-90 analysis in milk did not meet acceptance criteria. The contractor lab was high by about 35%.

The spiked water sample results are reported in Table 4-1. The spiked milk sample results are reported in Table 4-2.

- Comparison of results of the spiked air particulate filters (2) and charcoal cartridge filters (2) showed good results. All four results met the acceptance criteria. The results are reported in Table 4-3.

C. Conclusions

Based on all available Interlaboratory Comparison data the Environmental Monitoring Program for 2003 is acceptable with respect to both accuracy and measurement.

Table 4-1

Interlaboratory Comparison Program
Independent Laboratory/Contractor Laboratory
Comparison Spiked Water Samples (pCi/l)

Sample Date	Sample Type and Identification No.	Sample Analyses	Independent Lab (1)	Contractor Lab (1)
03/20/2003	Water E 3613-93 SPW-8133	Sr-89	114 ± 6	108 ± 4
		Sr-90	10 ± 1	11 ± 1
		I-131	70 ± 4	69 ± 2
		Ce-141	168 ± 8	161 ± 2
		Cr-51	238 ± 12	224 ± 13
		Cs-134	88 ± 4	70 ± 3
		Cs-137	195 ± 10	190 ± 2
		Co-58	42 ± 2	44 ± 1
		Mn-54	63 ± 3	63 ± 1
		Fe-59	46 ± 2	48 ± 1
		Zn-65	90 ± 5	91 ± 3
		Co-60	157 ± 8	154 ± 1
03/20/2003	Water E 3612-93 SPW-1181	H-3	4463 ± 223	4765 ± 81
06/12/2003	Water E 3710-93 SPW-3157	Sr-89	73 ± 3	70 ± 4
		Sr-90	20 ± 1	22 ± 1
		I-131	81 ± 3	88 ± 3
		Ce-141	253 ± 8	241 ± 2
		Cr-51	213 ± 8	218 ± 15
		Cs-134	92 ± 3	72 ± 8
		Cs-137	206 ± 7	202 ± 6
		Co-58	83 ± 3	81 ± 1
		Mn-54	166 ± 6	161 ± 4
		Fe-59	88 ± 3	90 ± 3
		Zn-65	162 ± 5	165 ± 2
		Co-60	118 ± 4	125 ± 2
06/12/2003	Water E 3709-93 SPW-3156	H-3	11950 ± 400	11499 ± 281

(1) Uncertainties are based on counting statistics and are specified at the 95% confidence coefficient.

(Table 4-1 continued on next page)

Table 4-1 (Continued)

Interlaboratory Comparison Program
Independent Laboratory/Contractor Laboratory
Comparison Spiked Water Samples (pCi/l)

Sample Date	Sample Type and Identification No.	Sample Analyses	Independent Lab (1)	Contractor Lab (1)
09/18/2003	Water E 3872-93 SPW-5323	Sr-89	100 ± 3	94 ± 4
		Sr-90	14 ± 1	15 ± 1
		I-131	76 ± 3	75 ± 2
		Ce-141	81 ± 3	82 ± 2
		Cr-51	221 ± 7	215 ± 18
		Cs-134	113 ± 4	99 ± 3
		Cs-137	84 ± 3	85 ± 1
		Co-58	94 ± 3	91 ± 4
		Mn-54	88 ± 3	91 ± 2
		Fe-59	75 ± 2	82 ± 3
		Zn-65	166 ± 6	175 ± 1
		Co-60	117 ± 4	121 ± 1
09/18/2003	Water E 3871-93 SPW-5321	H-3	8000 ± 300	8205 ± 265
12/11/2003	Water E 4003-93 SPW-5323	Sr-89	100 ± 3	95 ± 2
		Sr-90	10 ± 0	11 ± 2
		I-131	61 ± 2	61 ± 3
		Ce-141	189 ± 6	185 ± 3
		Cr-51	262 ± 9	258 ± 17
		Cs-134	127 ± 4	118 ± 2
		Cs-137	121 ± 4	118 ± 1
		Co-58	104 ± 3	104 ± 3
		Mn-54	162 ± 5	164 ± 2
		Fe-59	96 ± 3	99 ± 4
		Zn-65	184 ± 9	181 ± 6
		Co-60	145 ± 5	138 ± 2
12/11/2003	Water E 4002-93 SPW-7451	H-3	2290 ± 300	2374 ± 91

(1) Uncertainties are based on counting statistics and are specified at the 95% confidence coefficient.

Table 4-2

Interlaboratory Comparison Program
Independent Laboratory/Contractor Laboratory
Comparison Spiked Milk Samples (pCi/l)

Sample Date	Sample Type and Identification No.	Sample Analyses	Independent Lab (1)	Contractor Lab (1)
03/20/2003	Milk E 3614-93 SPM1-1180	Sr-89	133 ± 7	127 ± 6
		Sr-90	12 ± 1	13 ± 1
		I-131	74 ± 4	64 ± 4
		Ce-141	173 ± 9	158 ± 1
		Cr-51	246 ± 12	226 ± 19
		Cs-134	90 ± 5	73 ± 6
		Cs-137	200 ± 10	194 ± 2
		Co-58	47 ± 2	45 ± 2
		Mn-54	64 ± 3	64 ± 3
		Fe-59	47 ± 2	50 ± 3
		Zn-65	93 ± 5	90 ± 11
		Co-60	162 ± 8	160 ± 2
06/12/2003	Milk E 3711-93 SPM1-3155	Sr-89	85 ± 3	77 ± 1
		Sr-90	23 ± 1	25 ± 1
		I-131	103 ± 3	104 ± 2
		Ce-141	283 ± 9	261 ± 5
		Cr-51	239 ± 8	239 ± 5
		Cs-134	103 ± 3	79 ± 6
		Cs-137	230 ± 8	225 ± 2
		Co-58	93 ± 3	88 ± 1
		Mn-54	186 ± 6	182 ± 4
		Fe-59	99 ± 3	100 ± 2
		Zn-65	181 ± 6	172 ± 16
		Co-60	132 ± 4	130 ± 1

(1) Uncertainties are based on counting statistics and are specified at the 95% confidence coefficient.

(Table 4-2 continued on next page)

Table 4-2 (Continued)

Interlaboratory Comparison Program
Independent Laboratory/Contractor Laboratory
Comparison Spiked Water Samples (pCi/l)

Sample Date	Sample Type and Identification No.	Sample Analyses	Independent Lab (1)	Contractor Lab (1)
09/18/2003	Milk E 3873-93 SPM1-5322	Sr-89	100 ± 3	88 ± 3
		Sr-90	14 ± 1	15 ± 1
		I-131	71 ± 2	72 ± 4
		Ce-141	86 ± 3	88 ± 2
		Cr-51	233 ± 8	249 ± 23
		Cs-134	119 ± 4	108 ± 2
		Cs-137	88 ± 3	93 ± 4
		Co-58	99 ± 3	98 ± 1
		Mn-54	93 ± 3	98 ± 4
		Fe-59	79 ± 3	90 ± 7
		Zn-65	176 ± 6	182 ± 10
		Co-60	123 ± 4	132 ± 2
12/11/2003	Milk E 4004-93 SPM1-7452	Sr-89	168 ± 6	192 ± 4
		Sr-90	17 ± 1	23 ± 1 *
		I-131	90 ± 3	92 ± 2
		Ce-141	202 ± 7	195 ± 2
		Cr-51	280 ± 9	285 ± 16
		Cs-134	135 ± 5	126 ± 4
		Cs-137	129 ± 4	127 ± 5
		Co-58	111 ± 4	110 ± 3
		Mn-54	173 ± 6	170 ± 6
		Fe-59	102 ± 3	106 ± 2
		Zn-65	197 ± 7	194 ± 4
		Co-60	155 ± 5	149 ± 1

(1) Uncertainties are based on counting statistics and are specified at the 95% confidence coefficient.

* See Section 4-B.

Table 4-3

Interlaboratory Comparison Program
Contractor/Quality Control Laboratory
Comparison Spiked Air Particulate/Charcoal Filters

Sample Date	Sample Type and Identification No.	Sample Analyses	Indepenent Lab (1)	Contractor Lab (1)	Units
03/20/2003	Air Particulate Filter E 3615-93 SPAP-5896	Gross Beta	223 ± 11	235 ± 1	pCi/m^3
09/18/2003	Air Particulate Filter E 3874-93 SPAP-5320	Gross Beta	140 ± 5	134 ± 2	pCi/m^3
03/20/2003	Air Charcoal Filter E 3616-93 SPCH-1183	I-131	76 ± 4	69 ± 2	pCi/m^3
09/18/2003	Air Charcoal Filter E 3875-93 SPCH-5319	I-131	85 ± 3	88 ± 2	pCi/m^3

(1) Uncertainties are based on counting statistics and are specified at the 95% confidence coefficient.