

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

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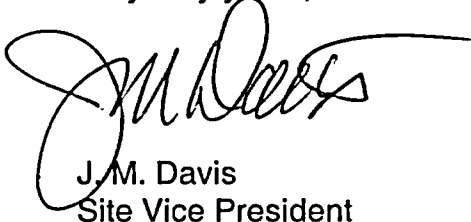
Gentlemen:

**VIRGINIA ELECTRIC AND POWER COMPANY**  
**NORTH ANNA POWER STATION UNITS 1 & 2 AND**  
**INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)**  
**ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT**

Enclosed is the Annual Radiological Environmental Operating Report for the reporting period of January 1, 2004 through December 31, 2004. This report is provided pursuant to North Anna Units 1 and 2, Technical Specifications 5.6.2, and North Anna Independent Spent Fuel Storage Installation Technical Specification 5.5.2c.

If you have any questions or require additional information, please contact Page Kemp at (540) 894-2295.

Very truly yours,



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Site Vice President

Enclosure

Commitments made in this letter: None

JE25

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***North Anna Power Station***  
***Radiological Environmental Monitoring Program***  
***January 1, 2004 to December 31, 2004***


***Prepared by***  
**Dominion, North Anna Power Station**

***Annual Radiological Environmental Operating Report***

***North Anna Power Station***


***January 1, 2004 to December 31, 2004***

***Prepared by:***



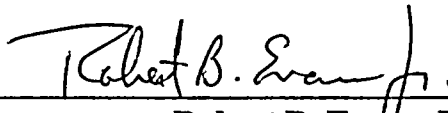
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## 1. EXECUTIVE SUMMARY

This document is a detailed report of the 2004 North Anna Nuclear Power Station Radiological Environmental Monitoring Program (REMP). It is submitted in accordance with North Anna Unit 1 and 2 Technical Specification 5.6.2 and North Anna Independent Spent Fuel Storage Installation (ISFSI) Technical Specification 5.5.2b. Radioactivity levels from January 1 through December 31, 2004, in water, silt, shoreline sediment, milk, aquatic biota, food products, vegetation, and direct exposure pathways have been analyzed, evaluated and summarized. The REMP is designed to confirm that radiological effluent releases are As Low As is Reasonably Achievable (ALARA), no undue environmental effects occur and the health and safety of the public are protected. The program also detects any unexpected environmental processes that could allow radiation accumulations in the environment or food pathway chains.

Radiation and radioactivity in the environment is monitored within a 25-mile radius of the station. North Anna Power Station personnel collect a variety of samples within this area. A number of sampling locations for each medium are selected using available meteorological, land use, and water use data. Two types of samples are obtained. The first type, control samples, are collected from areas that are beyond the measurable influence of North Anna Power Station or any other nuclear facility. These samples are used as reference data. Normal background radiation levels, or radiation present due to causes other than North Anna Power Station, can be compared to the environment surrounding the station. Indicator samples are the second sample type obtained. These samples show how much radiation is contributed to the environment by the station. Indicator samples are taken from areas close to the station where any station contribution will be at the highest concentration.

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." 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, or causes such as the Chernobyl accident or natural variation.

Global Dosimetry Solutions provided thermoluminescent dosimetry (TLD) services and AREVA Environmental Laboratory provided radioanalytical services. Participation in an Interlaboratory Comparison Program provides an independent check of sample measurement precision and accuracy. Typically, radioactivity levels in the environment are so low that analysis values frequently fall below the minimum detection limits of state-of-the-art measurement methods. Because of this, the Nuclear Regulatory Commission (NRC) requires that equipment used for radiological environmental monitoring must be able to detect specified minimum Lower Limits of Detection (LLDs). This ensures that analyses are as accurate as

possible. The NRC also mandates a reporting level for certain radionuclides. Licensed nuclear facilities must report the radionuclide activities in those environmental samples that are equal to or greater than the specified reporting level. Environmental radiation levels are sometimes referred to as a percent of the reporting level.

Analytical results are reported for all possible radiation exposure pathways to man. These pathways include airborne, water, aquatic, terrestrial and direct radiation exposure. The airborne exposure pathway includes radioactive airborne iodine and particulates and precipitation. The 2004 airborne results were similar to previous years. No plant related radioactivity was detected and fallout or natural radioactivity levels remained at levels consistent with past year's results.

Water and aquatic exposure pathway samples include surface, river and well water, silt and shoreline sediments, and fish. No plant related isotopes were detected in Lake Anna surface water except for tritium. The average tritium activity in surface water for 2004 was 2423 pCi/liter. Naturally occurring potassium-40 was detected at average environmental levels. River water collected from the North Anna River, 5.8 miles downstream of the site had an average tritium level of 2287 pCi/liter. No plant related radioisotopes were detected in well water. This trend is consistent throughout the environmental operational monitoring program. Both silt samples indicated the presence of naturally occurring thorium-228 at levels consistent with the natural background. Shoreline sediment, which may provide a direct exposure pathway, indicated the presence of Th-228 also at levels consistent with natural levels. The terrestrial exposure pathway includes milk and food/vegetation products. Iodine-131 was not detected in any 2004 milk samples and has not been detected in milk prior to or since the 1986 Chernobyl accident. Strontium-90 was detected in one milk sample and this activity is attributable to past atmospheric nuclear weapons testing. A ten-year activity trend continues to indicate the slow decrease in Sr-90 activity. Naturally occurring potassium-40 was detected at average environmental levels. Cs-137 was detected in one of 25 vegetation samples at an activity of 35 pCi/kg. Consistent with historical data, potassium-40 was detected. The direct exposure pathway measures environmental radiation doses by use of thermoluminescent dosimeters (TLDs). TLD results have remained essentially constant over the years.

During 2004, as in previous years, operation of the North Anna Power Station and the Independent Spent Fuel Storage Installation (ISFSI) created no adverse environmental effects or health hazards. The maximum dose calculated for a hypothetical individual at the station site boundary due to liquid and gaseous effluents released from the station during 2004 was 0.32 millirem. For reference, this dose may be compared to the 360 millirem average annual exposure to every person in the United States from natural and man-made sources. Natural sources in the environment provide approximately 82% of radiation exposure to man, while nuclear power contributes less than 0.1%. These results demonstrate not

only compliance with federal and state regulations but also demonstrate the adequacy of radioactive effluent control at North Anna Power Station.

## 2. PROGRAM DESCRIPTION

### 2.1 Introduction

This report documents the 2004 North Anna Power Station operational Radiological Environmental Monitoring Program (REMP).

The North Anna Power Station of Dominion Virginia Power Company is located on Lake Anna in Mineral, Virginia, approximately 35 miles southwest of Fredericksburg, Virginia. The site consists of two units, each with a pressurized water reactor (PWR) nuclear steam supply system and turbine generator furnished by Westinghouse Electric Corporation. Each unit was designed with a gross electrical output of 979 megawatts electric (MWe). Unit 1 achieved commercial operation on June 6, 1978 and Unit 2 on December 14, 1980. An independent spent fuel storage facility was licensed for dry cask storage of spent fuel in 1998.

The United States Nuclear Regulatory Commission (USNRC) regulations require that nuclear power plants be designed, constructed, and operated to keep levels of radioactive material in effluents to unrestricted areas as low as is reasonably achievable (ALARA). To ensure these criteria are met, the operating license for North Anna Power Station includes Technical Specifications, which address the release of radioactive effluents. In-plant monitoring is used to ensure release limits are not exceeded. As a precaution against unexpected or undefined environmental processes which might allow undue accumulation of radioactivity in the environment, a program for monitoring the plant environs is also included in North Anna Power Station Offsite Dose Calculation Manual (ODCM).

North Anna Power Station is responsible for collecting the various indicator and control environmental samples. Global Dosimetry Solutions is responsible for processing the TLDs. AREVA Environmental Laboratory is responsible for sample analyses. The results of the analyses are used to determine if changes in radioactivity levels may be attributable to station operations. Measured values are compared with control levels, which vary with time due to external events, such as cosmic ray bombardment, nuclear weapons test fallout and seasonal variations of naturally occurring radioisotopes. Data collected prior to station operation is used to indicate the degree of natural variation to be expected. This pre-operational data is compared with data collected during the operational phase to assist in evaluating any radiological impact of station operation.

Occasional samples of environment media show the presence of man-made isotopes. As a method of referencing the measured radionuclide concentrations in the sample media to a dose consequence to man, the data is compared to the reporting level concentrations listed in the USNRC Regulatory Guide 4.8 and North Anna's ODCM. These concentrations are based upon the annual dose commitment recommended by 10CFR50, Appendix I, to meet the criterion of "As

Low As Is Reasonably Achievable”.

This report documents the results of the Radiological Environmental Monitoring Program for 2004 and satisfies the following objectives of the program:

- To provide measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposure of the maximum exposed member of the public resulting from station operations.
- To supplement the radiological effluent monitoring program by verifying that radioactive effluents are within allowable limits.
- To identify changes in radioactivity in the environment.
- To verify that station operations have no detrimental effect on the health and safety of the public.

## ***2.2 Sampling and Analysis Program***

Table 2-1 summarizes the 2004 sampling program for North Anna Power Station. All samples listed in Table 2-1 are taken at indicator locations except those labeled "control." The North Anna Radiological Monitoring Locations maps denote sample locations for North Anna Power Station. The locations are color coded to designate sample types. Table 2-2 summarizes the analysis program conducted by AREVA Environmental Laboratory for North Anna Power Station during the year 2004.

**Table 2-1**  
**NORTH ANNA - 2004**  
**RADIOLOGICAL SAMPLING STATION**  
**DISTANCE AND DIRECTION FROM UNIT NO. 1**

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
Environmental	NAPS Sewage Treatment Plant	01	0.20	NE	42°	Quarterly & Annually	
Thermoluminescent	Fredericks Hall	02	5.30	SSW	203°	Quarterly & Annually	
Dosimetry (TLD)	Mineral, Va	03	7.10	WSW	243°	Quarterly & Annually	
	Wares Crossroads	04	5.10	WNW	287°	Quarterly & Annually	
	Route 752	05	4.20	NNE	20°	Quarterly & Annually	
	Sturgeon's Creek Marina	05A	2.04	N	11°	Quarterly & Annually	
	Levy, VA	06	4.70	ESE	115°	Quarterly & Annually	
	Bumpass, VA	07	7.30	SSE	167°	Quarterly & Annually	
	End of Route 685	21	1.00	WNW	301°	Quarterly & Annually	
	Route 700	22	1.00	WSW	242°	Quarterly & Annually	
	"Aspen Hills"	23	0.93	SSE	158°	Quarterly & Annually	
	Orange, VA	24	22.00	NW	325°	Quarterly & Annually	Control
	Bearing Cooling Tower	N-1/33	0.06	N	10°	Quarterly	
	Sturgeon's Creek Marina	N-2/34	2.04	N	11°	Quarterly	
	Parking Lot "C" (on-site)	NNE-3/35	0.24	NNE	32°	Quarterly	
	Good Hope Church	NNE-4/36	3.77	NNE	25°	Quarterly	
	Parking Lot "B"	NE-5/37	0.20	NE	42°	Quarterly	
	Lake Anna Marina (Bogg's Drive)	NE-6/38	1.46	NE	34°	Quarterly	
	Weather Tower Fence	ENE-7/39	0.36	ENE	74°	Quarterly	
	Route 689	ENE-8/40	2.43	ENE	65°	Quarterly	
	Near Training Facility	E-9/41	0.30	E	91°	Quarterly	
	"Morning Glory Hill"	E-10/42	2.85	E	93°	Quarterly	
	Island Dike	ESE-11/43	0.12	ESE	103°	Quarterly	
	Route 622	ESE-12/44	4.70	ESE	115°	Quarterly	
	DVP Biology Lab	SE-13/45	0.64	SE	138°	Quarterly	
	Route 701 (Dam Entrance)	SE-14/46	5.88	SE	137°	Quarterly	
	"Aspen Hills"	SSE-15/47	0.93	SSE	158°	Quarterly	
	Elk Creek	SSE-16/48	2.33	SSE	165°	Quarterly	
	NAPS Access Rd.	S-17/49	0.47	S	173°	Quarterly	

**Table 2-1**  
**NORTH ANNA - 2004**  
**RADIOLOGICAL SAMPLING STATION**  
**DISTANCE AND DIRECTION FROM UNIT NO. 1**

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
<b>Environmental Thermoluminescent Dosimetry (TLD)</b>	Elk Creek Church	S-18/50	1.55	S	178°	Quarterly	
	NAPS Access Rd.	SSW-19/51	0.42	SSW	197°	Quarterly	
	Route 618	SSW-20/52	5.30	SSW	205°	Quarterly	
	500kv Tower	SW-21/53	0.6	SW	218°	Quarterly	
	Route 700	SW-22/54	3.96	SW	232°	Quarterly	
	NAPS Radio Tower	WSW-23/55	0.38	WSW	237°	Quarterly	
	Route 700 (Exclusion Boundary)	WSW-24/56	1.00	WSW	242°	Quarterly	
	South Gate Switchyard	W-25/57	0.32	W	279°	Quarterly	
	Route 685	W-26/58	1.55	W	274°	Quarterly	
	End of Route 685	WNW-27/59	1.00	WNW	301°	Quarterly	
	Route 685	WNW-28/60	1.40	WNW	303°	Quarterly	
	North Gate - Construction Side	NW-29/61	0.45	NW	321°	Quarterly	
	Laydown Area						
	Lake Anna Campground	NW-30/62	2.54	NW	319°	Quarterly	
	#1/#2 Intake	NNW-31/63	0.07	NNW	349°	Quarterly	
	Route 208	NNW-32/64	2.21	NNW	344°	Quarterly	
	Bumpass Post Office	C-1/2	7.30	SSE	167°	Quarterly	Control
	Orange, VA	C-3/4	22.00	NW	325°	Quarterly	Control
	Mineral, VA	C-5/6	7.10	WSW	243°	Quarterly	Control
	Louisa, VA	C-7/8	11.54	WSW	257°	Quarterly	Control
<b>Airborne Particulate and Radioiodine</b>	NAPS Sewage Treatment Plant	01	0.20	NE	42°	Weekly	
	Fredericks Hall	02	5.30	SSW	203°	Weekly	
	Mineral, VA	03	7.10	WSW	243°	Weekly	
	Wares Crossroads	04	5.10	WNW	287°	Weekly	
	Route 752	05	4.20	NNE	20°	Weekly	
	Sturgeon's Creek Marina	05A	2.04	N	11°	Weekly	
	Levy, VA	06	4.70	ESE	115°	Weekly	
	Bumpass, VA	07	7.30	SSE	167°	Weekly	



**Table 2-1**  
**NORTH ANNA - 2004**  
**RADIOLOGICAL SAMPLING STATION**  
**DISTANCE AND DIRECTION FROM UNIT NO. 1**

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
Airborne Particulate and Radioiodine	End of Route 685	21	1.00	WNW	301°	Weekly	
	Route 700	22	1.00	WSW	242°	Weekly	
	"Aspen Hills"	23	0.93	SSE	158°	Weekly	
	Orange, VA	24	22.00	NW	325°	Weekly	Control
Surface Water	Waste Heat Treatment Facility (Second Cooling Lagoon)	08	3.37	SSE	148°	Monthly	
	*Lake Anna (upstream) (Route 669 Bridge)	09A	12.90	WNW	295°	Monthly	Control
River Water	North Anna River (downstream)	11	5.80	SE	128°	Monthly	
Ground Water (Well Water)	Biology Lab	01A	0.64	SE	138°	Quarterly	
Precipitation	Biology Lab	01A	0.64	SE	138°	Monthly	
Aquatic Sediment	Waste Heat Treatment Facility (Second Cooling Lagoon)	08	3.37	SSE	148°	Semi-Annually	
	Lake Anna (upstream) (Route 669 Bridge)	09A	12.90	WNW	295°	Semi-Annually	Control
	North Anna River (Downstream)	11	5.80	SE	128°	Semi-Annually	
Shoreline Soil	Waste Heat Treatment Facility (Second Cooling Lagoon)	08 **	3.37	SSE	148°	Semi-Annually	
Soil	NAPS Sewage Treatment Plant	01	0.20	NE	42°	Once/3 years	
	Fredericks Hall	02	5.30	SSW	203°	Once/3 years	
	Mineral, VA	03	7.10	WSW	243°	Once/3 years	
	Wares Crossroads	04	5.10	WNW	287°	Once/3 years	

\* In October 1991 the Surface Water Sample location at station 09 was moved to 09A.

\*\* Shoreline soil was changed from station 09 to 08 effective with the August 1996 sample.

**Table 2-1**  
**NORTH ANNA - 2004**  
**RADIOLOGICAL SAMPLING STATION**  
**DISTANCE AND DIRECTION FROM UNIT NO. 1**

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
Soil	Route 752	05	4.20	NNE	20°	Once/3 years	
	Sturgeon's Creek Marina	05A	2.04	N	11°	Once/3 years	
	Levy, VA	06	4.70	ESE	115°	Once/3 years	
	Bumpass, VA	07	7.30	SSE	167°	Once/3 years	
	End of Route 685	21	1.00	WNW	301°	Once/3 years	
	Route 700 (Exclusion Boundary)	22	1.00	WSW	242°	Once/3 years	
	"Aspen Hills"	23	0.93	SSE	158°	Once/3 years	
	Orange, VA	24	22.00	NW	325°	Once/3 years	Control
Milk	Holladay Dairy (R.C. Goodwin)	12	8.30	NW	310°	Monthly	
	Terrell's Dairy (Fredericks Hall)	13	5.60	SSW	205°	Monthly	
Fish	Waste Heat Treatment Facility (Second Cooling Lagoon)	08	3.37	SSE	148°	Semi-Annually	
	Lake Orange	25	16.5	NW	312°	Semi-Annually	Control
Food Products (Broadleaf Vegetation)	Bel Aire Plantation	14	1.20	NE	43°	Monthly if available or at harvest	
	Route 614	15	1.37	SE	133°	Monthly if available or at harvest	
	Route 629/522	16	12.60	NW	314°	Monthly if available or at harvest	Control
	Aspen Hills	23	0.93	SSE	158°	Monthly if available or at harvest	
	"Historic Lane"	26	1.15	S	172 °	Monthly if available or at harvest	

**TABLE 2-2**  
**North Anna Power Station**  
**SAMPLE ANALYSIS PROGRAM**

<b>SAMPLE MEDIA</b>	<b>FREQUENCY</b>	<b>ANALYSIS</b>	<b>LLD</b>	<b>REPORT UNITS</b>
<b>Thermoluminescent Dosimetry (TLD)</b> (84 TLDs)	Quarterly	Gamma Dose	2 mR±2mR	mR/std. Month
(12 TLDs)	Annually	Gamma Dose	2 mR±2mR	mR/std. Month
<b>Airborne Radioiodine</b>	Weekly	I-131	0.07	pCi/m <sup>3</sup>
<b>Airborne Particulate</b>	Weekly	Gross Beta	0.01	pCi/m <sup>3</sup>
	Quarterly (a)	Gamma Isotopic		pCi/m <sup>3</sup>
		Cs-134	0.05	
		Cs-137	0.06	
	2 <sup>nd</sup> Quarter Composite	Sr-89	(b)	pCi/m <sup>3</sup>
		Sr-90	(b)	
<b>Surface Water</b>	Monthly	I-131	1(c)	pCi/L
		Gamma Isotopic		pCi/L
		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
	Quarterly(a)	Tritium (H-3)	2000	pCi/L
	2 <sup>nd</sup> Quarter Composite	Sr-89	(b)	pCi/L
		Sr-90	(b)	
<b>River Water</b>	Monthly	I-131	1(c)	pCi/L
		Gamma Isotopic		pCi/L
		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	

\*LLDs indicate those levels to which environmental samples are required to be analyzed. Actual analysis of samples may be lower than the these listed values.

(a) Quarterly composite of each location's samples are used for the required analysis

(b) There are no required LLDs for Sr-89/90

(c) LLD for non-drinking water is 10 pCi/liter.

**TABLE 2-2**  
**North Anna Power Station**  
**SAMPLE ANALYSIS PROGRAM**

<b>SAMPLE MEDIA</b>	<b>FREQUENCY</b>	<b>ANALYSIS</b>	<b>LLD</b>	<b>REPORT UNITS</b>
<b>River Water</b>	Quarterly(a)	Tritium (H-3)	2000	pCi/L
	2 <sup>nd</sup> Quarter	Sr-89	(b)	pCi/L
	Composite	Sr-90	(b)	
<b>Ground Water (Well Water)</b>	Quarterly	Gamma Isotopic		pCi/L
		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		I-131	1(c)	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
	Quarterly(a) 2 <sup>nd</sup> Quarter	Tritium (H-3)	2000	pCi/L
		Sr-89	(b)	pCi/L
		Sr-90	(b)	
<b>Aquatic Sediment</b>	Semi-Annually	Gamma Isotopic		pCi/kg (dry)
		Cs-134	150	
		Cs-137	180	
	Annually	Sr-89	(b)	pCi/kg (dry)
		Sr-90	(b)	
<b>Precipitation</b>	Monthly	Gross Beta	4	pCi/L
	Semi-Annual	Gamma Isotopic		pCi/L
	Composite	Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		I-131	1(c)	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
<b>Shoreline Soil</b>	Semi-Annually	Gamma Isotopic		pCi/kg (dry)
		Cs-134	150	
		Cs-137	180	
	Annually	Sr-89	(b)	pCi/kg (dry)
		Sr-90	(b)	

\*LLDs indicate those levels to which environmental samples are required to be analyzed. Actual analysis of samples may be lower than the these listed values.

(a) Quarterly composite of each location's samples are used for the required analysis

(b) There are no required LLDs for Sr-89/90

(c) LLD for non-drinking water is 10 pCi/liter.

**TABLE 2-2**  
**North Anna Power Station**  
**SAMPLE ANALYSIS PROGRAM**

<b>SAMPLE MEDIA</b>	<b>FREQUENCY</b>	<b>ANALYSIS</b>	<b>LLD</b>	<b>REPORT UNITS</b>
<b>Soil</b>	<b>Once per 3 years</b>	<b>Gamma Isotopic</b>		<b>pCi/kg (dry)</b>
		Cs-134	150	
		Cs-137	180	
		Sr-89	(b)	
<b>Milk</b>	<b>Monthly</b>	Sr-90	(b)	<b>pCi/kg (dry)</b>
		I-131	1	
	<b>Monthly</b>	<b>Gamma Isotopic</b>		<b>pCi/L</b>
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
		Sr-89	(b)	
		Sr-90	(b)	
	<b>Quarterly</b>			
<b>Fish</b>	<b>Semi-Annually</b>	<b>Gamma Isotopic</b>		<b>pCi/kg (wet)</b>
		Mn-54	130	
		Fe-59	260	
		Co-58	130	
		Co-60	130	
		Zn-65	260	
		Cs-134	130	
		Cs-137	150	
<b>Food Products</b> <b>(Broadleaf Vegetation)</b>	<b>Monthly if</b> <b>available or</b> <b>at harvest</b>	<b>Gamma Isotopic</b>		<b>pCi/kg (wet)</b>
		Cs-134	60	
		Cs-137	80	
		I-131	60	

\*LLDs indicate those levels to which environmental samples are required to be analyzed. Actual analysis of samples may be lower than the these listed values.

(a) Quarterly composite of each location's samples are used for the required analysis

(b) There are no required LLDs for Sr-89/90

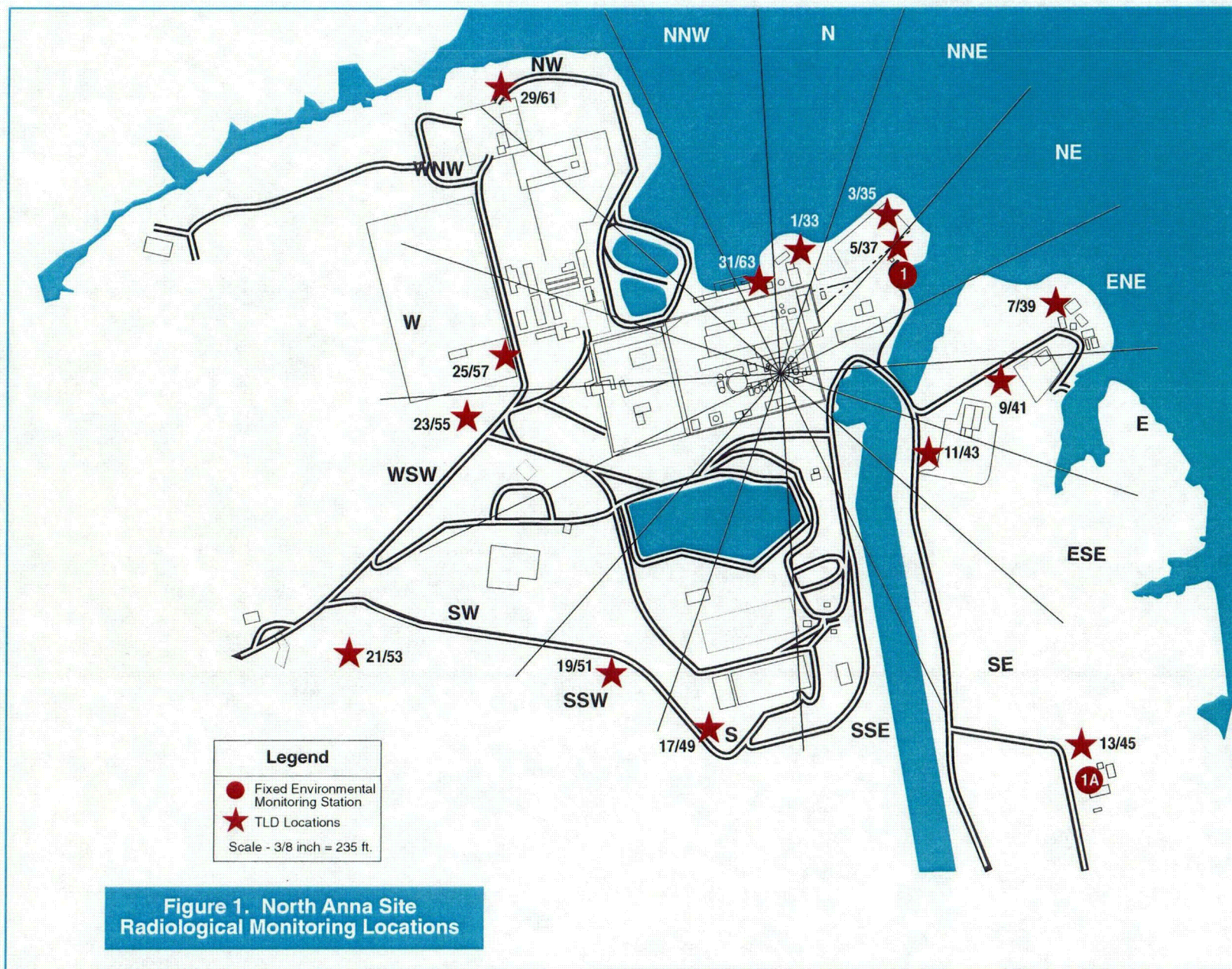
(c) LLD for non-drinking water is 10 pCi/liter.

**Legend For The North Anna Power Station  
Environmental Monitoring Stations Overview Maps**

Map Designation	Environmental Station Identification	Map Designation	Environmental Station
1 (a)	01,NE-5/37	7/8	C-7/8
1A	01A,SE-13/45	1/33	N-1/33
2 (a)	02,SSW-20/52	31/63	NNW-31/63
3 (a)	03,C-5/6	29/61	NW-29/61
4 (a)	04	3/35	NNE-3/35
5 (a)	05	7/39	ENE-7/39
5A (a)	05A,N-2/34	9/41	E-9/41
6 (a)	06,ESE-12/44	11/43	ESE-11/43
7 (a)	07,C-1/2	17/49	S-17/49
8	08-Water, Fish Sediment, Shoreline Soil	19/51 21/53	SSW-19/51 SW-21/53
9A	09A-Water sample, sediment	23/55	WSW-23/55
11	11-River Water, Sediment	25/57	W-25/57
12	12-Milk	16/48	SSE-16/48
13	13-Milk	18/50	
S-18/50			
14	14-Vegetation, NE-6/38	14/46	SE-14/46
15	Vegetation	22/54	SW-22/54
16	Vegetation	26/58	W-26/58
21 (a)	21,WNW-27/59	28/60	WNW-28/60
22 (a)	22,WSW-24/56	32/64	NNW-32/64
23 (a)	23-SSE-15/47	8/40	ENE-8/40
24 (a)(b)	24,C-3/4	4/36	NNE-4/36
25 (c)	25-Fish	10/42	E-10/42
26	26-Vegetation		

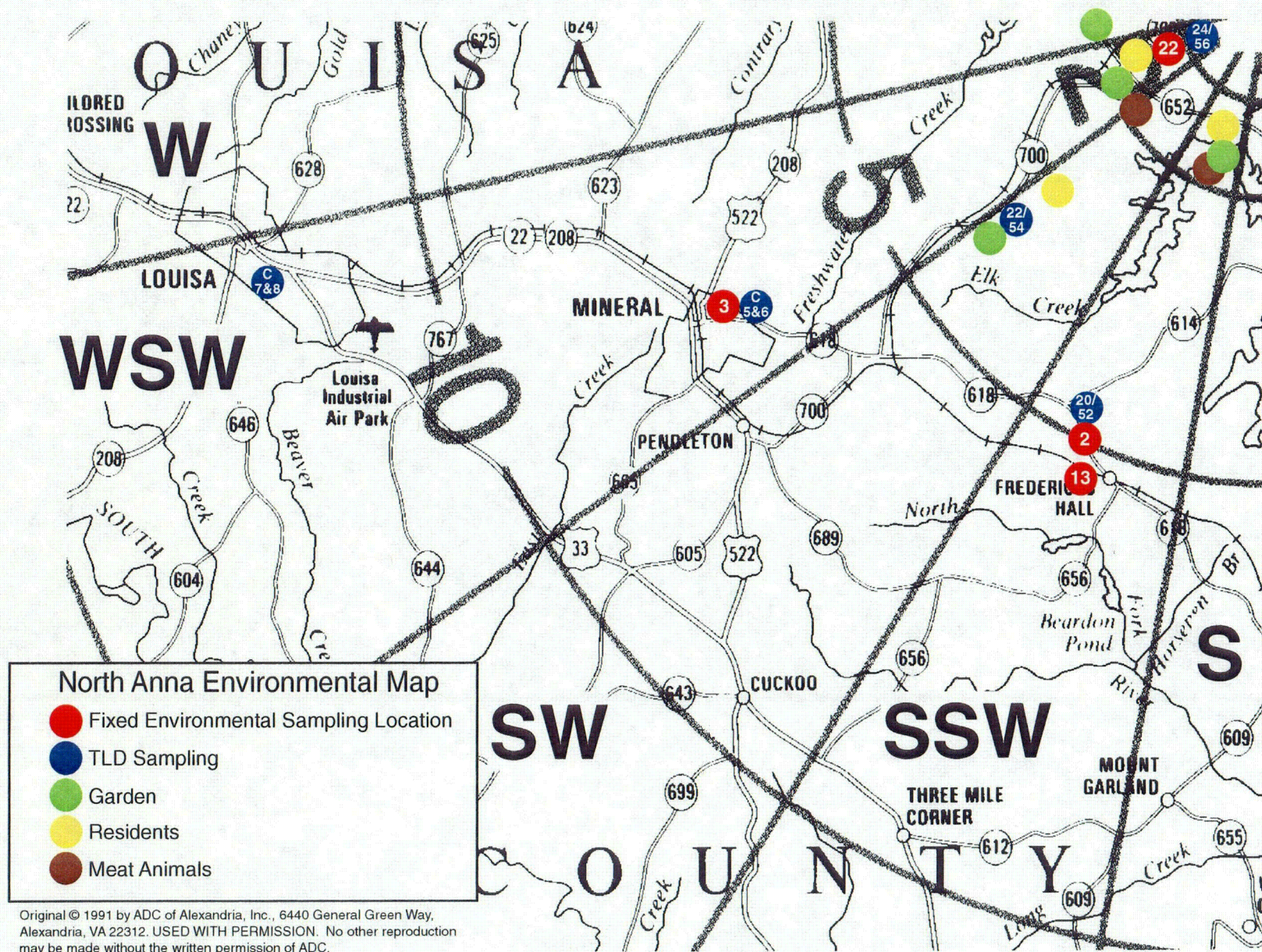
(a) Indicates air sample station, annual and quarterly TLD, Triennial soil.  
(b) In Orange  
(c) In Lake Orange





SV6441





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### 3. ANALYTICAL RESULTS

#### *3.1 Summary of Results*

In accordance with the North Anna Offsite Dose Calculation Manual (ODCM), a summary table of the analytical results has been prepared and is presented in Table 3-1. This data is presented in accordance with the format of the USNRC Branch Technical Position, "Acceptable Radiological Environmental Monitoring Program", Rev. 1, November 1979.

A more detailed analysis of the data is given in Section 4 where a discussion of the variations in the data explains many aspects that are not evident in the Summary Table because of the basic limitation of data summaries.



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	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
Air Iodine (pCi/m <sup>3</sup> )	I-131	624	0.07	(0/572)	N/A		N/A	(0/52)	0
				-	-		-	-	
Airborne Particulates (1E-03 pCi/m <sup>3</sup> )	Gross Beta	624	0.01	23.1(572/572) (2.6-43.9)	04	5.10 mi. WNW	23.1(52/52) (7.6-41.7)	22.7(52/52) (5.1-40.9)	0
	Gamma	48							
	Be-7	48	-	0.1(44/44) (0.0-0.9)	07	7.30 mi. SSE	0.1(4/4) (0.1-0.13)	0.3(4/4) (0.1-0.9)	0
	Cs-134	48	0.05	(0/44)	N/A		N/A	(0/4)	0
				-				-	
	Cs-137	48	0.06	(0/44)	N/A		N/A	(0/4)	0
				-				-	
	Sr-89	12	-	(0/11)	N/A		N/A	(0/1)	0
				-				-	
	Sr-90	12	-	(0/11)	N/A		N/A	(0/1)	0
				-				-	
Ground Well Water (pCi/liter)	Tritium	4	2000	(0/4)	N/A		N/A	N/A	0
				-				-	
	Gamma	4							
	Mn-54	4	15	(0/4)	N/A		N/A	N/A	0
				-				-	
	Fe-59	4	30	(0/4)	N/A		N/A	N/A	0
				-				-	
	Co-58	4	15	(0/4)	N/A		N/A	N/A	0
				-				-	

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	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
Ground Well Water (pCi/liter)	Co-60	4	15	(0/4) -	N/A		N/A	N/A -	0
	Zn-65	4	30	(0/4) -	N/A		N/A	N/A -	0
	Zr-95	4	30	(0/4) -	N/A		N/A	N/A -	0
	Nb-95	4	15	(0/4) -	N/A		N/A	N/A -	0
	I-131	4	10	(0/4) -	N/A		N/A	N/A -	0
	Cs-134	4	15	(0/4) -	N/A		N/A	N/A -	0
	Cs-137	4	18	(0/4) -	N/A		N/A	N/A -	0
	Ba-140	4	60	(0/4) -	N/A		N/A	N/A -	0
	La-140	4	15	(0/4) -	N/A		N/A	N/A -	0
	Sr-89	1	-	(0/1) -	N/A		N/A	N/A -	0
	Sr-90	1	-	(0/1) -	N/A		N/A	N/A -	0
River Water (pCi/liter)	Tritium	4	2000	2288(4/4) (1180-3090)	11	5.80 mi. SE	2288(4/4) (1180-3090)	N/A -	0

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Medium or Pathway Sampled (Unit)	Analysis		LLD*	All Indicator Locations	Location with Highest Mean			Control Location	Non-routine Reported Measurements
	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
River Water (pCi/liter)	Gamma	12							
	Mn-54	12	15	(0/12) -	N/A		N/A	N/A -	0
	Fe-59	12	30	(0/12) -	N/A		N/A	N/A -	0
	Co-58	12	15	(0/12) -	N/A		N/A	N/A -	0
	Co-60	12	15	(0/12) -	N/A		N/A	N/A -	0
	Zn-65	12	30	(0/12) -	N/A		N/A	N/A -	0
	Zr-95	12	30	(0/12) -	N/A		N/A	N/A -	0
	Nb-95	12	15	(0/12) -	N/A		N/A	N/A -	0
	I-131	12	1	(0/12) -	N/A		N/A	N/A -	0
	Cs-134	12	15	(0/12) -	N/A		N/A	N/A -	0
	Cs-137	12	18	(0/12) -	N/A		N/A	N/A -	0
	Ba-140	12	60	(0/12) -	N/A		N/A	N/A -	0
	La-140	12	15	(0/12) -	N/A		N/A	N/A -	0
	Sr-89	1	-	(0/1)	N/A		N/A	N/A	0

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	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
River Water (pCi/liter)	Sr-90	1	-	(0/1) -	N/A		N/A	N/A -	0
Surface Water (pCi/liter)	Tritium	8	2000	2423(4/4) (1280-2980)	08	3.37 mi. SSE	2423(4/4) (1280-2980)	(0/4) -	0
	Gamma	24							
	Mn-54	24	15	(0/12) -	N/A		N/A	(0/12) -	0
	Fe-59	24	30	(0/12) -	N/A		N/A	(0/12) -	0
	Co-58	24	15	(0/12) -	N/A		N/A	(0/12) -	0
	Co-60	24	15	(0/12) -	N/A		N/A	(0/12) -	0
	Zn-65	24	30	(0/12) -	N/A		N/A	(0/12) -	0
	Zr-95	24	30	(0/12) -	N/A		N/A	(0/12) -	0
	Nb-95	24	15	(0/12) -	N/A		N/A	(0/12) -	0
	I-131	24	1	(0/12) -	N/A		N/A	(0/12) -	0
	Cs-134	24	15	(0/12) -	N/A		N/A	(0/12) -	0
	Cs-137	24	18	(0/12)	N/A		N/A	(0/12)	0



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Medium or Pathway Sampled (Unit)	Analysis		LLD*	All Indicator Locations	Location with Highest Mean			Control Location	Non-routine Reported Measurements
	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
Surface Water (pCi/liter)	Ba-140	24	60	(0/12) -	N/A		N/A	(0/12) -	0
	La-140	24	15	(0/12) -	N/A		N/A	(0/12)	0
	Sr-89	1	-	(0/1) -	N/A		N/A	(0/1) -	0
	Sr-90	1	-	(0/1) -	N/A		N/A	(0/1) -	0
Precipitation (pCi/liter)	Monthly Gross Beta	12	4	6.43(11/12) (0.0-15.0)	01A	0.75 mi. SE	6.43 (0.0-15.0)	N/A -	
	Semiannually Gamma	2							
	Mn-54	2	15	(0/2) -	N/A		N/A	N/A -	0
	Fe-59	2	30	(0/2) -	N/A		N/A	N/A -	0
	Co-58	2	15	(0/2) -	N/A		N/A	N/A -	0
	Co-60	2	15	(0/2) -	N/A		N/A	N/A -	0
	Zn-65	2	30	(0/2) -	N/A		N/A	N/A -	0

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Medium or Pathway Sampled (Unit)	Analysis		LLD*	All Indicator Locations	Location with Highest Mean			Control Location	Non-routine Reported Measurements
	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
Precipitation (pCi/liter)	Zr-95	2	30	(0/2) -	N/A		N/A	N/A -	0
	Nb-95	2	15	(0/2) -	N/A		N/A	N/A -	0
	I-131	2	10	(0/2) -	N/A		N/A	N/A -	0
	Cs-134	2	15	(0/2) -	N/A		N/A	N/A -	0
	Cs-137	2	18	(0/2) -	N/A		N/A	N/A -	0
	Ba-140	2	60	(0/2) -	N/A		N/A	N/A -	0
	La-140	2	15	(0/2) -	N/A		N/A	N/A -	0
Sediment Silt (pCi/kg (dry))	Gamma	6							
	K-40	6	-	10903(4/4) (12200-16000)	11	5.80 mi. SSE	12100(2/2) (10500-13200)	11560(2/2) (10920-12200)	0
	Cs-134	6	150	(0/4) -	N/A		N/A	(0/2) -	0
	Cs-137	6	180	(0/4) -	N/A		N/A	(0/2) -	0
	Th-228	6	-	910(4/4) (511-1610)	08	3.37 mi. SE	1060(2/2) (511-1610)	648(2/2) (377-920)	0
	Sr-89 (0/1) (Annually)	3 0	-	(0/2) -	N/A		N/A	-	

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Medium or Pathway Sampled (Unit)	Analysis		LLD*	All Indicator Locations	Location with Highest Mean			Control Location	Non-routine Reported Measurements
	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
Sediment Silt (pCi/kg) (dry)	Sr-90 (Annually)	3	-	(0/2)	N/A		N/A	(0/1)	0
				-					
Soil (pCi/Kg) (dry)	Triennial Gamma	12							
	Cs-134	11	150	(0/11)	N/A		N/A	(0/1)	0
	Cs-137	11	180	285(5/11) (191-430)	3	7.10 mi. WSW	430	360(1/1)	0
	Th-228	11	-	1351(11/11) (540-2240)	7	7.30 mi SSE	2240	1090(1/1)	
	Sr-89	11	-	(0/11)	N/A		N/A	(0/1)	
	Sr-90	11	-	(0/11)	N/A		N/A	(0/1)	
Shoreline Soil (pCi/kg) (dry)	Gamma	2							
	K-40	2	-	2540(2/2) (2110-2980)	8	3.37 mi. SSE	2540(2/2) (2110-2908)	N/A -	0
	Th-228	2	-	336(2/2) (334-339)	8	3.37 mi. SSE	336(2/2) (334-339)	N/A -	0
	Cs-134	2	150	(0/2)	N/A		N/A	N/A -	0
	Cs-137	2	180	199(2/2) (162-236)	8	3.37 mi. SSE	199(2/2) (162-336)	N/A -	0
	Sr-89 (Annually)	1	-	(0/1)	N/A		N/A	N/A -	0
	Sr-90	1	-	(0/1)	N/A		N/A	N/A	0

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	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
Milk (pCi/liter)	Gamma	24							
	K-40	24	-	1353(24/24) (1180-1530)	12	8.3 mi. NW	1353(12/12) (1180-1530)	N/A -	0
	I-131	24	1	(0/24) -	N/A		N/A	N/A -	0
	Cs-134	24	15	(0/24) -	N/A		N/A	N/A -	0
	Cs-137	24	18	(0/24) -	N/A		N/A	N/A -	0
	Ba-140	24	60	(0/24) -	N/A		N/A	N/A -	0
	La-140	24	15	(0/24) -	N/A		N/A	N/A -	0
	Sr-89 (Quarterly)	8	-	(0/8) -	N/A		N/A	N/A -	0
	Sr-90 (Quarterly)	8	-	2.8(1/8) -		N/A		N/A -	N/A
Fish (pCi/kg) (wet)	Gamma	8							
	K-40	8	-	1597(4/4) (1230-1820)	08	3.37 mi. SSE	1597(4/4) (1230-1820)	1457(4/4) (1370-1420)	0
	Mn-54	8	130	(0/4) -	N/A		N/A	(0/4) -	0
	Fe-59	8	260	(0/4) -	N/A		N/A	(0/4) -	0
	Co-58	8	130	(0/4)	N/A		N/A	(0/4)	0

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	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
Fish (pCi/kg) (wet)	Co-60	8	130	(0/4) -	N/A		N/A	(0/4) -	0
	Zn-65	8	260	(0/4) -	N/A		N/A	(0/4) -	0
	Cs-134	8	130	(0/4) -	N/A		N/A	(0/4) -	0
	Cs-137	8	150	26.3(1/4) -	8	3.37 mi.	26.3(1/4) -	(0/4) -	0
Food Vegetation (pCi/kg) (wet))	Gamma	25							
	Be-7	25	-	1386(19/25) (440-2880)	23	varies SSE	1286(5/5) (1010-2880)	1473(3/5) (1310-1740)	0
	K-40	25	-	13428(25/25) (8900-19400)	15	varies SE	13948(5/5) (12800-15010)	11084(5/5) (9000-14700)	0
	I-131	25	60	(0/24) -	N/A		N/A	(0/5) -	0
	Cs-134	25	60	(0/24) -	N/A		N/A	(0/5) -	0
	Cs-137	25	80	35(1/25)	15	varies SE	35(1/5) -	(0/5) -	0
	Th-228	25	-	292(3/25) (197410)	16	varies. NW	410(1/5)	410(1/5) -	0
Direct Radiation (mR/std. month) (Environmental TLDs)	Gamma Dose	48	2	3.6(44/44) (1.7-6.7)	23	0.93 mi. SSE	5.3(4/4) (4.6-6.7)	3.5(4/4) (2.6-4.2)	0
Direct Radiation	Gamma Dose	12	2	1.56(11/11) (1.16-2.20)	23	0.93 mi. SSE	2.20(1/1) -	1.57(1/1) -	0

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	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	
Direct Radiation (mR/std. Month) (Sector TLDs)	Gamma Dose	253	2	5.3(253/256) (2.6-30)	19/51 <sup>(1)</sup>	0.42 mi. SSW	27.0(8/8) (15.7-39.7)	3.2(32/32) (2.0-4.9)	0

(1) 19/51 located onsite.

### 3.2 Analytical Results of 2004 REMP Samples

Radiological analyses of environmental media characteristically approach and frequently fall below the detection limits of state-of-the-art measurement methods. The data reported in the following tables are strictly counting statistics. The reported error is two times the standard deviation ( $2\sigma$ ) of the net activity. Unless otherwise noted, the overall error (counting, sample size, chemistry, errors, etc.) is estimated to be 2 to 5 times that listed. Results are considered positive when the measured value exceeds 1.5 times the listed  $2\sigma$  error (i.e., the measured value exceeds  $3\sigma$ ).

Because of counting statistics, negative values, zeros and numbers below the Minimum Detectable Level (MDL) are statistically valid pieces of data<sup>1</sup>. For the purposes of this report all valid data are presented in order to indicate any background biases. AREVA Environmental Laboratory's analytical methods meet the Lower Limit of Detection (LLD) requirements given in Table 2 of the USNRC Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program", (November 1979, Revision 1) and the North Anna ODCM.

Data are given according to sample type as indicated below.

1. Gamma Exposure Rate
2. Air Particulates, Gross Beta Radioactivity
3. Air Particulates, Weekly I-131
4. Air Particulates, Quantitative Gamma Spectra
5. Air Particulate Strontium
6. Soil
7. Precipitation
8. Cow Milk
9. Food Products and Vegetation
10. Well Water
11. River Water
12. Surface Water
13. Bottom Sediment/Silt
14. Shoreline Soil
15. Fish

---

<sup>1</sup> Analytical results are handled as recommended by HASL ("*Reporting of Analytical Results from HASL*," letter by Leo B. Higginbotham) and NUREG/CR-4007 (Sept. 1984).

**TABLE #3-2**  
**DIRECT RADIATION MEASUREMENTS - SECTOR QUARTERLY TLD RESULTS**

mR/Std. Month (30.4 days)  $\pm$  2 Sigma

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Station Name	First Quarter 1/7/2004 4/13/2004	Second Quarter 4/13/2004 7/1/2004	Third Quarter 7/1/2004 10/5/2004	Fourth Quarter 10/5/2004 1/5/2005	Quarterly Average
N-1	4.9	5.4	5.0	5.9	5.3 $\pm$ 0.9
N-33	5.0	5.4	4.9	5.3	5.2 $\pm$ 0.5
N-2	3.3	4.0	3.2	4.3	3.7 $\pm$ 1.1
N-34	3.2	3.7	3.2	4.5	3.7 $\pm$ 1.2
NNE-3	8.1	7.3	6.6	8.2	7.5 $\pm$ 1.5
NNE-35	7.0	7.0	6.7	8.5	7.3 $\pm$ 1.6
NNE-4	4.7	4.9	4.4	5.0	4.7 $\pm$ 0.5
NNE-36	4.7	3.4	4.3	5.0	4.4 $\pm$ 1.4
NE-5	4.5	4.3	4.0	5.5	4.6 $\pm$ 1.4
NE-37	5.3	5.2	3.4	5.8	4.9 $\pm$ 2.1
NE-6	4.0	2.9	3.3	4.4	3.6 $\pm$ 1.3
NE-38	3.9	3.9	3.4	5.0	4.1 $\pm$ 1.4
ENE-7	4.6	4.2	4.8	5.5	4.8 $\pm$ 1.1
ENE-39	4.5	4.8	4.5	6.1	5.0 $\pm$ 1.5
ENE-8	4.0	3.7	3.4	4.1	3.8 $\pm$ 0.7
ENE-40	3.0	3.8	3.4	3.9	3.5 $\pm$ 0.8
E-9	5.2	5.1	5.0	6.4	5.4 $\pm$ 1.3
E-41	4.9	4.8	4.9	6.0	5.2 $\pm$ 1.1
E-10	4.3	4.8	5.0	5.2	4.8 $\pm$ 0.8
E-42	4.4	5.0	4.5	5.8	4.9 $\pm$ 1.3
ESE-11	4.5	3.8	4.5	5.2	4.5 $\pm$ 1.1
ESE-43	4.2	4.7	4.0	5.0	4.5 $\pm$ 0.9
ESE-12	5.4	5.8	4.6	6.1	5.5 $\pm$ 1.3
ESE-44	4.3	4.7	4.2	5.4	4.6 $\pm$ 1.1
SE-13	5.7	4.5	3.9	5.4	4.9 $\pm$ 1.7
SE-45	4.0	4.6	4.2	6.4	4.8 $\pm$ 2.2
SE-14	6.8	6.9	6.4	7.3	6.8 $\pm$ 0.8
SE-46	6.3	6.7	6.4	*	6.5 $\pm$ 0.3
SSE-15	5.1	4.5	5.0	5.6	5.1 $\pm$ 0.8
SSE-47	4.8	5.6	4.9	5.9	5.3 $\pm$ 1.1
SSE-16	3.1	3.8	3.3	4.4	3.6 $\pm$ 1.1
SSE-48	3.0	3.8	3.0	4.1	3.5 $\pm$ 1

\*- Refer to "Section III, REMP Exceptions for Scheduled Sampling and Analysis During 2004"



**TABLE #3-2**  
**DIRECT RADIATION MEASUREMENTS - SECTOR QUARTERLY TLD RESULTS**

mR/Std. Month (30.4 days)  $\pm$  2 Sigma

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Station Name	First Quarter 1/7/2004 4/13/2004	Second Quarter 4/13/2004 7/1/2004	Third Quarter 7/1/2004 10/5/2004	Fourth Quarter 10/5/2004 1/5/2005	Quarterly Average
S-17	7.9	7.1	7.0	8.7	7.7 $\pm$ 1.6
S-49	7.4	7.9	7.0	8.1	7.6 $\pm$ 1.0
S-18	2.2	2.8	2.7	3.6	2.8 $\pm$ 1.2
S-50	2.4	3.0	2.4	3.6	2.8 $\pm$ 1.2
SSW-19	36.4	28.1	15.7	39.7	30.0 $\pm$ 21.4
SSW-51	31.6	30.4	16.1	18.0	24.0 $\pm$ 16.2
SSW-20	2.4	3.0	2.4	3.5	2.8 $\pm$ 1.0
SSW-52	2.3	2.8	2.4	3.8	2.8 $\pm$ 1.4
SW-21	4.2	4.1	4.1	5.0	4.3 $\pm$ 0.9
SW-53	3.9	3.8	3.9	4.1	3.9 $\pm$ 0.3
SW-22	4.7	4.8	4.4	*	4.6 $\pm$ 0.4
SW-54	4.3	4.7	4.4	*	4.5 $\pm$ 0.4
WSW-23	5.3	6.0	5.1	5.8	5.5 $\pm$ 0.9
WSW-55	5.7	6.1	4.6	6.1	5.6 $\pm$ 1.4
WSW-24	4.1	5.0	4.5	5.4	4.8 $\pm$ 1.1
WSW-56	3.8	4.5	5.0	5.0	4.6 $\pm$ 1.2
W-25	6.4	6.6	5.0	7.5	6.4 $\pm$ 2.1
W-57	6.6	6.8	6.3	7.1	6.7 $\pm$ 0.7
W-26	2.4	3.5	3.9	3.9	3.4 $\pm$ 1.4
W-58	3.1	2.1	3.0	3.3	2.9 $\pm$ 1.0
WNW-27	3.4	4.1	3.3	4.3	3.8 $\pm$ 1.0
WNW-59	2.9	3.7	3.4	3.7	3.4 $\pm$ 0.7
WNW-28	2.9	4.2	2.6	3.8	3.4 $\pm$ 1.5
WNW-60	3.0	3.5	2.8	3.4	3.2 $\pm$ 0.7
NW-29	5.7	6.5	5.8	7.2	6.3 $\pm$ 1.4
NW-61	5.8	6.3	5.8	6.9	6.2 $\pm$ 1.1
NW-30	2.4	2.1	2.5	3.6	2.6 $\pm$ 1.3
NW-62	2.4	2.6	2.6	3.5	2.8 $\pm$ 1.0
NNW-31	3.4	3.8	3.6	5.1	4.0 $\pm$ 1.5
NNW-63	3.8	3.5	3.6	4.5	3.9 $\pm$ 0.9
NNW-32	3.6	4.2	4.2	4.8	4.2 $\pm$ 1.0
NNW-64	3.6	2.7	3.6	4.9	3.7 $\pm$ 1.8

\*- Refer to \*Section III, REMP Exceptions for Scheduled Sampling and Analysis During 2004

**TABLE #3-2**  
**DIRECT RADIATION MEASUREMENTS - SECTOR QUARTERLY TLD RESULTS**

mR/Std. Month (30.4 days)  $\pm$  2 Sigma

Page 3 of 3

Station Name	First Quarter 1/7/2004 4/13/2004	Second Quarter 4/13/2004 7/1/2004	Third Quarter 7/1/2004 10/5/2004	Fourth Quarter 10/05/2004 1/05/2005	Quarterly Average
C-1	3.0	3.1	3.3	3.9	3.3 $\pm$ 0.8
C-2	3.0	2.8	3.4	4.3	3.4 $\pm$ 1.3
C-3	3.2	2.9	3.3	4.2	3.4 $\pm$ 1.1
C-4	3.4	3.0	3.4	4.5	3.6 $\pm$ 1.2
C-5	2.2	2.0	2.3	4.9	2.9 $\pm$ 2.8
C-6	2.6	2.5	2.3	3.0	2.6 $\pm$ 0.6
C-7	3.0	2.7	3.4	3.8	3.2 $\pm$ 0.9
C-8	3.3	3.0	2.9	3.9	3.3 $\pm$ 0.9
EPSA-01**	5.1	5.0	4.6	5.7	5.1 $\pm$ 0.9
EPSA-02**	5.0	4.7	4.5	5.9	5.0 $\pm$ 1.2
EPSF-03**	4.5	4.7	4.5	5.7	4.8 $\pm$ 1.2
EPSF-04**	4.3	3.9	5.1	6.3	4.9 $\pm$ 2.2
EPSR-05**	4.9	5.2	5.2	5.7	5.3 $\pm$ 0.7
EPSR-06**	4.9	4.3	4.6	6.1	5.0 $\pm$ 1.6
EPSJ-07**	3.5	3.3	3.9	5.2	4.0 $\pm$ 1.7
EPSJ-08**	3.6	3.4	3.8	5.2	4.0 $\pm$ 1.6
EPSP-09**	*	6.1	7.4	8.3	7.3 $\pm$ 2.3
EPSP-10**	8.5	6.4	7.4	8.9	7.8 $\pm$ 2.3
Average $\pm$ 2 s.d.	5.1 $\pm$ 10.3	5.1 $\pm$ 8.7	4.4 $\pm$ 4.6	5.9 $\pm$ 9.3	5.1 $\pm$ 7.9

\*- Refer to "Section III, REMP Exceptions for Scheduled Sampling and Analysis During 2004"

\*\* Emergency Plan TLDs. Included for informational purposes only. Not included in average

**TABLE 3-2**  
***DIRECT RADIATION MEASUREMENTS QUARTERLY AND ANNUAL TLD***

mR/Std. Month (30.4 days)  $\pm 2$  Sigma

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Station Name	First Quarter 1/7/2004 4/13/2004	Second Quarter 4/13/2004 7/1/2004	Third Quarter 7/1/2004 10/5/2004	Fourth Quarter 10/5/2004 1/5/2005	Quarterly Average	Annual TLD
STA-01	5.0	3.8	4.7	6.0	4.9 $\pm$ 1.8	1.74
STA-02	2.1	1.8	2.5	3.4	2.5 $\pm$ 1.4	1.21
STA-03	1.9	2.7	2.3	2.9	2.4 $\pm$ 0.8	1.26
STA-04	2.1	1.7	2.1	3.6	2.4 $\pm$ 1.7	1.07
STA-05	3.1	2.6	3.8	4.0	3.4 $\pm$ 1.2	1.59
STA-05A	3.1	2.6	3.3	4.4	3.4 $\pm$ 1.5	1.35
STA-06	4.5	4.6	4.2	5.3	4.6 $\pm$ 0.9	1.95
STA-07	2.9	3.2	2.2	3.9	3.1 $\pm$ 1.5	1.53
STA-21	2.8	3.5	3.2	4.1	3.4 $\pm$ 1.1	1.48
STA-22	4.4	5.3	4.6	5.0	4.8 $\pm$ 0.8	1.83
STA-23	5.1	5.0	4.6	6.7	5.3 $\pm$ 1.8	2.20
STA-24	3.9	2.6	3.4	4.2	3.5 $\pm$ 1.4	1.57
Average $\pm 2$ s.d.	3.4 $\pm$ 2.3	3.3 $\pm$ 2.4	3.4 $\pm$ 2.0	4.5 $\pm$ 2.2	3.6 $\pm$ 2.1	1.57 $\pm$ 0.65

**Table 3-3**  
**Air Particulate**  
**Gross Beta Radioactivity**  
**[pCi/m3 x 10-3]**

Period Ending	Station 01			Station 02			Station 03			Station 04			Station 05			Station 05A			Station 06		
01/07/04	21.5	+/-	3.0	21.5	+/-	3.0	23.5	+/-	3.1	22.0	+/-	3.0	23.4	+/-	3.1	24.9	+/-	3.1	23.1	+/-	3.1
01/14/04	39.1	+/-	3.8	35.4	+/-	3.7	43.9	+/-	4.5	41.7	+/-	3.9	41.2	+/-	3.9	36.1	+/-	3.7	36.6	+/-	3.7
01/21/04	20.3	+/-	3.3	14.7	+/-	3.1	23.3	+/-	3.4	18.8	+/-	3.3	20.2	+/-	3.3	19.1	+/-	3.2	19.3	+/-	3.3
01/28/04	23.4	+/-	3.4	23.1	+/-	3.3	25.5	+/-	3.5	26.1	+/-	3.4	28.0	+/-	3.5	22.9	+/-	3.4	25.0	+/-	3.4
02/04/04	29.0	+/-	3.7	27.3	+/-	3.7	31.5	+/-	3.8	29.6	+/-	3.8	32.4	+/-	3.9	26.7	+/-	3.7	30.6	+/-	3.8
02/11/04	18.3	+/-	2.9	22.5	+/-	3.0	17.9	+/-	2.8	22.2	+/-	3.0	15.8	+/-	2.7	22.7	+/-	3.0	19.3	+/-	2.9
02/18/04	18.5	+/-	3.3	26.5	+/-	3.4	22.2	+/-	3.3	30.9	+/-	3.6	28.7	+/-	3.5	23.8	+/-	3.4	30.1	+/-	3.6
02/25/04	23.0	+/-	3.5	21.0	+/-	3.3	26.6	+/-	3.5	23.7	+/-	3.3	26.7	+/-	3.4	17.2	+/-	3.1	24.1	+/-	3.4
03/03/04	24.0	+/-	3.1	25.6	+/-	3.2	21.8	+/-	3.1	22.9	+/-	3.1	22.0	+/-	3.1	20.5	+/-	3.0	21.9	+/-	3.0
03/10/04	21.0	+/-	3.0	17.8	+/-	2.8	20.1	+/-	3.0	24.2	+/-	3.2	20.4	+/-	3.0	16.0	+/-	2.8	19.3	+/-	2.9
03/17/04	12.5	+/-	3.6	16.2	+/-	3.8	13.5	+/-	3.7	21.2	+/-	4.1	14.3	+/-	4.4	12.4	+/-	3.6	18.9	+/-	4.0
03/24/04	14.8	+/-	3.7	16.2	+/-	3.9	19.6	+/-	4.1	17.8	+/-	4.0	15.5	+/-	3.8	16.5	+/-	3.9	20.6	+/-	4.2
03/31/04	18.8	+/-	4.5	19.0	+/-	4.5	13.4	+/-	4.5	18.2	+/-	4.4	19.7	+/-	4.5	18.3	+/-	4.4	22.2	+/-	4.6
04/06/04	9.6	+/-	3.2	5.8	+/-	3.0	6.0	+/-	3.1	7.6	+/-	3.2	7.5	+/-	3.2	6.2	+/-	3.2	9.1	+/-	3.3
04/14/04	15.8	+/-	3.8	17.9	+/-	3.9	15.5	+/-	3.8	21.3	+/-	4.1	17.5	+/-	3.9	17.4	+/-	3.9	16.5	+/-	3.8
04/21/04	34.1	+/-	3.7	19.7	+/-	3.2	26.4	+/-	3.5	24.7	+/-	3.4	26.3	+/-	3.5	19.3	+/-	3.3	23.6	+/-	3.4
04/28/04	20.7	+/-	4.4	29.0	+/-	4.8	29.1	+/-	4.8	21.9	+/-	4.5	22.5	+/-	4.5	24.3	+/-	4.6	28.9	+/-	4.8
05/05/04	20.1	+/-	4.6	18.5	+/-	2.5	20.6	+/-	2.5	19.5	+/-	2.5	20.4	+/-	2.5	19.9	+/-	2.5	19.1	+/-	2.5
05/12/04	24.7	+/-	4.6	25.5	+/-	4.6	30.8	+/-	4.9	28.1	+/-	4.8	34.3	+/-	5.1	23.0	+/-	4.6	25.2	+/-	4.7
05/19/04	33.6	+/-	5.1	27.1	+/-	4.9	33.8	+/-	5.1	34.6	+/-	5.2	36.5	+/-	5.2	36.5	+/-	5.2	30.7	+/-	5.0
05/26/04	17.1	+/-	4.3	15.3	+/-	4.2	18.2	+/-	4.4	14.8	+/-	4.2	21.0	+/-	4.6	18.8	+/-	4.4	20.7	+/-	4.5
06/02/04	14.3	+/-	4.2	16.4	+/-	4.3	19.7	+/-	4.5	14.1	+/-	4.2	21.1	+/-	4.6	12.5	+/-	4.1	12.6	+/-	4.1
06/09/04	12.8	+/-	4.3	13.4	+/-	4.4	15.1	+/-	4.4	16.1	+/-	4.4	20.1	+/-	4.7	15.6	+/-	4.5	17.0	+/-	4.5
06/16/04	23.5	+/-	4.3	24.0	+/-	4.3	20.6	+/-	4.1	21.6	+/-	4.1	26.8	+/-	4.4	21.4	+/-	4.1	21.9	+/-	4.2
06/23/04	12.0	+/-	3.8	11.6	+/-	3.8	11.5	+/-	3.7	15.4	+/-	4.0	12.5	+/-	3.8	13.9	+/-	3.9	11.1	+/-	3.7
06/30/04	32.8	+/-	5.7	26.2	+/-	5.2	30.7	+/-	5.4	29.0	+/-	5.3	27.2	+/-	5.3	25.2	+/-	5.1	25.5	+/-	5.1

**Table 3-3**  
**Air Particulate**  
**Gross Beta Radioactivity**  
**[pCi/m3 x 10-3]**

Period Ending	Station 07			Station 21			Station 22			Station 23			Station 24		
07/07/04	22.3	+/-	3.0	23.5	+/-	3.2	24.4	+/-	3.1	24.9	+/-	3.1	26.5	+/-	3.2
07/14/04	33.3	+/-	3.6	38.7	+/-	3.8	37.5	+/-	3.7	40.9	+/-	3.8	40.9	+/-	3.8
07/28/04	20.0	+/-	3.3	16.8	+/-	3.2	24.7	+/-	3.4	21.7	+/-	3.4	24.6	+/-	3.5
07/28/04	21.5	+/-	3.3	26.1	+/-	3.4	23.5	+/-	3.4	23.8	+/-	3.4	26.7	+/-	3.5
08/04/04	25.7	+/-	3.7	30.3	+/-	3.8	34.3	+/-	3.9	28.8	+/-	3.6	28.4	+/-	3.7
08/11/04	17.4	+/-	2.8	22.9	+/-	3.1	24.3	+/-	3.1	22.7	+/-	3.1	21.2	+/-	3.0
08/18/04	22.7	+/-	3.4	24.4	+/-	3.4	22.8	+/-	3.3	24.1	+/-	3.3	21.6	+/-	3.3
08/25/04	21.3	+/-	3.3	28.2	+/-	3.5	22.4	+/-	3.4	26.0	+/-	3.5	22.6	+/-	3.3
09/01/04	19.2	+/-	3.0	23.2	+/-	3.1	22.5	+/-	3.1	19.8	+/-	3.0	20.3	+/-	3.0
09/08/04	22.4	+/-	3.0	20.3	+/-	3.0	20.3	+/-	3.0	20.0	+/-	2.9	22.0	+/-	3.1
09/15/04	16.2	+/-	3.8	15.2	+/-	3.8	17.0	+/-	3.9	10.7	+/-	3.5	15.4	+/-	3.8
09/22/04	19.0	+/-	4.1	15.8	+/-	3.8	17.7	+/-	4.0	16.5	+/-	3.9	18.9	+/-	4.0
09/29/04	19.6	+/-	4.5	20.0	+/-	4.6	22.5	+/-	4.7	22.9	+/-	4.8	22.0	+/-	4.7
10/05/04	4.9	+/-	3.1	7.5	+/-	3.2	5.8	+/-	3.1	8.1	+/-	3.1	5.1	+/-	3.1
10/13/04	14.3	+/-	3.7	13.1	+/-	3.7	18.5	+/-	3.9	5.7	+/-	3.2	11.4	+/-	3.6
10/20/04	28.1	+/-	3.6	19.6	+/-	3.2	27.8	+/-	3.5	23.8	+/-	3.4	28.8	+/-	3.6
10/27/04	27.6	+/-	4.7	22.8	+/-	4.5	24.7	+/-	4.6	27.8	+/-	4.7	31.5	+/-	4.9
11/03/04	17.0	+/-	2.5	18.6	+/-	2.5	17.9	+/-	2.5	20.1	+/-	2.5	22.3	+/-	2.6
11/10/04	24.6	+/-	4.6	19.3	+/-	4.4	28.9	+/-	4.8	35.1	+/-	5.1	25.5	+/-	4.7
11/18/04	32.0	+/-	5.0	32.5	+/-	5.0	29.9	+/-	4.9	30.0	+/-	5.0	30.0	+/-	4.9
11/25/04	19.9	+/-	4.5	15.9	+/-	4.3	18.9	+/-	4.5	18.5	+/-	4.4	12.2	+/-	4.1
12/01/04	16.4	+/-	4.3	11.8	+/-	4.1	15.2	+/-	4.3	12.0	+/-	4.1	21.3	+/-	4.6
12/08/04	14.8	+/-	4.4	12.7	+/-	4.3	15.3	+/-	4.5	18.1	+/-	4.6	13.7	+/-	4.3
12/15/04	20.6	+/-	4.1	21.3	+/-	4.1	21.1	+/-	4.1	20.0	+/-	4.0	20.5	+/-	4.1
12/22/04	11.0	+/-	3.8	8.8	+/-	3.6	11.2	+/-	3.7	14.6	+/-	4.0	13.0	+/-	3.9
12/29/04	24.8	+/-	5.1	22.1	+/-	5.0	32.9	+/-	5.5	23.3	+/-	5.0	26.9	+/-	5.2

**Table 3-3**  
**Air Particulate**  
**Gross Beta Radioactivity**  
**[pCi/m3 x 10-3]**

Period Ending	Station 01			Station 02			Station 03			Station 04			Station 05			Station 05A			Station 06		
07/07/04	24.1	+/-	3.8	20.4	+/-	3.7	21.5	+/-	3.8	24.6	+/-	3.9	21.6	+/-	3.7	20.3	+/-	3.6	21.1	+/-	3.7
07/14/04	24.6	+/-	4.8	22.5	+/-	4.5	23.6	+/-	4.6	23.2	+/-	4.5	23.3	+/-	4.5	23.1	+/-	4.5	16.8	+/-	4.2
07/21/04	20.6	+/-	4.4	21.2	+/-	4.5	24.9	+/-	4.7	24.7	+/-	4.7	22.7	+/-	4.6	24.0	+/-	4.7	17.1	+/-	4.3
07/28/04	18.7	+/-	4.4	20.3	+/-	4.2	16.4	+/-	4.0	19.8	+/-	4.2	16.8	+/-	4.0	18.8	+/-	4.1	18.4	+/-	4.1
08/04/04	15.0	+/-	4.3	10.7	+/-	4.1	9.1	+/-	4.0	11.1	+/-	4.1	14.2	+/-	4.2	11.5	+/-	4.1	15.2	+/-	4.3
08/11/04	33.1	+/-	4.8	24.2	+/-	4.2	21.9	+/-	4.1	20.3	+/-	4.0	25.0	+/-	4.3	24.4	+/-	4.2	28.3	+/-	4.4
08/18/04	24.2	+/-	4.7	20.5	+/-	4.5	23.1	+/-	4.6	21.3	+/-	4.5	27.8	+/-	4.8	18.4	+/-	4.4	21.1	+/-	4.5
08/25/04	37.3	+/-	5.1	27.9	+/-	4.9	35.7	+/-	5.2	34.7	+/-	5.1	31.9	+/-	5.0	32.9	+/-	5.0	29.2	+/-	4.8
09/01/04	25.8	+/-	4.5	19.4	+/-	4.1	25.9	+/-	4.5	22.2	+/-	4.3	25.6	+/-	4.5	22.4	+/-	4.3	21.6	+/-	4.3
09/08/04	25.3	+/-	4.2	22.3	+/-	4.0	26.5	+/-	4.3	23.7	+/-	4.1	18.1	+/-	3.8	23.3	+/-	4.1	22.2	+/-	4.1
09/15/04	18.3	+/-	4.4	17.6	+/-	4.4	17.3	+/-	4.4	16.4	+/-	4.3	9.6	+/-	3.9	17.6	+/-	4.4	16.2	+/-	4.3
09/22/04	11.5	+/-	4.1	10.8	+/-	4.1	7.2	+/-	3.9	2.6	+/-	2.3	6.2	+/-	3.9	13.3	+/-	4.2	13.0	+/-	4.2
09/29/04	32.4	+/-	5.1	31.9	+/-	5.1	31.1	+/-	5.1	33.5	+/-	5.2	31.9	+/-	5.1	30.1	+/-	5.0	28.7	+/-	5.0
10/05/04	33.2	+/-	5.1	26.8	+/-	4.7	33.9	+/-	5.1	34.9	+/-	5.2	29.9	+/-	4.9	27.5	+/-	4.8	29.4	+/-	4.9
10/13/04	-1.0	+/-	16.0	26.6	+/-	4.1	27.2	+/-	4.2	29.5	+/-	4.3	24.6	+/-	4.0	12.9	+/-	5.2	28.7	+/-	4.2
10/20/04	34.4	+/-	6.1	22.5	+/-	4.6	26.2	+/-	4.7	24.2	+/-	4.6	16.5	+/-	4.2	24.8	+/-	4.6	26.2	+/-	4.7
10/27/04	12.6	+/-	4.2	13.1	+/-	4.1	11.8	+/-	4.1	14.9	+/-	4.3	10.9	+/-	4.1	11.4	+/-	4.1	9.6	+/-	4.0
11/03/04	34.6	+/-	5.1	26.9	+/-	4.8	35.9	+/-	5.2	32.9	+/-	5.0	26.6	+/-	4.8	26.9	+/-	4.8	30.7	+/-	4.9
11/10/04	26.1	+/-	4.9	21.0	+/-	4.8	20.2	+/-	4.7	24.0	+/-	4.9	20.3	+/-	4.7	19.2	+/-	4.6	19.3	+/-	4.6
11/18/04	27.1	+/-	4.1	16.5	+/-	3.5	27.4	+/-	4.1	25.0	+/-	4.0	19.9	+/-	3.7	24.7	+/-	4.0	15.0	+/-	3.4
11/24/04	34.2	+/-	5.5	26.4	+/-	5.1	27.7	+/-	5.2	35.7	+/-	5.5	22.4	+/-	4.8	30.0	+/-	5.3	26.2	+/-	5.1
12/01/04	16.6	+/-	3.9	10.6	+/-	3.6	11.8	+/-	3.7	15.6	+/-	3.9	8.1	+/-	3.5	12.1	+/-	3.7	8.3	+/-	3.5
12/08/04	29.7	+/-	4.7	30.6	+/-	4.7	24.3	+/-	4.4	29.6	+/-	4.7	23.6	+/-	4.4	28.4	+/-	4.6	28.2	+/-	4.6
12/15/04	15.0	+/-	3.8	11.2	+/-	3.6	19.1	+/-	4.1	18.2	+/-	4.0	15.9	+/-	3.9	15.2	+/-	3.9	15.2	+/-	3.9
12/22/04	27.0	+/-	4.7	24.8	+/-	4.6	27.6	+/-	4.7	23.3	+/-	4.5	21.8	+/-	4.4	21.9	+/-	4.4	24.0	+/-	4.5
12/29/04	26.2	+/-	4.9	23.2	+/-	4.7	23.9	+/-	4.8	27.4	+/-	4.9	19.5	+/-	4.6	24.9	+/-	4.8	23.1	+/-	4.7

**Table 3-3**  
**Air Particulate**  
**Gross Beta Radioactivity**  
**[pCi/m<sup>3</sup> x 10<sup>-3</sup>]**

Period Ending	Station 07			Station 21			Station 22			Station 23			Station 24		
07/14/04	22.4	+/-	4.5	26.0	+/-	4.6	19.5	+/-	4.3	21.8	+/-	4.4	23.5	+/-	4.6
07/21/04	28.2	+/-	4.9	26.1	+/-	4.7	25.6	+/-	4.7	20.6	+/-	4.5	27.7	+/-	4.8
07/28/04	18.9	+/-	4.1	18.8	+/-	4.1	14.0	+/-	3.9	18.6	+/-	4.1	16.2	+/-	4.0
08/04/04	8.6	+/-	3.9	9.8	+/-	4.0	12.6	+/-	4.2	13.3	+/-	4.2	16.6	+/-	4.4
07/07/04	17.6	+/-	3.5	25.8	+/-	4.0	23.2	+/-	3.8	17.9	+/-	3.5	18.0	+/-	3.5
08/11/04	25.9	+/-	4.3	24.8	+/-	4.3	19.9	+/-	4.0	27.2	+/-	4.4	28.2	+/-	4.4
08/18/04	22.6	+/-	4.5	21.0	+/-	5.2	21.8	+/-	4.5	22.0	+/-	4.5	22.9	+/-	4.6
08/25/04	33.3	+/-	5.0	37.9	+/-	5.2	38.3	+/-	5.2	34.3	+/-	5.1	33.1	+/-	5.0
09/01/04	24.4	+/-	4.4	25.4	+/-	4.5	25.4	+/-	4.5	24.7	+/-	4.4	22.6	+/-	4.3
09/08/04	19.1	+/-	3.9	22.4	+/-	4.1	23.7	+/-	4.2	22.5	+/-	4.1	25.5	+/-	4.3
09/15/04	13.3	+/-	4.2	14.2	+/-	4.2	16.5	+/-	4.3	13.0	+/-	4.2	16.9	+/-	4.4
09/22/04	8.3	+/-	4.0	13.6	+/-	4.3	6.6	+/-	3.9	11.4	+/-	4.1	12.8	+/-	4.2
09/29/04	28.1	+/-	4.9	29.4	+/-	5.0	32.5	+/-	5.1	28.7	+/-	5.0	30.9	+/-	5.0
10/05/04	28.4	+/-	4.8	34.6	+/-	5.2	32.4	+/-	5.1	31.1	+/-	4.9	32.5	+/-	5.0
10/13/04	23.5	+/-	4.0	27.9	+/-	4.2	22.8	+/-	3.9	25.0	+/-	4.1	29.6	+/-	4.3
10/20/04	24.6	+/-	4.6	28.8	+/-	4.8	21.7	+/-	4.5	22.7	+/-	4.6	24.0	+/-	4.6
10/27/04	10.9	+/-	4.1	13.5	+/-	4.2	10.1	+/-	4.0	9.0	+/-	3.9	11.5	+/-	4.1
11/03/04	26.2	+/-	4.7	32.5	+/-	5.0	26.9	+/-	4.8	33.3	+/-	5.1	30.5	+/-	4.9
11/10/04	22.9	+/-	4.9	22.6	+/-	4.8	24.0	+/-	4.8	22.1	+/-	4.9	25.2	+/-	4.9
11/18/04	22.0	+/-	3.8	25.2	+/-	4.0	22.1	+/-	3.9	22.4	+/-	3.8	23.7	+/-	4.0
11/24/04	28.9	+/-	5.2	29.4	+/-	5.2	30.6	+/-	5.3	28.0	+/-	5.2	29.9	+/-	5.2
12/01/04	8.3	+/-	3.5	16.2	+/-	4.0	10.5	+/-	3.6	12.6	+/-	3.7	13.1	+/-	3.8
12/08/04	23.5	+/-	4.3	28.3	+/-	4.6	29.9	+/-	4.7	27.4	+/-	4.6	28.5	+/-	4.6
12/15/04	7.9	+/-	3.4	18.5	+/-	4.1	15.4	+/-	3.9	10.1	+/-	3.5	15.6	+/-	3.9
12/22/04	17.1	+/-	4.2	25.5	+/-	4.6	23.5	+/-	4.5	18.9	+/-	4.3	24.5	+/-	4.6
12/29/04	22.3	+/-	4.7	20.3	+/-	4.6	22.7	+/-	4.7	25.4	+/-	4.9	24.7	+/-	4.8

**Table 3-4**  
**Airborne Iodine**  
**I - 131**  
**[pCi/m3 x 10-3]**

Period Ending	Station 01			Station 02			Station 03			Station 04			Station 05			Station 05A			Station 06		
01/07/04	6.0	+/-	16.0	-5.0	+/-	14.0	8.0	+/-	15.0	13.0	+/-	16.0	8.0	+/-	16.0	-2.0	+/-	14.0	-5.0	+/-	16.0
01/14/04	-3.0	+/-	15.0	18.0	+/-	16.0	-3.0	+/-	13.0	5.0	+/-	16.0	-2.0	+/-	15.0	5.0	+/-	16.0	-8.0	+/-	18.0
01/21/04	-10.0	+/-	21.0	-9.0	+/-	20.0	4.0	+/-	24.0	-21.0	+/-	22.0	2.0	+/-	22.0	5.0	+/-	19.0	-16.0	+/-	19.0
01/28/04	-2.0	+/-	20.0	6.0	+/-	26.0	0.0	+/-	24.0	-2.0	+/-	22.0	6.0	+/-	20.0	0.0	+/-	23.0	6.0	+/-	23.0
02/04/04	3.0	+/-	15.0	-18.0	+/-	17.0	-2.0	+/-	16.0	11.0	+/-	14.0	3.0	+/-	14.0	-8.0	+/-	17.0	0.0	+/-	17.0
02/11/04	3.0	+/-	21.0	12.0	+/-	19.0	-5.0	+/-	18.0	7.0	+/-	20.0	0.0	+/-	17.0	-9.0	+/-	19.0	-2.0	+/-	18.0
02/18/04	-9.0	+/-	16.0	-7.0	+/-	15.0	-1.0	+/-	15.0	-10.0	+/-	13.0	-1.0	+/-	14.0	6.0	+/-	14.0	-4.0	+/-	15.0
02/25/04	2.0	+/-	17.0	-2.0	+/-	16.0	3.0	+/-	13.0	0.0	+/-	13.0	2.0	+/-	13.0	2.0	+/-	16.0	5.0	+/-	16.0
03/03/04	-8.0	+/-	15.0	-3.0	+/-	14.0	-8.0	+/-	15.0	-5.0	+/-	14.0	-2.0	+/-	15.0	8.0	+/-	17.0	16.0	+/-	16.0
03/10/04	2.0	+/-	17.0	3.0	+/-	21.0	-12.0	+/-	18.0	16.0	+/-	17.0	-12.0	+/-	17.0	12.0	+/-	16.0	-2.0	+/-	16.0
03/17/04	-2.0	+/-	14.0	-3.0	+/-	15.0	2.0	+/-	15.0	2.0	+/-	13.0	-19.0	+/-	29.0	-2.0	+/-	15.0	-8.0	+/-	15.0
03/24/04	2.0	+/-	14.0	-12.0	+/-	18.0	-3.0	+/-	17.0	12.0	+/-	17.0	10.0	+/-	15.0	-2.0	+/-	15.0	13.0	+/-	15.0
03/31/04	-3.0	+/-	12.0	2.0	+/-	17.0	-14.0	+/-	13.0	-5.0	+/-	13.0	-10.0	+/-	19.0	-6.0	+/-	15.0	-2.0	+/-	16.0
04/06/04	-7.0	+/-	13.0	4.0	+/-	15.0	0.0	+/-	14.0	-3.0	+/-	12.0	-2.0	+/-	15.0	-8.0	+/-	14.0	-2.0	+/-	15.0
04/14/04	6.0	+/-	14.0	-1.0	+/-	12.0	-1.0	+/-	15.0	-4.0	+/-	15.0	1.0	+/-	15.0	6.0	+/-	12.0	12.0	+/-	13.0
04/21/04	-11.0	+/-	13.0	5.0	+/-	15.0	-22.0	+/-	16.0	2.0	+/-	16.0	-11.0	+/-	16.0	-2.0	+/-	13.0	3.0	+/-	14.0
04/28/04	5.0	+/-	17.0	-5.0	+/-	16.0	0.0	+/-	14.0	-11.0	+/-	17.0	10.0	+/-	15.0	3.0	+/-	16.0	-6.0	+/-	17.0
05/05/04	11.0	+/-	20.0	-7.0	+/-	13.0	11.0	+/-	13.0	-1.0	+/-	12.0	-1.0	+/-	13.0	3.0	+/-	14.0	-1.0	+/-	15.0
05/12/04	-25.0	+/-	15.0	2.0	+/-	14.0	3.0	+/-	15.0	5.0	+/-	16.0	17.0	+/-	17.0	18.0	+/-	17.0	-10.0	+/-	15.0
05/19/04	-19.0	+/-	17.0	-3.0	+/-	17.0	-13.0	+/-	15.0	-6.0	+/-	16.0	-3.0	+/-	16.0	-8.0	+/-	14.0	-5.0	+/-	17.0
05/26/04	-6.0	+/-	17.0	11.0	+/-	16.0	13.0	+/-	18.0	19.0	+/-	17.0	6.0	+/-	21.0	-19.0	+/-	20.0	-19.0	+/-	21.0
06/02/04	7.0	+/-	20.0	-15.0	+/-	20.0	4.0	+/-	21.0	-4.0	+/-	20.0	-2.0	+/-	19.0	-20.0	+/-	18.0	-2.0	+/-	20.0
06/09/04	-5.0	+/-	18.0	-5.0	+/-	16.0	-2.0	+/-	18.0	-5.0	+/-	17.0	2.0	+/-	15.0	-19.0	+/-	20.0	-5.0	+/-	14.0
06/16/04	10.0	+/-	17.0	3.0	+/-	16.0	0.0	+/-	16.0	5.0	+/-	18.0	-16.0	+/-	19.0	-2.1	+/-	8.1	18.0	+/-	18.0
06/23/04	-16.0	+/-	20.0	-12.0	+/-	22.0	16.0	+/-	21.0	-12.0	+/-	17.0	16.0	+/-	23.0	-10.0	+/-	21.0	-10.0	+/-	19.0
06/30/04	8.0	+/-	19.0	0.0	+/-	18.0	10.0	+/-	20.0	0.0	+/-	17.0	-8.0	+/-	21.0	8.0	+/-	22.0	-12.0	+/-	18.0



**Table 3-4**  
**Airborne Iodine**  
**I - 131**  
**[pCi/m<sup>3</sup> x 10<sup>-3</sup>]**

Period Ending	Station 07			Station 21			Station 22			Station 23			Station 24		
01/07/04	-6.0	+/-	11.0	-14.0	+/-	17.0	-9.0	+/-	23.0	-4.0	+/-	26.0	-5.0	+/-	24.0
01/14/04	10.0	+/-	15.0	3.0	+/-	14.0	-5.0	+/-	16.0	6.0	+/-	13.0	10.0	+/-	18.0
01/21/04	-7.0	+/-	21.0	-9.0	+/-	20.0	5.0	+/-	21.0	2.0	+/-	20.0	-11.0	+/-	18.0
01/28/04	10.0	+/-	22.0	-16.0	+/-	21.0	-8.0	+/-	20.0	14.0	+/-	21.0	0.0	+/-	21.0
02/04/04	11.0	+/-	17.0	10.0	+/-	14.0	-5.0	+/-	16.0	-3.0	+/-	17.0	-2.0	+/-	18.0
02/11/04	0.0	+/-	18.0	0.0	+/-	18.0	4.0	+/-	16.0	4.0	+/-	20.0	-5.0	+/-	23.0
02/18/04	4.0	+/-	17.0	7.0	+/-	14.0	-3.0	+/-	14.0	7.0	+/-	15.0	15.0	+/-	15.0
02/25/04	0.0	+/-	16.0	-2.0	+/-	11.0	2.0	+/-	16.0	5.0	+/-	15.0	-8.0	+/-	14.0
03/03/04	-8.0	+/-	17.0	0.0	+/-	17.0	0.0	+/-	17.0	2.0	+/-	18.0	-5.0	+/-	14.0
03/10/04	-2.0	+/-	17.0	-2.0	+/-	17.0	7.0	+/-	19.0	-2.0	+/-	16.0	9.0	+/-	18.0
03/17/04	2.0	+/-	15.0	-8.0	+/-	17.0	5.0	+/-	12.0	-8.0	+/-	14.0	2.0	+/-	17.0
03/24/04	-2.0	+/-	16.0	-6.0	+/-	17.0	8.0	+/-	14.0	7.0	+/-	15.0	2.0	+/-	16.0
03/31/04	-8.0	+/-	15.0	-10.0	+/-	18.0	11.0	+/-	16.0	0.0	+/-	15.0	2.0	+/-	16.0
04/06/04	-2.0	+/-	17.0	0.0	+/-	14.0	9.0	+/-	14.0	-3.0	+/-	14.0	-6.0	+/-	16.0
04/14/04	6.0	+/-	14.0	-6.0	+/-	13.0	-7.0	+/-	14.0	10.0	+/-	11.0	-6.0	+/-	15.0
04/21/04	-11.0	+/-	17.0	-2.0	+/-	16.0	-5.0	+/-	19.0	-11.0	+/-	12.0	15.0	+/-	19.0
04/28/04	2.0	+/-	14.0	0.0	+/-	20.0	3.0	+/-	16.0	-10.0	+/-	16.0	-3.0	+/-	15.0
05/05/04	-5.0	+/-	12.0	0.0	+/-	13.0	-3.0	+/-	11.0	10.0	+/-	13.0	4.0	+/-	15.0
05/12/04	2.0	+/-	17.0	8.0	+/-	16.0	5.0	+/-	16.0	-3.0	+/-	18.0	-13.0	+/-	16.0
05/19/04	-6.0	+/-	13.0	-5.0	+/-	11.0	-10.0	+/-	17.0	-5.0	+/-	15.0	-8.0	+/-	14.0
05/26/04	2.0	+/-	20.0	2.0	+/-	16.0	-10.0	+/-	20.0	-11.0	+/-	20.0	4.0	+/-	19.0
06/02/04	-7.0	+/-	23.0	-7.0	+/-	17.0	7.0	+/-	21.0	-21.0	+/-	19.0	4.0	+/-	22.0
06/09/04	0.0	+/-	16.0	-10.0	+/-	18.0	10.0	+/-	18.0	8.0	+/-	18.0	-6.0	+/-	15.0
06/16/04	6.0	+/-	16.0	-10.0	+/-	15.0	13.0	+/-	17.0	-11.0	+/-	20.0	-3.0	+/-	16.0
06/23/04	-6.0	+/-	19.0	0.0	+/-	24.0	0.0	+/-	18.0	4.0	+/-	19.0	-6.0	+/-	19.0
06/30/04	-18.0	+/-	20.0	0.0	+/-	16.0	12.0	+/-	23.0	-8.0	+/-	21.0	2.0	+/-	21.0

**Table 3-4**  
**Airborne Iodine**  
**I - 131**  
**[pCi/m3 x 10-3]**

Period Ending	Station 01			Station 02			Station 03			Station 04			Station 05			Station 05A			Station 06		
07/07/04	20.0	+/-	17.0	3.0	+/-	20.0	3.0	+/-	16.0	-5.0	+/-	19.0	-11.0	+/-	18.0	-3.0	+/-	17.0	-3.0	+/-	17.0
07/21/04	8.0	+/-	21.0	6.0	+/-	25.0	8.0	+/-	19.0	-8.0	+/-	18.0	-8.0	+/-	17.0	-14.0	+/-	22.0	27.0	+/-	24.0
07/21/04	15.0	+/-	17.0	-12.0	+/-	20.0	9.0	+/-	22.0	-8.0	+/-	21.0	6.0	+/-	20.0	4.0	+/-	21.0	-10.0	+/-	22.0
07/28/04	-11.0	+/-	19.0	10.0	+/-	17.0	2.0	+/-	13.0	-8.0	+/-	16.0	14.0	+/-	16.0	17.0	+/-	17.0	-14.0	+/-	19.0
08/04/04	11.0	+/-	15.0	0.0	+/-	18.0	0.0	+/-	16.0	-8.0	+/-	17.0	3.0	+/-	16.0	0.0	+/-	18.0	3.0	+/-	19.0
08/11/04	3.0	+/-	14.0	-5.0	+/-	20.0	-12.0	+/-	19.0	13.0	+/-	15.0	-4.0	+/-	14.0	-3.0	+/-	19.0	-7.0	+/-	18.0
08/18/04	7.0	+/-	19.0	-11.0	+/-	16.0	-7.0	+/-	18.0	-8.0	+/-	19.0	1.0	+/-	18.0	-7.0	+/-	19.0	8.0	+/-	19.0
08/25/04	13.0	+/-	15.0	-3.0	+/-	17.0	18.0	+/-	17.0	-9.0	+/-	17.0	8.0	+/-	17.0	7.0	+/-	16.0	7.0	+/-	16.0
09/01/04	-19.0	+/-	20.0	13.0	+/-	21.0	-4.0	+/-	18.0	15.0	+/-	25.0	4.0	+/-	18.0	-6.0	+/-	23.0	15.0	+/-	23.0
09/08/04	1.0	+/-	15.0	2.0	+/-	16.0	5.0	+/-	17.0	5.0	+/-	16.0	-4.0	+/-	16.0	2.0	+/-	22.0	3.0	+/-	14.0
09/15/04	-6.0	+/-	16.0	1.0	+/-	12.0	13.0	+/-	15.0	-9.0	+/-	15.0	6.0	+/-	16.0	-6.0	+/-	15.0	-13.0	+/-	16.0
09/22/04	14.0	+/-	16.0	-6.0	+/-	16.0	3.0	+/-	18.0	-3.0	+/-	16.0	-5.0	+/-	16.0	-5.0	+/-	17.0	19.0	+/-	17.0
09/29/04	-7.0	+/-	14.0	-3.0	+/-	11.0	4.0	+/-	14.0	-1.0	+/-	16.0	1.0	+/-	13.0	3.0	+/-	11.0	-13.0	+/-	14.0
10/05/04	-2.0	+/-	20.0	11.0	+/-	20.0	-11.0	+/-	16.0	6.0	+/-	18.0	7.0	+/-	20.0	2.0	+/-	16.0	9.0	+/-	20.0
10/13/04	0.0	+/-	25.0	-3.0	+/-	14.0	12.0	+/-	13.0	5.0	+/-	14.0	3.0	+/-	15.0	9.0	+/-	10.0	1.0	+/-	13.0
10/20/04	-2.0	+/-	29.0	-10.0	+/-	16.0	8.0	+/-	16.0	-6.0	+/-	16.0	0.0	+/-	18.0	2.0	+/-	15.0	0.0	+/-	15.0
10/27/04	-6.0	+/-	15.0	-4.0	+/-	16.0	6.0	+/-	15.0	6.0	+/-	15.0	-8.0	+/-	17.0	8.0	+/-	15.0	6.0	+/-	14.0
11/03/04	15.0	+/-	17.0	8.0	+/-	17.0	-15.0	+/-	17.0	-3.0	+/-	14.0	-6.0	+/-	17.0	-5.0	+/-	15.0	-3.0	+/-	18.0
11/10/04	6.0	+/-	21.0	6.0	+/-	23.0	-4.0	+/-	21.0	2.0	+/-	21.0	9.0	+/-	21.0	4.0	+/-	22.0	-17.0	+/-	25.0
11/18/04	1.0	+/-	14.0	11.0	+/-	12.0	8.0	+/-	14.0	7.0	+/-	16.0	6.0	+/-	12.0	6.0	+/-	15.0	-4.0	+/-	18.0
11/24/04	-2.0	+/-	23.0	-8.0	+/-	30.0	-8.0	+/-	21.0	0.0	+/-	21.0	10.0	+/-	22.0	2.0	+/-	22.0	-12.0	+/-	27.0
12/01/04	-4.0	+/-	17.0	6.0	+/-	14.0	0.0	+/-	15.0	6.0	+/-	16.0	-9.0	+/-	15.0	-1.0	+/-	14.0	-10.0	+/-	15.0
12/08/04	17.0	+/-	28.0	5.0	+/-	30.0	0.0	+/-	25.0	0.0	+/-	28.0	-2.0	+/-	30.0	-26.0	+/-	27.0	23.0	+/-	27.0
12/15/04	-2.0	+/-	17.0	6.0	+/-	16.0	-11.0	+/-	14.0	8.0	+/-	19.0	8.0	+/-	14.0	6.0	+/-	17.0	-6.0	+/-	16.0
12/22/04	-12.0	+/-	24.0	9.0	+/-	26.0	6.0	+/-	22.0	16.0	+/-	24.0	25.0	+/-	24.0	0.0	+/-	32.0	3.0	+/-	19.0
12/29/04	7.5	+/-	8.3	6.0	+/-	11.0	-6.0	+/-	10.0	-6.0	+/-	12.0	2.9	+/-	9.6	-11.0	+/-	12.0	-5.0	+/-	10.0

**Table 3-4**  
**Airborne Iodine**  
**I - 131**  
**[pCi/m<sup>3</sup> x 10<sup>-3</sup>]**

Period Ending	Station 07			Station 21			Station 22			Station 23			Station 24		
07/07/04	-6.0	+/-	17.0	-2.0	+/-	16.0	-6.0	+/-	18.0	-6.0	+/-	18.0	-6.0	+/-	15.0
07/21/04	4.0	+/-	17.0	-2.0	+/-	19.0	-4.0	+/-	16.0	-4.0	+/-	19.0	-19.0	+/-	22.0
07/21/04	2.0	+/-	18.0	6.0	+/-	20.0	2.0	+/-	20.0	10.0	+/-	23.0	0.0	+/-	14.0
07/28/04	12.0	+/-	17.0	5.0	+/-	15.0	10.0	+/-	19.0	3.0	+/-	18.0	14.0	+/-	19.0
08/04/04	6.0	+/-	16.0	5.0	+/-	16.0	5.0	+/-	15.0	6.0	+/-	19.0	-5.0	+/-	14.0
08/11/04	2.0	+/-	16.0	9.0	+/-	17.0	12.0	+/-	16.0	2.0	+/-	19.0	7.0	+/-	15.0
08/18/04	-1.0	+/-	16.0	-10.0	+/-	23.0	5.0	+/-	18.0	-5.0	+/-	16.0	17.0	+/-	21.0
08/25/04	-3.0	+/-	17.0	2.0	+/-	19.0	6.0	+/-	16.0	-2.0	+/-	17.0	-9.0	+/-	19.0
09/01/04	-4.0	+/-	19.0	-23.0	+/-	25.0	10.0	+/-	23.0	-2.0	+/-	21.0	-19.0	+/-	23.0
09/08/04	-1.0	+/-	17.0	2.0	+/-	15.0	0.0	+/-	15.0	-6.0	+/-	13.0	5.0	+/-	14.0
09/15/04	7.0	+/-	16.0	6.0	+/-	14.0	3.0	+/-	16.0	-3.0	+/-	16.0	-10.0	+/-	16.0
09/22/04	8.0	+/-	15.0	-3.0	+/-	15.0	5.0	+/-	19.0	2.0	+/-	16.0	-3.0	+/-	16.0
09/29/04	-1.0	+/-	15.0	1.0	+/-	13.0	4.0	+/-	14.0	7.0	+/-	16.0	6.0	+/-	14.0
10/05/04	0.0	+/-	19.0	-13.0	+/-	17.0	0.0	+/-	19.0	-9.0	+/-	18.0	-6.0	+/-	20.0
10/13/04	5.0	+/-	15.0	1.0	+/-	13.0	-4.0	+/-	13.0	3.0	+/-	13.0	10.0	+/-	13.0
10/20/04	-2.0	+/-	15.0	-5.0	+/-	16.0	15.0	+/-	17.0	-2.0	+/-	17.0	-21.0	+/-	17.0
10/27/04	2.0	+/-	15.0	-5.0	+/-	17.0	-9.0	+/-	16.0	-5.0	+/-	15.0	6.0	+/-	17.0
11/03/04	9.0	+/-	13.0	14.0	+/-	18.0	-2.0	+/-	16.0	16.0	+/-	17.0	-6.0	+/-	16.0
11/10/04	-9.0	+/-	23.0	4.0	+/-	21.0	-11.0	+/-	20.0	2.0	+/-	21.0	7.0	+/-	20.0
11/18/04	-7.0	+/-	15.0	-1.0	+/-	17.0	8.0	+/-	16.0	3.0	+/-	16.0	-14.0	+/-	17.0
11/24/04	-2.0	+/-	21.0	2.0	+/-	29.0	-14.0	+/-	25.0	6.0	+/-	24.0	-2.0	+/-	24.0
12/01/04	4.0	+/-	13.0	7.0	+/-	14.0	-9.0	+/-	15.0	-4.0	+/-	15.0	9.0	+/-	14.0
12/08/04	-11.0	+/-	28.0	8.0	+/-	30.0	10.0	+/-	31.0	-2.0	+/-	30.0	2.0	+/-	28.0
12/15/04	-19.0	+/-	19.0	-11.0	+/-	16.0	13.0	+/-	17.0	-5.0	+/-	18.0	2.0	+/-	19.0
12/22/04	8.0	+/-	23.0	24.0	+/-	20.0	-6.0	+/-	23.0	22.0	+/-	24.0	0.0	+/-	25.0
12/29/04	-6.0	+/-	12.0	10.0	+/-	13.0	-5.0	+/-	13.0	3.4	+/-	9.8	-10.0	+/-	11.0

**Table 3-5**  
**Airborne Particulate**  
**Gamma Spectra and Strontium**  
**[pCi/m3 x10-3]**

Quarter 1

Sampling Location	Be-7			K-40			Cs-134			Cs-137		
01	96.0	+/-	34.0	-36.4	+/-	8.2	-0.9	+/-	1.2	-0.6	+/-	1.5
02	79.0	+/-	32.0	-26.0	+/-	12.0	0.0	+/-	1.2	0.2	+/-	1.8
03	84.0	+/-	34.0	-19.0	+/-	11.0	0.3	+/-	1.1	-0.2	+/-	1.6
04	109.0	+/-	34.0	-43.1	+/-	9.5	-0.1	+/-	1.0	0.3	+/-	1.7
05	80.0	+/-	34.0	-32.0	+/-	15.0	0.2	+/-	1.1	0.5	+/-	1.7
05A	92.0	+/-	33.0	-27.0	+/-	12.0	0.0	+/-	1.0	-0.2	+/-	1.6
06	112.0	+/-	38.0	-29.0	+/-	11.0	0.5	+/-	1.8	1.2	+/-	1.8
07	102.0	+/-	33.0	-27.0	+/-	12.0	-0.4	+/-	1.2	0.8	+/-	1.8
21	63.0	+/-	33.0	-20.0	+/-	17.0	0.3	+/-	1.0	-1.8	+/-	1.6
22	108.0	+/-	33.0	-26.0	+/-	11.0	0.0	+/-	1.1	-1.2	+/-	1.4
23	94.0	+/-	37.0	-25.0	+/-	12.0	0.2	+/-	0.9	1.2	+/-	1.8
24	105.0	+/-	36.0	-11.0	+/-	16.0	-0.1	+/-	0.9	-0.9	+/-	1.4

Quarter 2

Sampling Location	Be-7			K-40			Cs-134			Cs-137			Sr-89			Sr-90		
01	125.0	+/-	34.0	-0.3	+/-	12.0	0.8	+/-	1.1	-0.4	+/-	1.7	2.0	+/-	13.0	-0.8	+/-	1.7
02	136.0	+/-	35.0	-0.5	+/-	11.0	0.1	+/-	0.8	-1.1	+/-	1.7	-2.1	+/-	8.4	0.3	+/-	1.2
03	162.0	+/-	37.0	1.0	+/-	15.0	0.2	+/-	0.9	-0.1	+/-	1.6	-2.7	+/-	8.0	-0.1	+/-	1.1
04	143.0	+/-	35.0	-1.0	+/-	14.0	0.3	+/-	1.1	-0.2	+/-	1.7	2.2	+/-	9.7	0.3	+/-	1.3
05	141.0	+/-	23.0	0.0	+/-	5.6	-0.1	+/-	0.5	-0.1	+/-	0.5	3.3	+/-	9.0	0.4	+/-	1.2
05A	129.0	+/-	34.0	-2.8	+/-	7.5	-0.7	+/-	0.9	0.0	+/-	1.6	-2.0	+/-	1.1	0.1	+/-	1.5
06	130.0	+/-	33.0	-4.6	+/-	8.8	0.3	+/-	0.8	-0.4	+/-	0.7	-4.0	+/-	1.1	0.9	+/-	1.7
07	114.0	+/-	29.0	-4.8	+/-	7.9	-0.4	+/-	0.5	0.5	+/-	0.6	5.0	+/-	12.0	0.3	+/-	1.5
21	109.0	+/-	27.0	2.1	+/-	8.6	-0.1	+/-	0.9	0.1	+/-	0.8	-6.4	+/-	7.7	0.5	+/-	1.2
22	121.0	+/-	29.0	0.7	+/-	8.1	-0.2	+/-	0.7	-0.4	+/-	0.8	1.7	+/-	9.8	1.2	+/-	1.4
23	108.0	+/-	21.0	1.6	+/-	6.8	-0.2	+/-	0.5	0.5	+/-	0.5	-1.0	+/-	13.0	0.4	+/-	1.8
24	99.0	+/-	27.0	-10.2	+/-	7.7	0.1	+/-	0.7	-0.2	+/-	0.6	-4.0	+/-	10.0	1.0	+/-	1.6

Sr-89/90 sampled in 2nd Qtr.

**Table 3-5**  
**Airborne Particulate and Strontium**  
**Gamma Spectra**  
**[pCi/m3 x10-3]**

Quarter 3

Sampling Location	Be-7		K-40			Cs-134			Cs-137		
01	109.0	+/- 31.0	-0.6	+/- 9.0		-0.1	+/- 1.5		-0.5	+/- 1.5	
02	84.0	+/- 29.0	1.0	+/- 10.0		0.2	+/- 0.9		0.4	+/- 1.6	
03	124.0	+/- 30.0	-7.0	+/- 11.0		1.1	+/- 1.0		-0.5	+/- 1.4	
04	87.0	+/- 28.0	-12.8	+/- 9.0		0.1	+/- 0.6		0.4	+/- 1.6	
05	110.0	+/- 16.0	3.0	+/- 5.3		-0.1	+/- 0.4		-0.2	+/- 0.4	
05A	102.0	+/- 30.0	-5.7	+/- 8.9		0.1	+/- 0.5		1.0	+/- 1.5	
06	100.0	+/- 31.0	-2.0	+/- 10.0		-0.5	+/- 0.9		0.0	+/- 1.5	
07	89.0	+/- 30.0	8.0	+/- 13.0		0.1	+/- 0.6		-0.9	+/- 1.5	
21	120.0	+/- 32.0	1.0	+/- 12.0		0.3	+/- 1.0		-0.6	+/- 1.4	
22	124.0	+/- 32.0	-4.0	+/- 12.0		0.4	+/- 0.7		-0.7	+/- 1.5	
23	108.0	+/- 29.0	5.0	+/- 14.0		-0.5	+/- 0.9		-0.6	+/- 1.5	
24	130.0	+/- 32.0	5.0	+/- 13.0		-0.3	+/- 1.0		-0.9	+/- 1.5	

Quarter 4

Sampling Location	Be-7		K-40			Cs-134			Cs-137		
01	142.0	+/- 37.0	2.2	+/- 8.9		0.3	+/- 0.7		0.1	+/- 0.6	
02	90.0	+/- 28.0	4.7	+/- 8.5		0.4	+/- 0.7		-0.1	+/- 0.7	
03	930.0	+/- 30.0	-7.3	+/- 8.6		-0.2	+/- 0.6		-0.1	+/- 0.7	
04	92.0	+/- 28.0	0.5	+/- 7.0		0.1	+/- 0.7		0.3	+/- 0.8	
05	82.0	+/- 31.0	-0.5	+/- 9.2		-0.6	+/- 0.7		0.1	+/- 0.5	
05A	109.0	+/- 31.0	4.0	+/- 10.0		0.6	+/- 0.8		0.2	+/- 0.6	
06	80.0	+/- 28.0	5.0	+/- 10.0		0.0	+/- 0.5		-0.1	+/- 0.4	
07	75.0	+/- 27.0	5.0	+/- 11.0		-0.3	+/- 6.3		-0.1	+/- 0.6	
21	106.0	+/- 33.0	-3.4	+/- 8.3		-0.4	+/- 0.7		-0.2	+/- 0.5	
22	79.0	+/- 28.0	0.7	+/- 8.8		-0.7	+/- 6.8		0.4	+/- 0.7	
23	94.0	+/- 30.0	6.3	+/- 9.8		-0.3	+/- 0.6		0.1	+/- 0.7	
24	124.0	+/- 32.0	1.7	+/- 6.5		0.1	+/- 0.6		0.0	+/- 0.8	

**Table 3-6**  
**Soil**  
**Gamma Spectra and Strontium**  

[pCi/kg]

collection date: 07/14/04

Station	Sr-89			Sr-90			Be-7			K-40			Cs-134			Cs-137			Th-228		
01	180	+/-	170	-20	+/-	130	100	+/-	210	18600	+/-	980	1	+/-	22	-1	+/-	27	1300	+/-	100
02	120	+/-	190	60	+/-	150	170	+/-	270	7270	+/-	970	18	+/-	25	48	+/-	41	540	+/-	120
03	0	+/-	190	180	+/-	150	-180	+/-	390	5500	+/-	1100	36	+/-	56	430	+/-	84	570	+/-	170
04	20	+/-	200	130	+/-	160	230	+/-	210	4800	+/-	510	-11	+/-	76	242	+/-	37	621	+/-	83
05	90	+/-	180	60	+/-	140	450	+/-	390	14700	+/-	910	-6	+/-	24	191	+/-	43	1300	+/-	110
05A	-110	+/-	190	160	+/-	150	530	+/-	430	10860	+/-	750	-31	+/-	83	27	+/-	27	1038	+/-	93
06	-30	+/-	210	40	+/-	150	160	+/-	350	9500	+/-	1000	19	+/-	37	313	+/-	71	2140	+/-	170
07	70	+/-	190	30	+/-	130	330	+/-	380	5400	+/-	1000	16	+/-	42	17	+/-	47	2240	+/-	210
21	70	+/-	170	240	+/-	160	990	+/-	470	13900	+/-	1200	-11	+/-	31	46	+/-	46	2120	+/-	180
22	10	+/-	210	110	+/-	150	-80	+/-	420	19300	+/-	1800	10	+/-	43	85	+/-	71	1080	+/-	220
23	-70	+/-	240	110	+/-	170	60	+/-	410	26400	+/-	1900	-13	+/-	37	246	+/-	72	1910	+/-	200
24	40	+/-	200	60	+/-	140	450	+/-	430	4600	+/-	1000	-5	+/-	44	360	+/-	94	1090	+/-	200

**Table 3-7**  
**Precipitation**  
**Gamma Spectra**  
**[pCi/L]**

06/29/2004

Sampling Location	Be-7	K-40	Cr-51	Mn-54	Fe-59	Co-58	Co-60
01A	11.0 +/- 19.0	-12.0 +/- 23.0	1.0 +/- 21.0	-1.5 +/- 1.8	-0.1 +/- 4.3	-0.7 +/- 1.9	0.8 +/- 1.7
	Zn-65	Zr-95	Nb-95	Ru-103	Ru-106	Sb-125	I-131
01A	-3.0 +/- 5.9	2.2 +/- 3.2	0.6 +/- 2.0	0.8 +/- 2.3	22.0 +/- 17.0	0.0 +/- 4.9	0.9 +/- 5.4
	Cs-134	Cs-137	Ba-140	La-140	Th-228		
01A	0.6 +/- 1.9	0.6 +/- 1.8	1.2 +/- 3.7	1.4 +/- 4.3	3.3 +/- 6.2		

12/29/2004

Sampling Location	Be-7	K-40	Cr-51	Mn-54	Fe-59	Co-58	Co-60
01A	11.7 +/- 9.9	-2.0 +/- 11.0	4.0 +/- 12.0	-0.3 +/- 0.6	0.5 +/- 2.5	-0.5 +/- 0.8	-0.2 +/- 0.6
	Zn-65	Zr-95	Nb-95	Ru-103	Ru-106	Sb-125	I-131
01A	0.7 +/- 1.9	0.2 +/- 1.5	0.0 +/- 1.1	-0.6 +/- 1.6	2.0 +/- 5.9	0.4 +/- 1.8	-3.0 +/- 11.0
	Cs-134	Cs-137	Ba-140	La-140	Th-228		
01A	0.3 +/- 0.7	-0.6 +/- 0.7	-2.4 +/- 3.9	-2.8 +/- 4.5	2.7 +/- 2.9		

**Table 3-7**  
**Precipitation**  
**Gross Beta**  
**[pCi/L]**

Sampling Date	Gross Beta			Rainfall (inches)
01/28/04	15.0	+/-	3.0	0.72
02/25/04	5.2	+/-	2.1	2.49
03/31/04	6.1	+/-	2.3	2.13
04/28/04	6.5	+/-	2.2	3.85
05/26/04	4.1	+/-	2.1	2.46
06/29/04	4.6	+/-	2.5	5.43
07/28/04	5.5	+/-	2.2	5.98
09/01/04	4.9	+/-	2.2	4.23
09/29/04	3.9	+/-	2.0	5.79
10/27/04	9.8	+/-	2.6	1.71
11/24/04	1.9	+/-	1.7	3.89
12/29/04	5.1	+/-	2.0	3.23

Total =41.91"



**Table 3-8**  
Milk  
Gamma Spectra and Strontium  
[pCi/L]

														Station 12	
Date	K-40		Sr-89		Sr-90		I-131		Cs-134		Cs-137		Ba-140		La-140
01/21/04	1410.0	+/- 120.0	[a]		[a]		-0.75	+/- 0.28	0.0	+/- 3.2	-1.4	+/- 2.9	3.2	+/- 4.1	3.6 +/- 4.7
02/11/04	1320.0	+/- 130.0	[a]		[a]		-0.05	+/- 0.25	2.7	+/- 3.8	-2.0	+/- 3.7	-2.6	+/- 6.4	-3.0 +/- 7.4
03/24/04	1470.0	+/- 170.0	-3.7	+/- 4.5	0.0	+/- 0.9	0.24	+/- 0.50	-2.8	+/- 4.5	-0.7	+/- 4.0	6.3	+/- 7.4	7.2 +/- 8.5
04/14/04	1370.0	+/- 120.0	[a]		[a]		-0.12	+/- 0.04	3.4	+/- 3.8	0.6	+/- 2.9	-2.6	+/- 5.3	-3.0 +/- 6.1
05/19/04	1430.0	+/- 110.0	[a]		[a]		-0.05	+/- 0.02	2.2	+/- 2.9	1.2	+/- 2.6	1.3	+/- 5.7	1.5 +/- 6.6
06/23/04	1338.0	+/- 97.0	-1.1	+/- 3.8	-0.2	+/- 0.9	-0.15	+/- 0.27	-0.7	+/- 2.8	-1.9	+/- 2.6	0.3	+/- 4.9	0.4 +/- 5.6
07/21/04	1310.0	+/- 120.0	[a]		[a]		-0.07	+/- 0.03	1.5	+/- 3.3	0.5	+/- 3.0	-1.8	+/- 6.0	-2.1 +/- 6.9
08/25/04	1210.0	+/- 140.0	[a]		[a]		0.09	+/- 0.24	1.6	+/- 4.1	-1.4	+/- 4.0	-1.1	+/- 5.1	-1.2 +/- 5.8
09/15/04	1254.0	+/- 87.0	0.8	+/- 0.8	0.1	+/- 0.6	0.32	+/- 0.41	2.7	+/- 3.8	-1.0	+/- 3.3	-3.0	+/- 6.4	-3.4 +/- 7.3
10/21/04	1410.0	+/- 150.0	[a]		[a]		-0.06	+/- 0.02	-0.9	+/- 4.0	-1.7	+/- 4.2	2.5	+/- 6.6	2.9 +/- 7.5
11/18/04	1530.0	+/- 110.0	[a]		[a]		0.15	+/- 0.39	0.9	+/- 3.1	1.6	+/- 3.4	3.2	+/- 6.0	3.7 +/- 6.9
12/15/04	1530.0	+/- 170.0	1.0	+/- 3.7	-0.4	+/- 1.2	-0.03	+/- 0.22	0.0	+/- 4.7	1.1	+/- 4.7	-0.7	+/- 6.3	-0.8 +/- 7.2

														Station 13	
Date	K-40		Sr-89		Sr-90		I-131		Cs-134		Cs-137		Ba-140		La-140
01/21/04	1330.0	+/- 130.0	[a]		[a]		1.30	+/- 2.90	1.8	+/- 3.9	-0.8	+/- 3.2	-3.6	+/- 5.1	-4.1 +/- 5.9
02/11/04	1300.0	+/- 130.0	[a]		[a]		-1.23	+/- 0.51	-2.0	+/- 3.7	-0.5	+/- 3.5	-3.4	+/- 5.7	-3.9 +/- 6.5
03/24/04	1440.0	+/- 110.0	1.7	+/- 5.4	2.8	+/- 1.1	0.19	+/- 0.48	2.6	+/- 3.6	1.4	+/- 3.0	0.0	+/- 5.4	0.0 +/- 6.3
04/14/04	1360.0	+/- 110.0	[a]		[a]		-0.12	+/- 0.05	-0.4	+/- 3.1	0.0	+/- 2.8	0.6	+/- 3.8	0.7 +/- 4.3
05/19/04	1360.0	+/- 130.0	[a]		[a]		0.11	+/- 0.33	0.0	+/- 4.0	1.9	+/- 3.6	3.6	+/- 6.5	4.2 +/- 7.5
06/23/04	1460.0	+/- 110.0	-4.2	+/- 4.3	-0.3	+/- 1.0	0.06	+/- 0.42	1.3	+/- 3.4	0.8	+/- 2.7	-2.5	+/- 6.7	-2.8 +/- 7.7
07/21/04	1400.0	+/- 140.0	[a]		[a]		0.11	+/- 0.36	2.9	+/- 3.8	1.7	+/- 3.6	1.9	+/- 7.0	2.2 +/- 8.1
08/25/04	1330.0	+/- 6.1	[a]		[a]		-0.07	+/- 0.03	5.2	+/- 4.2	-0.2	+/- 4.0	-1.6	+/- 5.3	-1.8 +/- 6.1
09/15/04	1284.0	+/- 93.0	0.5	+/- 0.9	-0.1	+/- 0.7	-0.03	+/- 0.26	-3.5	+/- 5.1	2.5	+/- 3.8	1.9	+/- 7.3	2.2 +/- 8.4
10/21/04	1180.0	+/- 160.0	[a]		[a]		0.12	+/- 0.37	-1.7	+/- 4.7	0.0	+/- 4.5	-2.2	+/- 6.0	-2.5 +/- 6.9
11/18/04	1310.0	+/- 120.0	[a]		[a]		0.13	+/- 0.37	1.2	+/- 3.4	1.1	+/- 3.0	0.5	+/- 5.6	0.5 +/- 6.5
12/15/04	1150.0	+/- 150.0	-0.7	+/- 4.0	-0.7	+/- 11.0	-0.14	+/- 0.05	1.0	+/- 3.6	2.2	+/- 4.3	6.3	+/- 5.7	7.2 +/- 6.5

[a] Sr-89/90 analyses performed on the last monthly sample of each quarter.

**Table 3-9**  
Food and Vegetation  
Gamma Spectra  
[pCi/kg]

Sampling Location	Sampling Date	Be-7			K-40			I-131			Cs-134			Cs-137			Th-228		
14	05/12/04	440.0	+/-	240.0	10200	+/-	1300.0	1.0	+/-	22.0	7.0	+/-	27.0	5.0	+/-	21.0	-11.0	+/-	86.0
	06/17/04	1060.0	+/-	500.0	18300	+/-	1100.0	15.0	+/-	30.0	24.0	+/-	33.0	30.0	+/-	37.0	110.0	+/-	170.0
	07/14/04	650.0	+/-	340.0	13900	+/-	1100.0	-3.0	+/-	31.0	9.0	+/-	30.0	3.0	+/-	25.0	190.0	+/-	130.0
	08/18/04	800.0	+/-	330.0	11600	+/-	1100.0	-6.0	+/-	18.0	-6.00	+/-	32.00	26.0	+/-	23.0	-50.0	+/-	100.0
	09/22/04	2440.0	+/-	420.0	19400	+/-	1100.0	14.0	+/-	34.0	3.00	+/-	30.00	3.0	+/-	24.0	130.0	+/-	130.0
15	05/12/04	320.0	+/-	270.0	12800	+/-	1400.0	35.0	+/-	33.0	3.0	+/-	29.0	-3.0	+/-	20.0	100.0	+/-	100.0
	06/17/04	2280.0	+/-	450.0	13030	+/-	840.0	30.0	+/-	35.0	28.0	+/-	32.0	-2.0	+/-	28.0	270.0	+/-	110.0
	07/14/04	620.0	+/-	240.0	15010	+/-	830.0	12.0	+/-	30.0	-28.0	+/-	22.0	35.0	+/-	23.0	110.0	+/-	110.0
	08/18/04	810.0	+/-	180.0	14450	+/-	750.0	6.0	+/-	24.0	11.0	+/-	18.0	7.0	+/-	15.0	78.0	+/-	83.0
	09/22/04	970.0	+/-	260.0	14450	+/-	700.0	12.0	+/-	33.0	0.0	+/-	20.0	6.0	+/-	18.0	-30.0	+/-	81.0
16	05/12/04	320.0	+/-	240.0	11100	+/-	1400.0	10.0	+/-	25.0	17.0	+/-	22.0	0.0	+/-	23.0	30.0	+/-	110.0
	06/17/04	280.0	+/-	260.0	9000	+/-	1000.0	38.0	+/-	38.0	18.0	+/-	22.0	12.0	+/-	17.0	-18.0	+/-	81.0
	07/14/04	1370.0	+/-	360.0	14700	+/-	1200.0	-6.0	+/-	23.0	2.0	+/-	32.0	12.0	+/-	26.0	410.0	+/-	130.0
	08/18/04	1310.0	+/-	390.0	10420	+/-	930.0	-1.0	+/-	20.0	2.0	+/-	27.0	20.0	+/-	24.0	80.0	+/-	120.0
	09/22/04	1740.0	+/-	590.0	10200	+/-	1300.0	9.0	+/-	21.0	-10.0	+/-	29.0	-6.0	+/-	33.0	190.0	+/-	140.0

**Table 3-9**  
Food and Vegetation  
Gamma Spectra  
[pCi/kg]

Sampling Location	Sampling Date	Be-7			K-40			I-131			Cs-134			Cs-137			Th-228		
23	05/12/04	570.0	+/-	380.0	11900	+/-	1200.0	25.0	+/-	32.0	-9.0	+/-	30.0	4.0	+/-	33.0	10.0	+/-	120.0
	06/17/04	150.0	+/-	210.0	8900	+/-	1100.0	23.0	+/-	85.0	10.0	+/-	25.0	2.0	+/-	16.0	70.0	+/-	88.0
	07/14/04	1010.0	+/-	380.0	13600	+/-	1200.0	3.0	+/-	30.0	8.0	+/-	30.0	35.0	+/-	34.0	94.0	+/-	87.0
	08/18/04	2880.0	+/-	280.0	18950	+/-	770.0	-5.0	+/-	16.0	-1.0	+/-	21.0	7.0	+/-	18.0	197.0	+/-	67.0
	09/22/04	2540.0	+/-	480.0	17000	+/-	1200.0	-8.0	+/-	29.0	20.0	+/-	33.0	9.0	+/-	27.0	80.0	+/-	140.0
26	05/12/04	740.0	+/-	340.0	11300	+/-	1100.0	18.0	+/-	32.0	-6.0	+/-	27.0	9.0	+/-	27.0	25.0	+/-	97.0
	06/17/04	130.0	+/-	180.0	8590	+/-	950.0	-5.0	+/-	31.0	5.0	+/-	20.0	9.0	+/-	13.0	15.0	+/-	59.0
	07/14/04	1070.0	+/-	350.0	13600	+/-	1300.0	-2.0	+/-	21.0	-10.0	+/-	32.0	17.0	+/-	25.0	180.0	+/-	150.0
	08/18/04	680.0	+/-	240.0	24050	+/-	800.0	25.0	+/-	32.0	-6.0	+/-	25.0	11.0	+/-	20.0	62.0	+/-	82.0
	09/22/04	1900.0	+/-	390.0	12500	+/-	1000.0	8.0	+/-	28.0	5.0	+/-	29.0	0.0	+/-	24.0	10.0	+/-	110.0

**Table 3-10**  
**Well Water**  
**Gamma Spectra, Strontium, and Tritium**  
**[pCi/L]**

Sampling Date	H-3			Be-7			K-40			Sr-89		Sr-90		I-131		Ba-140			Station 01A Th-228					
03/31/04	-240.0	+/-	640.0	11.0	+/-	18.0	16.0	+/-	31.0	[a]		[a]		-1.8	+/-	5.5	0.9	+/-	4.0	3.0	+/-	12.0		
06/29/04	-280.0	+/-	950.0	-12.0	+/-	22.0	-8.0	+/-	37.0	-1.5	+/-	4.1	1.0	+/-	1.0	-1.5	+/-	4.1	2.7	+/-	3.5	-8.0	+/-	10.0
09/29/04	370.0	+/-	680.0	1.0	+/-	15.0	12.0	+/-	24.0	[a]		[a]		-2.7	+/-	4.9	1.8	+/-	3.9	-2.1	+/-	7.0		
12/29/04	330.0	+/-	870.0	-9.0	+/-	15.0	20.0	+/-	26.0	[a]		[a]		-1.9	+/-	4.8	-2.1	+/-	3.2	0.9	+/-	6.7		

[a] Sr-89/90 analyses performed on the second quarter sample.

**Table 3-11**  
**River Water**  
**Gamma Spectra, Strontium, and Tritium**  
**[pCi/L]**

Sampling Date	H-3	Be-7	K-40	Sr-89	Sr-90	I-131	Cs-137	Ba-140	Station 11 Th-228
01/14/04	b	-14.0 +/- 26.0	31.0 +/- 47.0	[a]	[a]	0.3 +/- 0.6	1.0 +/- 2.7	5.1 +/- 7.5	0.6 +/- 9.1
02/16/04	b	-11.0 +/- 17.0	-1.0 +/- 25.0	[a]	[a]	0.2 +/- 0.4	0.0 +/- 1.7	1.8 +/- 3.1	-3.3 +/- 7.0
03/17/04	1180.0 +/- 680.0	-4.0 +/- 18.0	21.0 +/- 21.0	[a]	[a]	-0.1 +/- 0.1	0.8 +/- 1.9	-0.1 +/- 3.9	-3.4 +/- 5.7
04/15/04	b	-8.0 +/- 15.0	25.0 +/- 22.0	[a]	[a]	0.2 +/- 0.5	-0.2 +/- 1.3	-0.4 +/- 5.1	-0.4 +/- 5.5
05/17/04	b	-3.0 +/- 21.0	-29.0 +/- 29.0	[a]	[a]	0.7 +/- 0.7	0.7 +/- 2.5	-0.5 +/- 4.7	0.0 +/- 10.0
06/14/04	2600.0 +/- 1200.0	-9.0 +/- 38.0	79.0 +/- 57.0	1.1 +/- 5.2	-0.5 +/- 1.1	0.0 +/- 0.4	-0.6 +/- 3.8	2.3 +/- 6.4	-9.0 +/- 14.0
07/14/04	b	5.0 +/- 23.0	-4.0 +/- 32.0	[a]	[a]	0.0 +/- 0.3	-0.9 +/- 2.8	-2.0 +/- 5.9	3.0 +/- 11.0
08/16/04	b	7.0 +/- 26.0	-3.0 +/- 28.0	[a]	[a]	0.1 +/- 0.3	1.1 +/- 3.0	0.7 +/- 4.4	2.9 +/- 8.9
09/13/04	2280.0 +/- 810.0	-9.0 +/- 17.0	24.0 +/- 28.0	[a]	[a]	-0.2 +/- 0.2	0.0 +/- 1.8	2.5 +/- 5.6	4.2 +/- 8.9
10/13/04	b	5.0 +/- 18.0	6.0 +/- 27.0	[a]	[a]	0.0 +/- 0.3	0.5 +/- 1.9	2.0 +/- 4.6	-9.6 +/- 7.1
11/12/04	b	-0.7 +/- 4.9	7.0 +/- 9.3	[a]	[a]	-0.1 +/- 0.4	-0.5 +/- 0.5	-1.2 +/- 1.1	0.7 +/- 2.7
12/14/04	3090.0 +/- 800.0	3.0 +/- 21.0	-1.0 +/- 33.0	[a]	[a]	-0.1 +/- 0.0	1.6 +/- 2.4	2.9 +/- 4.9	1.0 +/- 10.0

[a] Sr-89/90 analyses performed on the second quarter sample.

[b] Tritium analyses on quarterly composite.



**Table 3-12**  
**Surface Water**  
**Gamma Spectra, Strontium, Tritium**  
**[pCi/L]**

[pCi/L]																				Station 08							
Date	H-3		Sr-89		Sr-90		Be-7		K-40		I-131		Cs-137		Ba-140		Th-228										
01/14/04		[b]		[a]		[a]	3.0	+/-	21.0	10.0	+/-	39.0	0.3	+/-	0.5	1.7	+/-	2.4	0.7	+/-	5.9	-11.2	+/-	9.9			
02/16/04		[b]		[a]		[a]	-3.0	+/-	19.0	-3.0	+/-	24.0	0.0	+/-	0.2	-1.4	+/-	1.8	0.6	+/-	2.9	-0.3	+/-	6.8			
03/17/04	1280.0	+/-	680.0		[a]	[a]	7.0	+/-	19.0	-4.0	+/-	24.0	0.0	+/-	0.2	-0.9	+/-	1.8	-0.4	+/-	4.1	-0.9	+/-	6.2			
04/15/04		[b]		[a]		[a]	13.00	+/-	14.00	-20.0	+/-	21.0	-0.1	+/-	0.3	-0.1	+/-	1.4	-0.3	+/-	4.7	-0.4	+/-	4.7			
05/17/04		[b]		[a]		[a]	2.00	+/-	26.00	-32.0	+/-	38.0	0.1	+/-	0.4	-0.5	+/-	2.9	2.5	+/-	6.4	-11.0	+/-	13.0			
06/14/04	2700.0	+/-	1300.0	0.0	+/-	5.1	-0.4	+/-	1.1	12.00	+/-	27.00	17.0	+/-	38.0	-0.2	+/-	0.4	2.0	+/-	3.6	-0.8	+/-	6.1	-5.0	+/-	12.0
07/14/04		[b]		[a]		[a]	12.00	+/-	22.00	-25.0	+/-	38.0	0.2	+/-	0.5	-0.6	+/-	3.0	0.9	+/-	6.2	5.0	+/-	11.0			
08/16/04		[b]		[a]		[a]	0.00	+/-	16.00	18.0	+/-	41.0	0.2	+/-	0.4	0.0	+/-	2.7	-0.6	+/-	4.8	6.0	+/-	11.0			
09/13/04	2980.0	+/-	850.0		[a]	[a]	14.00	+/-	19.00	-3.0	+/-	28.0	0.0	+/-	0.3	0.8	+/-	1.7	2.8	+/-	5.8	-2.9	+/-	7.2			
10/13/04		[b]		[a]		[a]	13.00	+/-	22.00	7.0	+/-	36.0	-0.1	+/-	0.3	-1.3	+/-	2.5	-3.9	+/-	5.6	3.0	+/-	11.0			
11/12/04		[b]		[a]		[a]	0.10	+/-	5.30	3.0	+/-	10.0	-0.3	+/-	0.3	0.3	+/-	0.5	1.2	+/-	1.1	-1.2	+/-	2.9			
12/14/04	2730.0	+/-	780.0		[a]	[a]	-3.00	+/-	21.00	-16.0	+/-	26.0	-0.1	+/-	0.0	0.6	+/-	2.4	-3.9	+/-	4.0	6.6	+/-	9.6			

																	Station 09A															
Date	H-3			Sr-89			Sr-90			Be-7			K-40			I-131			Cs-137			Ba-140			Th-228							
01/14/04		[b]			[a]		[a]		7.0	+/-	22.0		28.0	+/-	34.0		0.1	+/-	0.3		0.0	+/-	2.3		0.5	+/-	5.2		-1.0	+/-	11.0	
02/16/04		[b]			[a]		[a]		-4.0	+/-	25.0		1.0	+/-	36.0		0.3	+/-	0.4		0.0	+/-	3.1		3.0	+/-	4.6		1.0	+/-	11.0	
03/17/04	110.0	+/-	620.0		[a]		[a]		-7.0	+/-	18.0		5.0	+/-	27.0		-0.1	+/-	0.2		-0.3	+/-	1.9		-3.0	+/-	3.2		-0.7	+/-	7.6	
04/15/04		[b]			[a]		[a]		-10.00	+/-	18.00		-9.0	+/-	28.0		-0.2	+/-	0.4		-0.1	+/-	1.9		-0.5	+/-	5.6		0.9	+/-	7.6	
05/17/04		[b]			[a]		[a]		-17.00	+/-	24.00		10.0	+/-	37.0		0.1	+/-	0.4		-1.5	+/-	2.6		-3.4	+/-	3.9		13.0	+/-	11.0	
06/14/04	-500.0	+/-	1100.0	-1.8	+/-	4.7	0.0	+/-	1.0	12.00	+/-	32.00		-8.0	+/-	53.0		-0.3	+/-	0.3		-0.8	+/-	4.2		2.3	+/-	5.6		13.0	+/-	17.0
07/14/04		[b]			[a]		[a]		-8.00	+/-	30.00		-11.0	+/-	40.0		0.5	+/-	0.7		2.5	+/-	2.6		2.3	+/-	5.7		-3.1	+/-	8.5	
08/16/04		[b]			[a]		[a]		4.00	+/-	24.00		-35.0	+/-	42.0		-0.1	+/-	0.3		-1.2	+/-	3.1		0.8	+/-	6.6		-2.0	+/-	11.0	
09/13/04	-580.0	+/-	700.0		[a]		[a]		9.00	+/-	18.00		-13.0	+/-	27.0		0.0	+/-	0.2		0.7	+/-	1.9		0.3	+/-	5.4		3.5	+/-	7.7	
10/13/04		[b]			[a]		[a]		4.00	+/-	25.00		31.0	+/-	36.0		0.4	+/-	0.5		1.2	+/-	2.6		2.8	+/-	6.2		-5.0	+/-	11.0	
11/12/04		[b]			[a]		[a]		2.50	+/-	4.80		10.0	+/-	10.0		-0.5	+/-	0.3		-0.1	+/-	0.5		0.2	+/-	1.0		3.1	+/-	3.0	
12/14/04	-350.0	+/-	640.0		[a]		[a]		-7.00	+/-	22.00		5.0	+/-	35.0		-0.1	+/-	0.0		0.5	+/-	2.6		-1.8	+/-	5.2		5.0	+/-	11.0	

[a] Sr-89/90 analyses performed on the second quarter sample.

[b] Tritium analyses on quarterly composite.

**Table 3-13**  
**Sediment Silt**  
**Gamma Spectra and Strontium**  
**[pCi/Kg]**

Date	Sr-89			Sr-90			Be-7			K-40			Mn-54		
03/24/2004															
Station 08	[a]		[a]	-20.0	+/-	200.0	2100.0	+/-	420.0	14.0	+/-	19.0			
Station 09A	[a]		[a]	-60.0	+/-	210.0	10920.0	+/-	780.0	15.0	+/-	20.0			
Station 11	[a]		[a]	-210.0	+/-	400.0	13700.0	+/-	1400.0	29.0	+/-	43.0			

Date	Sr-89			Sr-90			Be-7			K-40			Mn-54		
10/25/2004															
Station 08	-260.0	+/-	190.0	140.0	+/-	110.0	180.0	+/-	320.0	16000.0	+/-	1400.0	-29.0	+/-	40.0
Station 09A	-140.0	+/-	230.0	0.0	+/-	130.0	50.0	+/-	240.0	12200.0	+/-	1100.0	-10.0	+/-	27.0
Station 11	-60.0	+/-	260.0	10.0	+/-	140.0	120.0	+/-	290.0	10500.0	+/-	1200.0	-6.0	+/-	31.0

Date	Co-58			Co-60			Cs-134			Cs-137			Th-228		
03/24/2004															
Station 08	-4.0	+/-	20.0	9.0	+/-	16.0	-12.0	+/-	72.0	15.0	+/-	19.0	511.0	+/-	82.0
Station 09A	1.0	+/-	23.0	-4.0	+/-	19.0	43.0	+/-	76.0	-4.0	+/-	23.0	377.0	+/-	87.0
Station 11	-21.0	+/-	39.0	-38.0	+/-	39.0	-13.0	+/-	38.0	37.0	+/-	43.0	1020.0	+/-	180.0

Date	Co-58			Co-60			Cs-134			Cs-137			Th-228		
10/25/2004															
Station 08	-21.0	+/-	42.0	-15.0	+/-	43.0	29.0	+/-	32.0	-16.0	+/-	30.0	1610.0	+/-	160.0
Station 09A	-15.0	+/-	27.0	21.0	+/-	30.0	-2.0	+/-	24.0	34.0	+/-	28.0	990.0	+/-	110.0
Station 11	-1.0	+/-	31.0	-8.0	+/-	34.0	17.0	+/-	32.0	56.0	+/-	41.0	500.0	+/-	140.0

[a] Sr-89/90 analyses performed annually.

**Table 3-14**  
Shoreline Soil  
Gamma Spectra and Strontium  
[pCi/Kg]

Sample Date	Sr-89				Sr-90				Be-7				K-40				Mn-54			
03/16/2004																				
Station 08	[a]				[a]				-90.0	+/-	280.0	2110.0	+/-	470.0	13.0	+/-	18.0			
Sample Date	Sr-89				Sr-90				Be-7				K-40				Mn-54			
10/25/2004																				
Station 08	-40.0	+/-	160.0	41.0	+/-	98.0	280.0	+/-	200.0	2980.0	+/-	550.0	-4.0	+/-	21.0					
Sample Date	Co-58				Co-60				Cs-134				Cs-137				Th-228			
03/16/2004																				
Station 08	2.0	+/-	24.0	7.0	+/-	16.0	236.0	+/-	43.0	236.0	+/-	43.0	339.0	+/-	91.0					
Sample Date	Co-58				Co-60				Cs-134				Cs-137				Th-228			
10/25/2004																				
Station 08	13.0	+/-	18.0	-4.0	+/-	18.0	162.0	+/-	41.0	162.0	+/-	41.0	334.0	+/-	87.0					

[a] Sr-89/90 analyses performed annually.

**Table 3-15**  
**Fish**  
**Gamma Spectra**  
**[pCi/Kg]**

Fish [a]																								
Station 08																								
Sampling	K-40		Mn-54		Fe-59		Co-58		Co-60		Zn-65		Cs-134		Cs-137									
Date																								
04/17/04	1820.0	+/-	170.0	5.2	+/-	6.8	-11.0	+/-	27.0	0.5	+/-	7.6	1.5	+/-	6.7	-20.0	+/-	16.0	-1.9	+/-	6.3	26.3	+/-	8.9
10/26/04	1690.0	+/-	720.0	0.0	+/-	30.0	-21.0	+/-	74.0	8.0	+/-	17.0	28.0	+/-	25.0	-11.0	+/-	59.0	-46.0	+/-	37.0	18.0	+/-	25.0

Fish [a] Station 25																								
Sampling Date	K-40		Mn-54		Fe-59		Co-58		Co-60		Zn-65		Cs-134		Cs-137									
04/17/04	1670.0	+/-	170.0	1.6	+/-	6.7	0.1	+/-	28.0	-5.9	+/-	7.9	6.0	+/-	6.6	4.0	+/-	15.0	-6.5	+/-	6.2	8.4	+/-	7.1
09/29/04	1370.0	+/-	470.0	0.0	+/-	18.0	24.0	+/-	96.0	-26.0	+/-	23.0	3.0	+/-	17.0	-39.0	+/-	42.0	24.0	+/-	23.0	2.0	+/-	20.0

Catfish [b] Station 08																								
Sampling Date	K-40		Mn-54		Fe-59		Co-58		Co-60		Zn-65		Cs-134		Cs-137									
04/17/04	1650.0	+/-	180.0	2.1	+/-	6.3	4.0	+/-	31.0	3.5	+/-	7.8	-4.4	+/-	7.5	-10.0	+/-	16.0	3.2	+/-	7.2	9.5	+/-	8.7
10/26/04	1230.0	+/-	630.0	-4.0	+/-	31.0	28.0	+/-	61.0	13.0	+/-	21.0	15.0	+/-	24.0	-9.0	+/-	56.0	3.0	+/-	27.0	21.0	+/-	33.0

Catfish [b] Station 25																								
Sampling Date	K-40		Mn-54		Fe-59		Co-58		Co-60		Zn-65		Cs-134		Cs-137									
04/17/04	1420.0	+/-	150.0	1.9	+/-	5.8	-16.0	+/-	24.0	2.1	+/-	7.4	0.6	+/-	6.4	-12.0	+/-	14.0	1.4	+/-	6.5	2.2	+/-	6.3
09/29/04	1370.0	+/-	540.0	-2.0	+/-	22.0	-7.0	+/-	74.0	0.0	+/-	22.0	-3.0	+/-	26.0	-22.0	+/-	63.0	28.0	+/-	24.0	6.0	+/-	21.0

[a] Non-bottom dwelling species of gamefish.

[b] Bottom dwelling species of fish.

## 4. DISCUSSION OF RESULTS

Data from the radiological analyses of environmental media collected during 2004 and tabulated in Section 3, are discussed below. Except for TLDs, AREVA Environmental Laboratory analyzed all samples throughout the year. The procedures and specifications followed for these analyses are as required in the AREVA Environmental Laboratory quality assurance manuals and laboratory procedures. In addition to internal quality control measurements performed by each laboratory, they also participate in an Interlaboratory Comparison Program. Participation in this program ensures that independent checks on the precision and accuracy of the measurements of radioactive material in environmental samples are performed. The results of the Interlaboratory Comparison Programs are provided in Appendix C.

The predominant radioactivity detected throughout 2004 was that from external sources, such as fallout from nuclear weapons tests and naturally occurring radionuclides. Naturally occurring nuclides such as Be-7, K-40, and Th-228 were detected in numerous samples. Th-228 results were variable and are generally at levels higher than plant related radionuclides.

The following is a discussion and summary of the results of the environmental measurements taken during the 2004 reporting period.

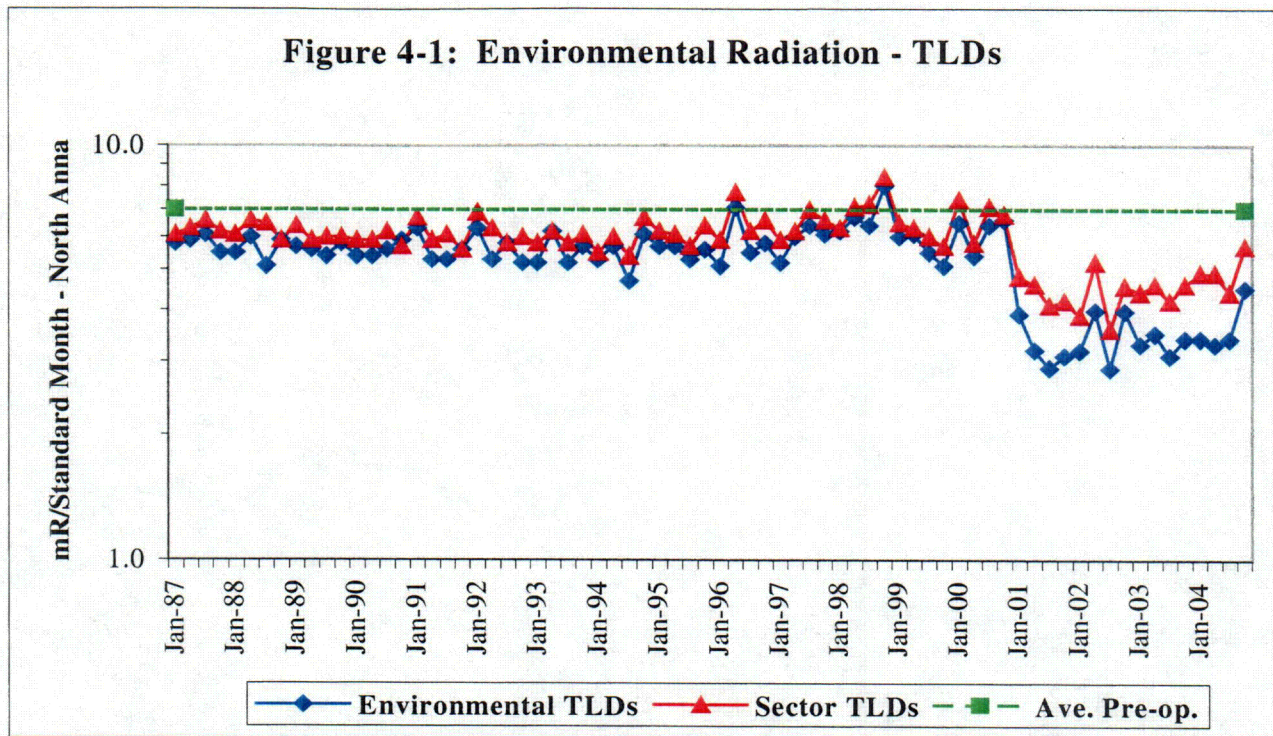
### 4.1 *Gamma Exposure Rate*

A thermoluminescent dosimeter (TLD) is an inorganic crystal used to detect ambient radiation. TLDs are placed in two concentric rings around the station. The inner ring is located at the site boundary, and the outer ring is located at approximately five miles from the station. TLDs are also placed in special interest areas, such as population areas and nearby residences. Additional TLDs serve as controls. Ambient radiation comes from naturally occurring radioisotopes in the air and soil, radiation from cosmic origin, fallout from nuclear weapons testing, station effluents and direct radiation from the station.

The results of the analyses are presented in Table 3-2. Figure 4-1 shows a historical trend of TLD exposure rate measurements. Control and indicator averages indicate a steady relationship. Two dosimeters made of CaF and LiF sensitive elements are deployed at each sampling location. These TLDs replaced the previously used CaSO<sub>4</sub>:Dy in Teflon TLDs. The dose with the replacement TLDs is lower than that of the previously used TLDs. This will continue to be monitored.



**Figure 4-1: Environmental Radiation - TLDs**



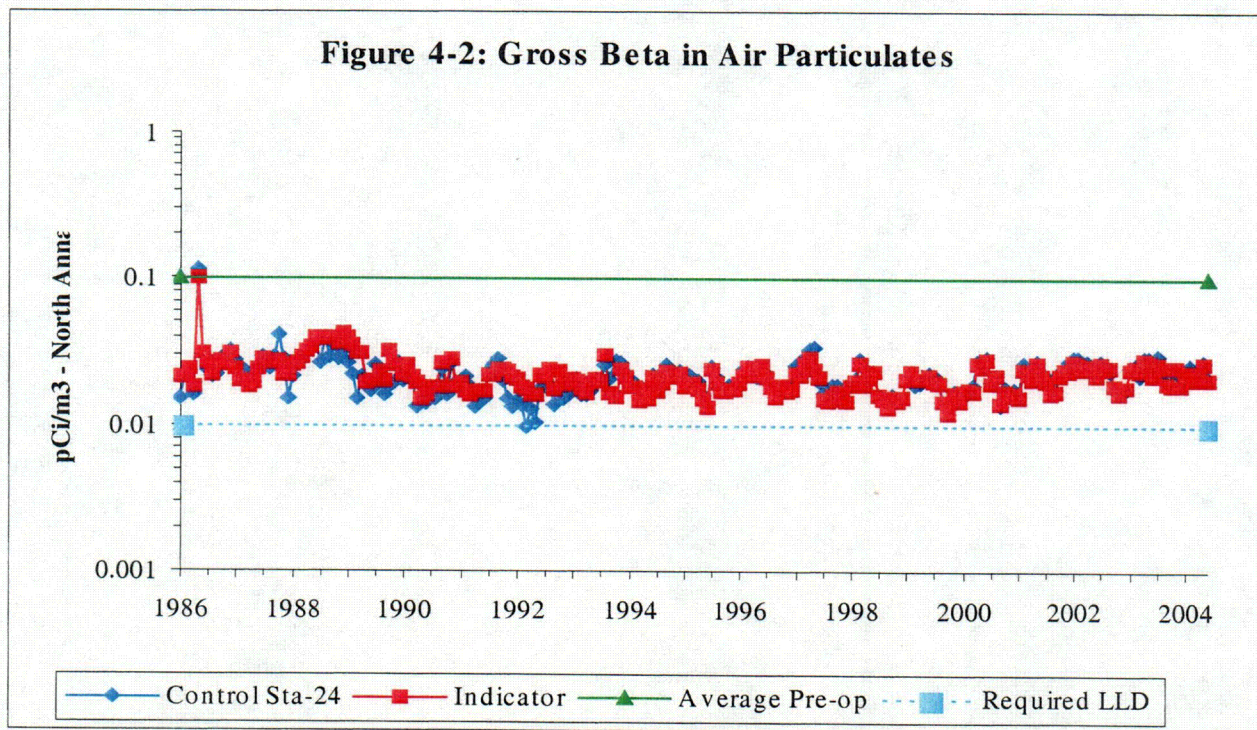
Sector TLDs are deployed quarterly at thirty-two locations in the environs of the North Anna site. Two badges are placed at each location. The average level of the 32 locations (two badges at each location) was 5.3 mR/standard month with a range of 2.6 to 30.0 mR/standard month. The highest quarterly average reading and highest single quarter average for any single location were obtained at location SSW-19/51. These values were 30.0 mR/standard month and 34.0 mR/standard month, respectively. This location is on site directly across the access road from the Independent Spent Fuel Storage Facility. The higher values can thus be attributed to the spent fuel stored in the ISFSI. Quarterly and annual TLDs are also located at each of the twelve environmental air sampling stations. For the eleven locations within 10 miles of the station the average quarterly reading was 3.7 mR/standard month with a range of 2.4 to 5.3 mR/standard month. The average annual reading for these locations was 1.57 mR/standard month with a range of from 1.07 to 2.20 mR/standard month. The control location showed a quarterly average of 3.5 mR/standard month with a range of 2.6 to 4.2 mR/standard month. Its annual reading was 1.57 mR/standard month. Eight other TLDs, designated C-1 thru C-8, were collected quarterly from four locations and showed an average reading of 3.2 mR/standard month with a range of 2.0 to 4.9 mR/standard month. During the pre-operational period (starting in 1977) the doses were measured between 4.3 and 8.8 mR/standard month.



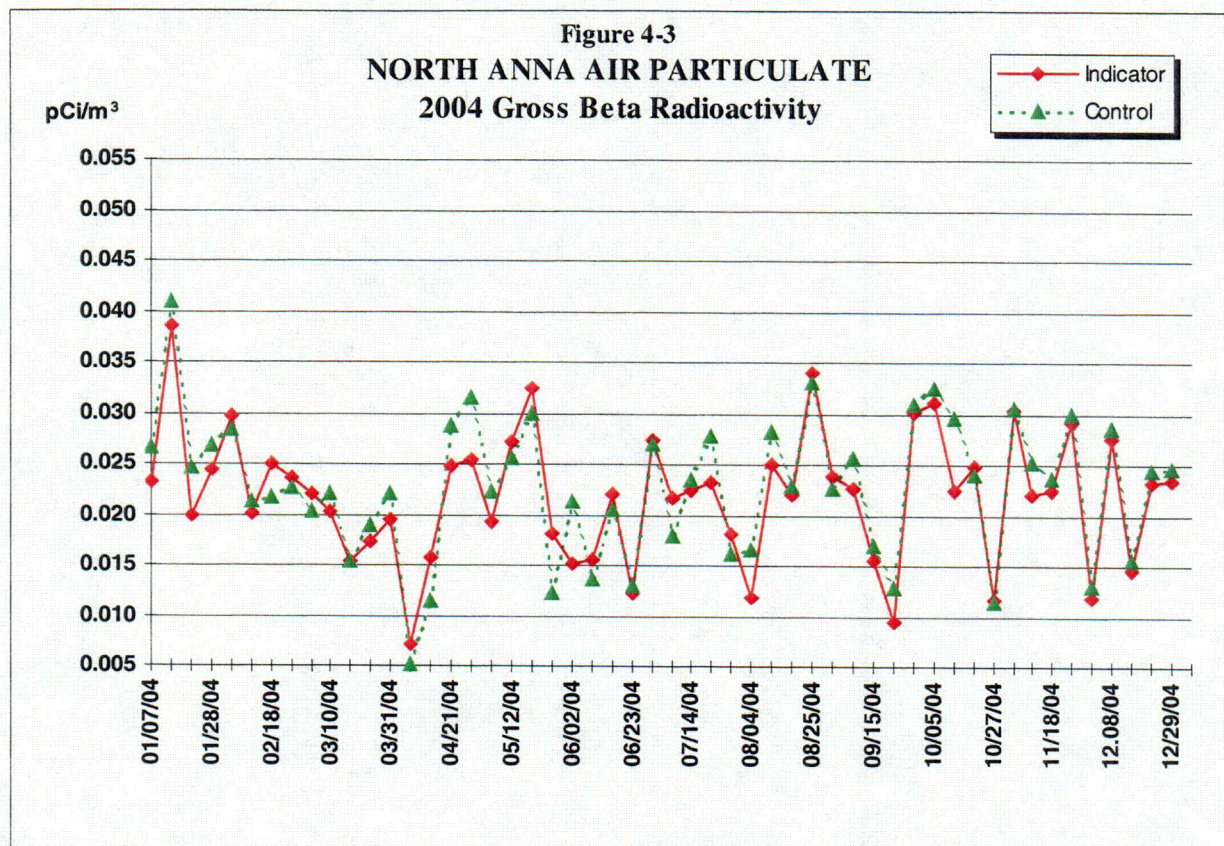
## 4.2 Airborne Gross Beta

Results of the weekly gross beta analyses are presented in Table 3-3. A review of the results, shown in a historical plot in Figure 4-2, indicates gross beta activity at levels similar to that seen over the last decade. Inner and outer ring monitoring locations continue to show no significant variation in measured activities (see Figure 4-3). This indicates that any station contribution is not measurable.

Gross beta activity found during the pre-operational and early operating period of North Anna Power Station was higher because of nuclear weapons testing. During that time, nearly 740 nuclear weapons were tested worldwide. In 1985 weapons testing ceased, and with the exception of the Chernobyl accident in 1986, airborne gross beta results have remained steady. During the preoperational period of July 1, 1974 through March 31, 1978 gross beta activities ranged from a low of 0.005 pCi/m<sup>3</sup> to a high of 0.75 pCi/m<sup>3</sup>.







### 4.3 Airborne Radioiodine

Charcoal cartridges are used to collect airborne radioiodine. Once a week the samples are collected and analyzed. The results of the analyses are presented in Table 3-4. All results are below the lower limit of detection with no positive activity detected. These results are similar to pre-operational data and the results of samples taken prior to and after the 1986 accident in the Soviet Union at Chernobyl.

### 4.4 Air Particulate Gamma

The air particulate filters that are utilized for the weekly gross beta analyses are composited by location and analyzed quarterly by gamma spectrometry. The results are listed in Table 3-5. The results indicate the presence of naturally occurring Be-7, which is produced by cosmic processes. Examination of pre-operational data indicates comparable measurements of Be-7, as would be expected. No other positive results were seen. These analyses indicate the lack of station effects.



#### ***4.5 Air Particulate Strontium***

Strontium-89 and 90 analyses were performed on the second quarter composites of air particulate filters from all twelve monitoring stations. The results are listed in Table 3-5. There was no detection of these fission products at any of the indicator or control stations.

#### ***4.6 Soil***

Soil samples, which are collected every three years from twelve stations, were collected in July and analyzed by gamma ray spectroscopy. The results are presented in Table 3-6. Naturally occurring potassium-40 was detected in all eleven indicator stations with an average concentration of 12385 pCi/kg (dry) and a range of 4600 to 26400 pCi/kg (dry). The control location had a measurement of 4600 pCi/kg (dry). Thorium-228 was detected in eleven indicator stations with an average activity of 1351 pCi/kg (dry) and a range of 540 to 2240 pCi/kg (dry). The control station had a concentration of 1090 pCi/kg (dry). The fission product cesium-137 was detected in five of the eleven indicator stations with an average activity of 284 pCi/kg (dry) and a range of 191 to 430 pCi/kg (dry). The control location had a concentration of 360 pCi/kg (dry). The cesium-137 is attributable to past atmospheric nuclear weapons testing.

The twelve soil samples were also analyzed for strontium-89 and strontium-90. Neither strontium-89 or strontium-90 were detected in any of the samples.

#### ***4.7 Precipitation***

A sample of rain water was collected monthly at on-site station 01A and analyzed for gross beta activity. The results are presented in Table 3-7. Eleven of twelve precipitation samples showed positive results in 2004. The average annual gross beta activity was 6.1 pCi/liter with a range from 3.9 to 15.0 pCi/liter. Semi-annual composites were prepared and analyzed for gamma emitting isotopes and tritium. No positive indications of gamma emitting radioisotopes were observed in the semi-annual composite samples for 2004. During the pre-operational period gross beta activity in rain water was expressed in nCi per square meter of the collector surface, thus a direct comparison can not be made to the 2004 period. During the pre-operational period, tritium was measured in over half of the few quarterly composites made. This tritium activity ranged from 100 to 330 pCi/liter.

#### ***4.8 Cow Milk***

Analysis of milk samples is generally the most sensitive indicator of fission

product existence in the terrestrial environment. This, in combination with the fact that consumption of milk is significant, results in this pathway usually being the most critical from the plant release viewpoint. This pathway also shows measurable amounts of nuclear weapons testing fallout. Therefore, this media needs to be evaluated very carefully when trying to determine if there is any plant effect.

Analysis results for cow milk are contained in Table 3-8. All results show a lack of detectable I-131 above the LLD of 1 pCi/l. Results of gamma ray spectroscopy indicate no detectable plant related radioactivity in the milk samples. In years past, Cs-137 has been detected sporadically. The occurrences were attributed to residual global fallout from past atmospheric weapons testing. Cs-137 was not detected at a level above the LLD in 2004.

Once each quarter a sample from each of the two collection stations is analyzed for strontium-89 and strontium-90. Positive indication of Sr-89 was not detected. One positive indication of Sr-90 was detected in the 1st quarter milk sample collected from station 13 at 2.80 pCi/liter. Sr-90 has been observed in the past. Pre-operational levels of 2.2 to 5.4 pCi/liter were measured for Sr-90. There has been a long-term activity trend for Sr-90 showing a continuous decline. It should be noted that strontium-90 is not a part of station effluents. Its detection is the product of nuclear weapons testing fallout. This conclusion can be made based upon the fact that Sr-89 and Sr-90 have not been detected in effluents released from the station in many years, and the trend of consistent declining levels since the pre-operational period.

#### ***4.9 Food Products and Vegetation***

Twenty-five food samples were collected from five locations and analyzed by gamma spectrometry. The results of the analyses are presented in Table 3-9. As expected, naturally occurring potassium-40 was detected in all samples, cosmogenic beryllium-7 was detected in most samples, and thorium-228 was detected in some samples. Other than cesium-137 observed in one analysis, no other gamma emitters were detected. The levels detected are consistent with those observed in food product or vegetation samples collected in previous years and the presence of cesium-137 is attributed to residual global fallout from past atmospheric weapons testing.

#### ***4.10 Well Water***

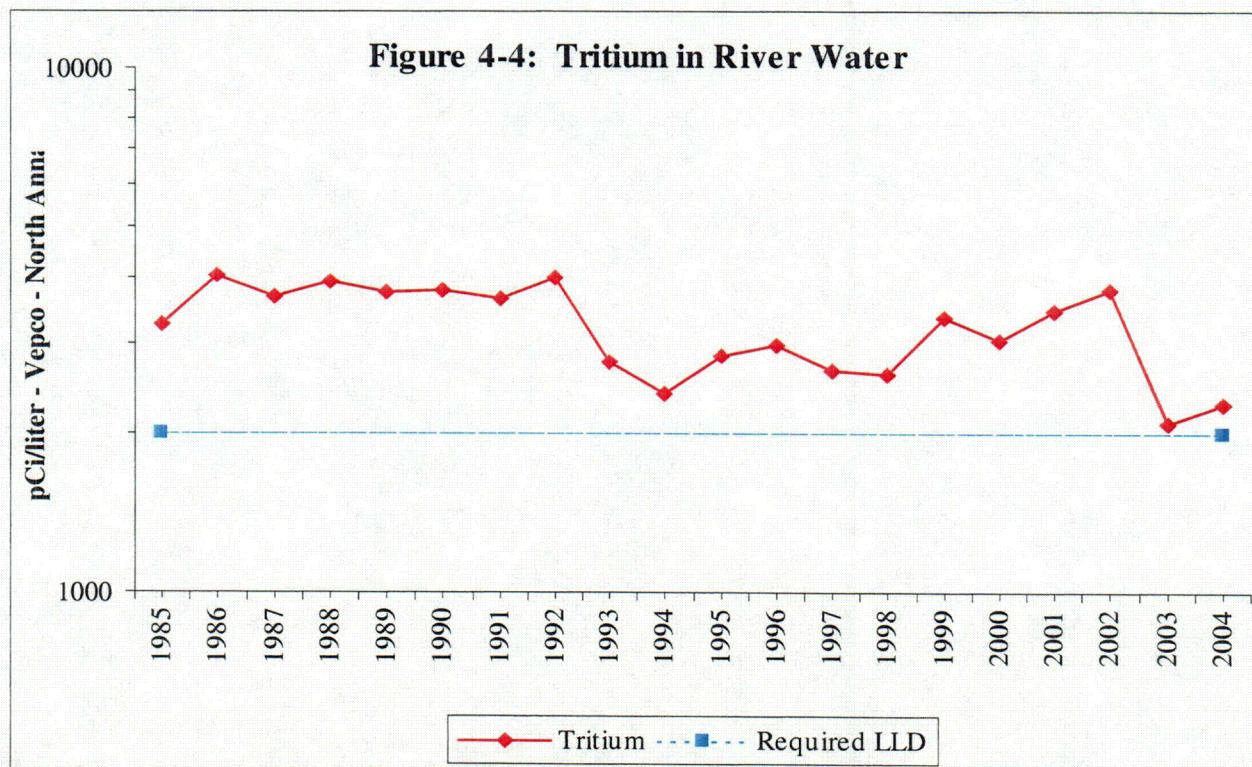
Water was sampled quarterly from the on site well at the metrology laboratory. These samples were analyzed for gamma radiation and for tritium. The second



quarter sample was analyzed for strontium-89 and strontium-90. The results of these analyses are presented in Table 3-10. Consistent with past monitoring, no plant related radioactivity was detected. No gamma emitting isotopes were detected during the pre-operational period.

#### 4.11 River Water

A sample of water from the North Anna River was collected monthly, the analyses are presented in Table 3-11. All monthly samples are analyzed by gamma spectroscopy. The monthly samples were composited quarterly and analyzed for tritium, the third quarter samples were additionally analyzed for strontium-89 and strontium-90. No gamma emitting radioisotopes were detected in any of the samples. There was no measured activity of strontium-89 or strontium-90. Tritium was measured in all four samples with an average annual concentration of 2288 pCi/liter and a range of 1180 to 3090 pCi/liter. These levels are comparable to those observed in previous years, see Figure 4-4. No river water samples were collected during the pre-operational period.



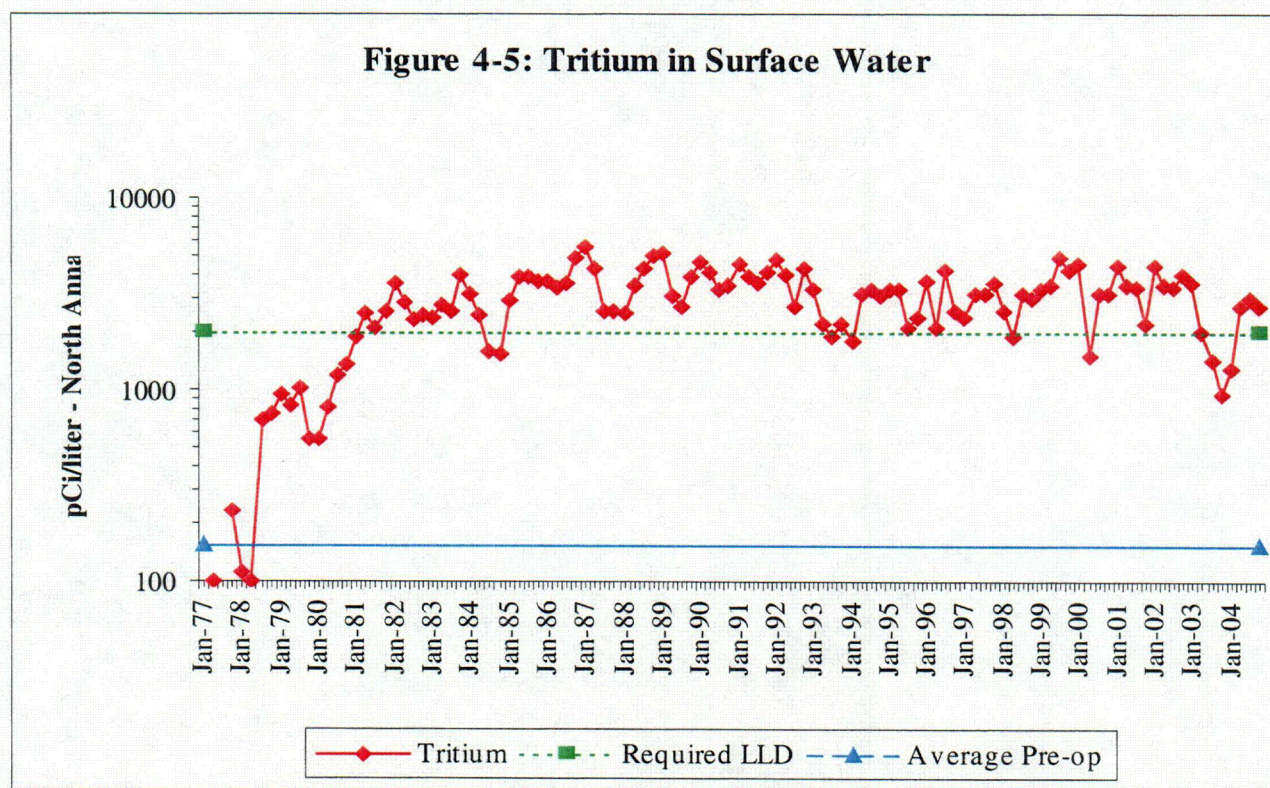
#### 4.12 Surface Water

Samples of surface water were collected monthly from two stations, an indicator



station located at the discharge lagoon and a control station located 12.9 miles WNW. The samples were analyzed by gamma ray spectrometry and for iodine-131 by radiochemical separation. A quarterly composite from each station was prepared and analyzed for tritium, and the third quarter samples were additionally analyzed for strontium-89 and strontium-90. The results are presented in Table 3-12.

No gamma emitting radioisotopes nor iodine were detected in any of the samples. The average level of tritium activity at the indicator station was 2423 pCi/liter with a range of 1280 to 2980 pCi/liter. Levels of tritium have been increasing since 1978 when the average level was below 300 pCi/liter. Levels measured at the indicator location (Station 8) are comparable to those measured since 1986, see Figure 4-5. During the pre-operational period tritium was measured in several samples with concentrations between 90 and 250 pCi/liter.



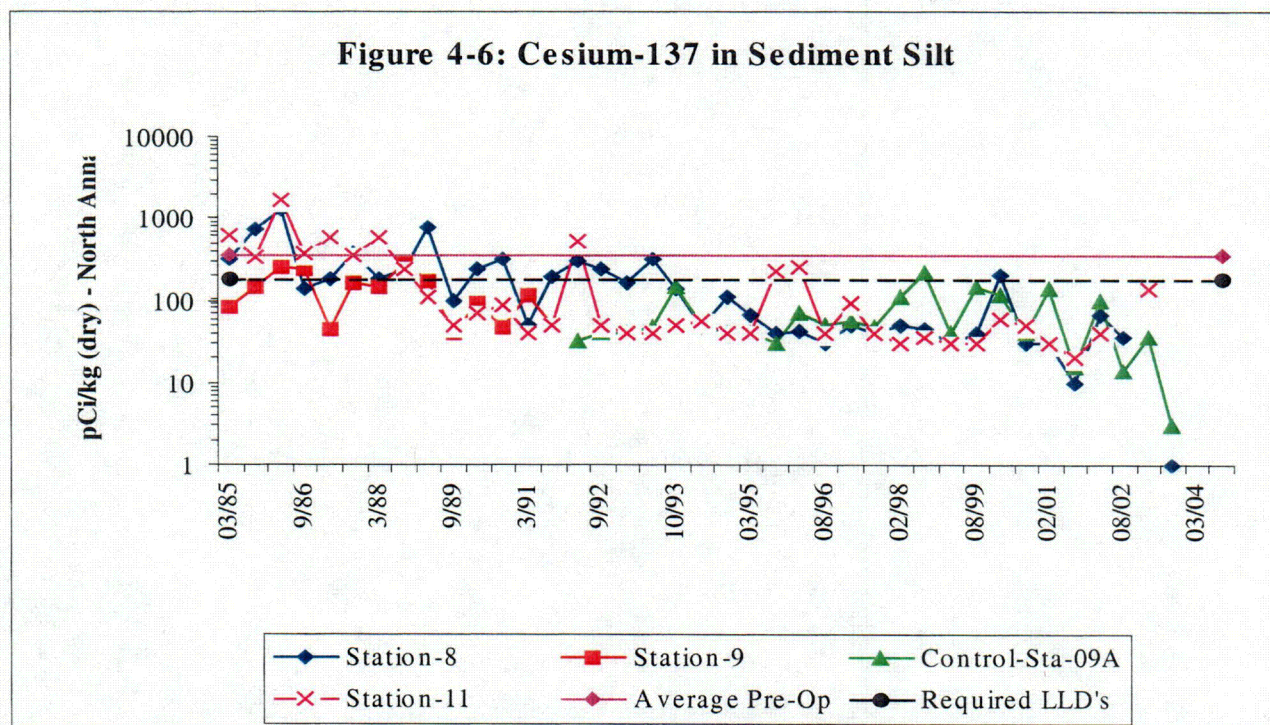
#### 4.13 Bottom Sediment

Bottom sediment or silt is sampled to evaluate any buildup of radionuclides in the environment due to the operation of the station. Buildup of radionuclides in



bottom sediment could indirectly lead to increasing radioactivity levels in fish.

Sediment samples were collected during March and October from each of three locations and were analyzed by gamma spectrometry. The October samples were analyzed for strontium-89 and strontium-90. The results are presented in Table 3-13. Figure 4-6 shows the historical trend of Cs-137 in sediments.



There was no Cesium-137 detected in any of the sediment samples in 2004. The detection of Cs-137 in bottom sediment is historically common, with positive indications usually apparent in both indicator and control samples. The detection of Cs-137 is the result of accumulation and runoff into the lake of residual weapons testing fallout; its global presence has been well documented. During the pre-operational period sediment samples were analyzed by gamma ray spectroscopy.

There was no measurable amount of strontium-89 or 90 in aquatic sediment/silt. A number of naturally occurring radioisotopes were detected in these samples at background levels.

#### 4.14 Shoreline Soil

Shoreline soil/sediment, unlike bottom sediment, may provide a direct dose to humans. Buildup of radioisotopes along the shoreline may provide a source of direct exposure for those using the area for commercial and recreational uses. A

sample of shoreline sediment was collected in March and October from indicator station 08. The samples were analyzed by gamma ray spectrometry. The September sample was analyzed for strontium-89 and strontium-90. The results are presented in Table 3-14.

Naturally occurring radioisotopes were detected at concentrations equivalent to normal background activities. The activities of these radioisotopes indicate a steady trend. Cesium-137 was measured in both samples collected with an average concentration of 199 pCi/kg (dry weight). No Strontium was detected. Strontium-90 is normally detected in this media, however as discussed previously, the presence of Sr-90 and Cs-137 is attributed to accumulation of residual global fallout from past atmospheric weapons testing.

#### *4.15 Fish*

Four sample sets of fish, two from Lake Anna and two from the control station, Lake Orange, were collected during 2004 and analyzed by gamma spectroscopy. Each sample set consisted of a sample of game species and a sample of bottom-dwelling species, which were analyzed separately. The results are presented in Table 3-15. In one sample, Sta.#08, game species, Cs-137 was observed with a concentration of 26.3 pCi/kg. Except for naturally occurring K-40, no other nuclide was observed in this media in 2004. Only Cs-137 was measured in pre-operational environmental fish samples.

## 5. PROGRAM EXCEPTIONS

### REMP Exceptions for Scheduled Sampling and Analysis During 2003 – North Anna

Location	Description	Date of Sampling	Reason(s) for Loss/Exception
Sta. 14-16, 23, 26	Vegetation	January	Seasonal Unavailability
Sta. 14-16, 23, 26	Vegetation	February	Seasonal Unavailability
Sta. 01	Air Iodine and Particulate	02/18/04	Low volume due to sampler malfunction.
Sta. 14-16, 23, 26	Vegetation	March	Seasonal Unavailability
Sta. 05	Air Iodine and Particulate	03/17/04	Low volume due to sampler malfunction.
Sta. 14-16, 23, 26	Vegetation	April	Seasonal Unavailability
Sta. 01	Air Iodine and Particulate	05/05/04	Low volume due to breaker trip.
Sta. 05	Air Iodine and Particulate	07/15/04	Motor locked up – end of run.
AREVA (vendor)	I-131 Lab Contamination	08/03/04	
Sta. 01	Air Iodine and Particulate	10/13/04	Low volume due to breaker trip.
Sta. 14-16, 23, 26	Vegetation	October	Seasonal Unavailability
Sta. 05A	Air Iodine and Particulate	10/13/04	Low volume due to breaker trip.
Sta. 01	Air Iodine and Particulate	10/20/04	Low volume due to breaker trip.
Sta. 14-16, 23, 26	Vegetation	November	Seasonal Unavailability
Sta. 14-16, 23, 26	Vegetation	December	Seasonal Unavailability
TLD EPSP - 9	TLD	1 <sup>st</sup> Quarter	Vendor lost TLD
TLD 22/54	TLD	4 <sup>th</sup> Quarter	Power Pole replaced – no notification

## REFERENCES



## *References*

1. Dominion, North Anna Power Station Technical Specifications, Units 1 and 2.
2. Dominion, North Anna Power Station Independent Spent Fuel Storage Installation Technical Specifications.
3. Dominion, Station Administrative Procedure, VPAP-2103N, "Offsite Dose Calculation Manual".
4. Virginia Electric and Power Company, North Anna Technical Procedure, HP-3051.010, "Radiological Environmental Monitoring Program".
5. Title 10 Code of Federal Regulation, Part 50 (10CFR50), "Domestic Licensing of Production and Utilization Facilities".
6. United States Nuclear Regulatory Commission Regulatory Guide 1.109, Rev. 1, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I", October, 1977.
7. United States Nuclear Regulatory Commission, Regulatory Guide 4.8 "Environmental Technical Specifications for Nuclear Power Plants", December 1975.
8. USNRC Branch Technical Position, "Acceptable Radiological Environmental Monitoring Program", Rev. 1, November 1979.
9. NUREG 0472, "Radiological Effluent Technical Specifications for PWRs", Rev. 3, March 1982.
10. "Technical Specifications for North Anna Independent Spent Fuel Storage Installation (ISFSI)".
11. HASL-300, Environmental Measurements Laboratory, "EML Procedures Manual," 27<sup>th</sup> Edition, Volume 1, February 1992.
12. NUREG/CR-4007, "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," September 1984.

## **APPENDICES**

## **APPENDIX A: LAND USE CENSUS**

**Year 2004**



## LAND USE CENSUS

North Anna Power Station  
North Anna County, Virginia

*January 1 to December 31, 2004*

Direction	Distance (miles)					
	Nearest Site Boundary	Nearest Resident	Nearest Garden (> 50m <sup>2</sup> )	Nearest Meat Animal	Nearest Milch Cow	Nearest Milch Goat
N	0.9	1.5	1.5	None	None	None
NNE	0.9	0.9	1.3	1.5	None	None
NE	0.8	0.9	0.9	1.5	None	None
ENE	0.8	2.1	2.1	2.5	None	2.5
E	0.8	1.3	1.3	3.5	None	None
ESE	0.9	1.7	1.7	None	None	None
SE	0.9	1.4	1.4	1.5	None	None
SSE	0.9	1.0	1.0	2.8	None	None
S	0.9	1.1	1.1	2.8	None	None
SSW	1.0	1.4	None	1.9	None	None
SW	1.1	3.1	3.1	None	None	None
WSW	1.1	1.6	1.6	1.6	None	None
W	1.1	1.5	1.5	None	None	None
WNW	1.0	1.1	2.5	3.9	None	None
NW	1.0	1.0	1.3	None	None	None
NNW	0.9	1.0	1.1	None	None	None

2003 to 2004 Land Use Census Changes			
Nearest	Direction	2003 Distance	2004 Distance
Site Boundary	No Changes		
Resident	WSW	1.7 mi	1.6 mi (2)
	SSW	1.2 mi	1.4 mi (2)
Garden	N	1.8 mi	1.5 mi (1)
	NNE	1.6 mi	1.3 mi (2)
	SSE	1.3 mi	1.0 mi (2)
	S	1.2 mi	1.1 mi (1)
	SW	None	3.1 mi (1)
	WSW	2.0 mi	1.6 mi (2)
	W	1.9 mi	1.5 mi (1)
	NW	1.4 mi	1.3 mi (2)
	NNW	2.2 mi	1.1 mi (1)
Meat Animal	N	2.2 mi	None (1)
	NE	1.4 mi	1.5 mi (2)
	S	None	2.8 mi (1)
	WSW	1.7 mi	1.6 mi (2)
	WNW	4.1 mi	3.9 mi (2)
	NNW	2.0 mi	None (1)
Milch Cow	No Changes		
Milch Goat	ENE	None	2.5 mi (1)

(1) - Actual census location changes.

(2) - Mileage changes due to methodology change in measurements.

## **APPENDIX B: SUMMARY OF INTERLABORATORY COMPARISONS**

**YEAR 2004**

## **INTRODUCTION**

This appendix covers the Intercomparison Program of the AREVA ANP Environmental Laboratory as required by technical specifications for each unit. Framatome uses QA/QC samples provided by Analytics, Inc to monitor the quality of analytical processing associated with the Radiological Environmental Monitoring Program (REMP). The suite of Analytics QA/QC samples are designed to be comparable with the pre-1996 US EPA Interlaboratory Cross-Check Program in terms of sample number, matrices, and nuclides. It was modified to more closely match the media mix presently being processed by Framatome and includes:

- milk for gamma (10 nuclides) and low-level (LL) Iodine-131 analyses once per quarter,
- milk for Sr-89 and Sr-90 analyses during the 1st and 3rd quarters,
- water for gamma (10 nuclides) and low-level (LL) Iodine-131 analyses during the 1st and 3rd quarters,
- water for Sr-89 and Sr-90 analyses during the 4th quarter,
- water tritium analysis during the 2nd and 4th quarters,
- air filter for gamma (9 nuclides) analyses during the 2nd quarter, and
- air filter for gross beta analysis during the 1st and 3rd quarters.

In addition to the Analytics Intercomparison Program, AREVA ANP also participates in other intercomparison programs which include radionuclides and media similar to those required by the Millstone program. These programs are the National Institute of Standards and Technology (NIST) Measurement Assurance Program (MAP), the Environmental Resource Associates (ERA) Proficiency Test (PT) Program, the Department of Energy (DOE) Quality Assessment Program (QAP), and the Mixed Analyte Performance Evaluation Program (MAPEP).

## **RESULTS**

Intercomparison program results are evaluated using AREVA ANP's internal bias acceptance criterion. The criterion is defined as within 25% of the known strontium value for samples containing both Sr-89 and Sr-90 and within 15% of the known value for other radionuclides, or within two sigma of the known value. Any sample analysis result which does not pass the criteria is investigated by AREVA ANP.

Analytics Intercomparison Program results are included on pages 79 through 81 for the first quarter of 2004 through the third quarter of 2004. A total of 113 analysis results were obtained with 111 initially passing acceptance criteria, a 98.2% success rate. During analysis of the second quarter Sr-89/90 filter analyses, problems were encountered in filter dissolution. The analyses were

performed during the third quarter and were in agreement.

**FRAMATOME ANP 2004 ENVIRONMENTAL LABORATORY**  
**ANALYTICS RADIOLOGICAL ENVIRONMENTAL CROSS-CHECK**  
**PERFORMANCE EVALUATION**

Sample Number	Quarter/ Year	Sample Media	Nuclide	Units	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E4057-162	1st/04	Water	Gross Alpha	pCi/L	72.3	74.5	0.97	Acceptable
E4057-162	1st/04	Water	Gross Beta	pCi/L	285.7	301	0.95	Acceptable
E4058-162	1st/04	Water	I-131	pCi/L	94	90.2	1.04	Acceptable
E4058-162	1st/04	Water	I-131LL	pCi/L	88.7	90.2	0.98	Acceptable
E4058-162	1st/04	Water	Ce-141	pCi/L	87.5	85	1.03	Acceptable
E4058-162	1st/04	Water	Cr-51	pCi/L	335	326	1.03	Acceptable
E4058-162	1st/04	Water	Cs-134	pCi/L	86	89.7	0.96	Acceptable
E4058-162	1st/04	Water	Cs-137	pCi/L	185.6	185	1.00	Acceptable
E4058-162	1st/04	Water	Co-58	pCi/L	113.2	112	1.01	Acceptable
E4058-162	1st/04	Water	Mn-54	pCi/L	112.3	114	0.99	Acceptable
E4058-162	1st/04	Water	Fe-59	pCi/L	60.8	56.7	1.07	Acceptable
E4058-162	1st/04	Water	Zn-65	pCi/L	149.1	143	1.04	Acceptable
E4058-162	1st/04	Water	Co-60	pCi/L	151.4	153	0.99	Acceptable
E4059-162	1st/04	Water	Sr-89	pCi	107.7	123	0.88	Acceptable
E4059-162	1st/04	Water	Sr-90	pCi	14.85	14.5	1.02	Acceptable
E4060-162	1st/04	Filter	Gross Alpha	pCi/L	48.09	58.9	0.82	Acceptable
E4060-162	1st/04	Filter	Gross Beta	pCi/L	231.1	218	1.06	Acceptable
E4061-162	1st/04	Milk	I-131	pCi/L	77.73	77.7	1.00	Acceptable
E4061-162	1st/04	Milk	I-131LL	pCi/L	83.6	77.7	1.08	Acceptable
E4061-162	1st/04	Milk	Ce-141	pCi/L	92	85.2	1.08	Acceptable
E4061-162	1st/04	Milk	Cr-51	pCi/L	314	327	0.96	Acceptable
E4061-162	1st/04	Milk	Cs-134	pCi/L	88.7	90	0.99	Acceptable
E4061-162	1st/04	Milk	Cs-137	pCi/L	188.6	185	1.02	Acceptable
E4061-162	1st/04	Milk	Co-58	pCi/L	115	112	1.03	Acceptable
E4061-162	1st/04	Milk	Mn-54	pCi/L	114.7	114	1.01	Acceptable
E4061-162	1st/04	Milk	Fe-59	pCi/L	59.7	56.8	1.05	Acceptable
E4061-162	1st/04	Milk	Zn-65	pCi/L	145.5	143	1.02	Acceptable
E4061-162	1st/04	Milk	Co-60	pCi/L	154.8	153	1.01	Acceptable
E4062-162	1st/04	Milk	Sr-89	pCi	86.2	103	0.84	Acceptable
E4062-162	1st/04	Milk	Sr-90	pCi	12.7	12.1	1.05	Acceptable

**FRAMATOME ANP 2004 ENVIRONMENTAL LABORATORY  
ANALYTICS ENVIRONMENTAL CROSS CHECK PROGRAM  
PERFORMANCE EVALUATION**

Sample Number	Quarter/ Year	Sample Media	Nuclide	Units	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E4182-162	2nd/04	Water	H-3	pCi/L	11680	11900	0.98	Agreement
E4183-162	2nd/04	Filter	Gross Alpha	pCi	46.8	48.8	0.96	Agreement
E4183-162	2nd/04	Filter	Gross Beta	pCi	156	160	0.98	Agreement
E4184A-162	2nd/04	Filter	Ce-141	pCi	86	88.3	0.97	Agreement
E4184A-162	2nd/04	Filter	Cr-51	pCi	127	128	0.99	Agreement
E4184A-162	2nd/04	Filter	Cs-134	pCi	54	56.9	0.94	Agreement
E4184A-162	2nd/04	Filter	Cs-137	pCi	90	87.8	1.03	Agreement
E4184A-162	2nd/04	Filter	Co-58	pCi	27	26	1.03	Agreement
E4184A-162	2nd/04	Filter	Mn-54	pCi	42	39.7	1.06	Agreement
E4184A-162	2nd/04	Filter	Fe-59	pCi	27	25.1	1.09	Agreement
E4184A-162	2nd/04	Filter	Zn-65	pCi	62	56	1.11	Agreement
E4184A-162	2nd/04	Filter	Co-60	pCi	92	96.8	0.95	Agreement
E4185-162	2nd/04	Filter	Sr-89	pCi				(1)
E4185-162	2nd/04	Filter	Sr-90	pCi				(1)
E4186-162	2nd/04	Milk	I-131	pCi/L	55	58.2	0.95	Agreement
E4186-162	2nd/04	Milk	I-131LL	pCi/L	59	58.2	1.01	Agreement
E4186-162	2nd/04	Milk	Ce-141	pCi/L	165	157	1.06	Agreement
E4186-162	2nd/04	Milk	Cr-51	pCi/L	241	228	1.06	Agreement
E4186-162	2nd/04	Milk	Cs-134	pCi/L	99	101	0.98	Agreement
E4186-162	2nd/04	Milk	Cs-137	pCi/L	157	156	1.01	Agreement
E4186-162	2nd/04	Milk	Co-58	pCi/L	46	46.2	1.00	Agreement
E4186-162	2nd/04	Milk	Mn-54	pCi/L	73	70.5	1.04	Agreement
E4186-162	2nd/04	Milk	Fe-59	pCi/L	48	44.5	1.08	Agreement
E4186-162	2nd/04	Milk	Zn-65	pCi/L	100	99.3	1.01	Agreement
E4186-162	2nd/04	Milk	Co-60	pCi/L	175	172	1.02	Agreement
MAPEP-04-RdF12	May-04	Filter	Sr-90	pCi	20.3	22.4	0.91	Agreement (2)

(1) - Problems encountered in filter dissolution, filter re-ordered. See 3<sup>rd</sup> Quarter results.

(2) - Replacement filter for first half 2004 from DOE MAPEP



**FRAMATOME ANP 2004 ENVIRONMENTAL LABORATORY  
ANALYTICS RADIOLOGICAL ENVIRONMENTAL CROSS-CHECK  
PERFORMANCE EVALUATION**

Sample	Quarter/	Sample			Reported	Known	Ratio	
Number	Year	Media	Nuclide	Units	Value	Value	E-LAB/ Analytics	Evaluation
E4269-162	3rd/2004	Water	Gross Alpha	pCi/L	41.3	42.7	0.97	Agreement
E4269-162	3rd/2004	Water	Gross Beta	pCi/L	214	225	0.95	Agreement
E4270-162	3rd/2004	Water	I-131LL	pCi/L	67.8	70.8	0.96	Agreement
E4270-162	3rd/2004	Water	I-131	pCi/L	70.5	70.8	1.00	Agreement
E4270-162	3rd/2004	Water	Ce-141	pCi/L	258	250	1.03	Agreement
E4270-162	3rd/2004	Water	Cr-51	pCi/L	230	223	1.03	Agreement
E4270-162	3rd/2004	Water	Cs-134	pCi/L	93.4	96.4	0.97	Agreement
E4270-162	3rd/2004	Water	Cs-137	pCi/L	217	215	1.01	Agreement
E4270-162	3rd/2004	Water	Co-58	pCi/L	93.4	94.6	0.99	Agreement
E4270-162	3rd/2004	Water	Mn-54	pCi/L	181	181	1.00	Agreement
E4270-162	3rd/2004	Water	Fe-59	pCi/L	95.2	91.6	1.04	Agreement
E4270-162	3rd/2004	Water	Zn-65	pCi/L	180	178	1.01	Agreement
E4270-162	3rd/2004	Water	Co-60	pCi/L	126	125	1.01	Agreement
E4271-162	3rd/2004	Filter	Gross Alpha	pCi	38.3	36.8	1.04	Agreement
E4271-162	3rd/2004	Filter	Gross Beta	pCi	191	194	0.98	Agreement
E4272-162	3rd/2004	Milk	I-131LL	pCi/L	79.4	83.5	0.95	Agreement
E4272-162	3rd/2004	Milk	I-131	pCi/L	81.1	83.5	0.97	Agreement
E4272-162	3rd/2004	Milk	Ce-141	pCi/L	240	235	1.02	Agreement
E4272-162	3rd/2004	Milk	Cr-51	pCi/L	214	210	1.02	Agreement
E4272-162	3rd/2004	Milk	Cs-134	pCi/L	89.5	90.6	0.99	Agreement
E4272-162	3rd/2004	Milk	Cs-137	pCi/L	204	202	1.01	Agreement
E4272-162	3rd/2004	Milk	Co-58	pCi/L	90.9	89	1.02	Agreement
E4272-162	3rd/2004	Milk	Mn-54	pCi/L	173	171	1.01	Agreement
E4272-162	3rd/2004	Milk	Fe-59	pCi/L	91.3	86.1	1.06	Agreement
E4272-162	3rd/2004	Milk	Zn-65	pCi/L	169	167	1.01	Agreement
E4272-162	3rd/2004	Milk	Co-60	pCi/L	116	118	0.98	Agreement
E4273-162	3rd/2004	Milk	Sr-89	pCi/L	99.2	102	0.97	Agreement
E4273-162	3rd/2004	Milk	Sr-90	pCi/L	23.4	24.5	0.96	Agreement
E4340-162	3rd/2004*	Filter	Sr-89	pCi/L	151	152	1.00	Agreement
E4340-162	3rd/2004*	Filter	Sr-90	pCi/L	53.5	58.8	0.91	Agreement

\* - Replacement filter for lost 2nd quarter filter.

**FRAMATOME ANP 2004 ENVIRONMENTAL LABORATORY  
ANALYTICS RADIOLOGICAL ENVIRONMENTAL CROSS-CHECK  
PERFORMANCE EVALUATION**

Sample Number	Quarter/ Year	Sample Media	Nuclide	Units	Reported Value	Known Value	Ratio E-LAB/ Analytics	Evaluation
E4380-162	4th/2004	Water	H-3	pCi/L	8327	8060	1.03	Agreement
E4381-162	4th/2004	Filter	Sr-89	pCi	87.7	92.3	0.95	Agreement
E4381-162	4th/2004	Filter	Sr-90	pCi	8.78	10.6	0.83	Agreement
E4382-162	4th/2004	Filter	Gross Alpha	pCi	24.9	29.5	0.84	Agreement
E4382-162	4th/2004	Filter	Gross Beta	pCi	223	204	1.09	Agreement
E4383-162	4th/2004	Filter	Ce-141	pCi	75.6	80.3	0.94	Agreement
E4383-162	4th/2004	Filter	Cr-51	pCi	201	189	1.06	Agreement
E4383-162	4th/2004	Filter	Cs-134	pCi	82.4	84.7	0.97	Agreement
E4383-162	4th/2004	Filter	Cs-137	pCi	68.8	62.9	1.09	Agreement
E4383-162	4th/2004	Filter	Co-58	pCi	75.3	72.9	1.03	Agreement
E4383-162	4th/2004	Filter	Mn-54	pCi	76.3	67.7	1.13	Agreement
E4383-162	4th/2004	Filter	Fe-59	pCi	69.8	60.5	1.15	Agreement
E4383-162	4th/2004	Filter	Zn-65	pCi	109	97.7	1.12	Agreement
E4383-162	4th/2004	Filter	Co-60	pCi	85.1	87.1	0.98	Agreement
E4384-162	4th/2004	Milk	I-131LL	pCi/L	64.2	66.7	0.96	Agreement
E4384-162	4th/2004	Milk	I-131	pCi/L	69.0	66.7	1.03	Agreement
E4384-162	4th/2004	Milk	Ce-141	pCi/L	154	155	0.99	Agreement
E4384-162	4th/2004	Milk	Cr-51	pCi/L	385	379	1.02	Agreement
E4384-162	4th/2004	Milk	Cs-134	pCi/L	167	170	0.98	Agreement
E4384-162	4th/2004	Milk	Cs-137	pCi/L	132	126	1.05	Agreement
E4384-162	4th/2004	Milk	Co-58	pCi/L	147	146	1.01	Agreement
E4384-162	4th/2004	Milk	Mn-54	pCi/L	144	136	1.06	Agreement
E4384-162	4th/2004	Milk	Fe-59	pCi/L	129	121	1.07	Agreement
E4384-162	4th/2004	Milk	Zn-65	pCi/L	197	196	1.01	Agreement
E4383-162	4th/2004	Milk	Co-60	pCi/L	177	175	1.01	Agreement
E4412-162	4th/2004	Water	Sr-89	pCi/L	90.9	98.1	0.93	Agreement
E4412-162	4th/2004	Water	Sr-90	pCi/L	9.33	11.3	0.83	Agreement