VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

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VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNIT NOS. 1 AND 2
INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

In accordance with North Anna Units 1 and 2 Technical Specification 5.6.2 and the North Anna Independent Spent Fuel Storage Installation Technical Specification 5.5.2c, enclosed is the 2011 Annual Radiological Environmental Operating Report. The Radiological Environmental Operating Report provides the details associated with the Radiological Environmental Monitoring Program.

If you have any questions or require additional information, please contact D. R. Taylor at (540) 894-2616.

Very truly yours,

G. T. Bischof
Site Vice President

Enclosure

Commitments made in this letter: None

JE25
NMSS26
NRR
NMSS

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Washington, D. C. 20555

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Dominion

North Anna Power Station

Radiological Environmental Monitoring Program

January 1, 2011 to December 31, 2011

Prepared by

Dominion, North Anna Power Station

Annual Radiological Environmental Operating Report

North Anna Power Station

January 1, 2011 to December 31, 2011

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1. EXECUTIVE SUMMARY

This document is a detailed report of the 2011 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, 2011, 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. 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, Fukushima Daiichi or natural variation.

Global Dosimetry Solutions provided thermoluminescent dosimetry (TLD) services and Teledyne Brown Engineering Environmental Services 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 2011 airborne results were similar to previous years. Fallout or natural radioactivity levels remained at levels consistent with past years' results.

Water and aquatic exposure pathway samples include precipitation, surface, river and well water, silt and shoreline sediments, and fish. The average tritium activity in surface water for 2011 was 3350 pCi/liter. Nb-95 was reported in one surface water sample at the indicator location. However, the peak was not identified, but forced activity concentration calculation exceeded MDC and the 2 sigma error. This is considered a false positive. No plant related isotopes were reported in any other surface or river water. River water collected from the North Anna River, 5.8 miles downstream of the site had an average tritium level of 3590 pCi/liter. No plant related isotopes were detected in quarterly precipitation samples. I-131 was detected in precipitation samples taken and counted in March and April. These samples are not normally counted for gamma on a monthly basis. Due to the Fukushima Daiichi event, the plant requested that monthly samples be analyzed for gamma emitters in March and April. I-131 was detected in both samples. The average concentration was 1.83 pCi/L and ranged from 1.10 – 2.55 pCi/L. I-131 is not normally detected in environmental samples and apparently was not related to operation of North Anna Power Station, but the Fukushima Daiichi incident. This is discussed in more detail in the appropriate section. Silt samples indicated the presence of naturally occurring potassium-40 and thorium and uranium decay daughters at levels consistent with the natural background. No plant related isotope was identified in any sample. Shoreline soil, which may provide a direct exposure pathway, indicated the presence of potassium-40 and thorium and uranium decay daughters also at levels consistent with natural levels. No plant related isotope was detected in shoreline soil. No plant related isotopes were detected in fish samples from either Lake Anna or the control location, Lake Orange.

Soil samples, which are collected every three years from twelve stations, were not

collected in 2011. During the preoperational phase Cs-137 was routinely detected and was attributed to fallout. Levels during this phase varied by location and date and ranged from 88 to 1390 pCi/Kg. The average was 645 pCi/kg. The levels from 2010 also varied significantly by location and date and indicated a decrease from the preoperational levels above. This indicates that the Cs-137 detected in 2010 was most likely due to previous fallout from atomic bomb testing. Naturally occurring nuclides such as Be-7, K-40, Ra-226, Th-228, Th-232 and others were detected in 2010.

The terrestrial exposure pathway includes milk and food/vegetation products. Iodine-131 was detected in one milk sample in April of 2011 at a level of 1.28 pCi/L. This is most likely a result of the Fukushima Daiichi accident, as previously no I-131 had been detected in milk prior to or since the 1986 Chernobyl accident. No plant related radioisotopes were detected in any milk samples. Naturally occurring beryllium-7, potassium-40 and radionuclides associated with the uranium and thorium series were detected at environmental levels consistent with historical data. No plant related isotopes were detected in any vegetation samples. Low levels of Cs-137 have been detected intermittently in past years. The direct exposure pathway measures environmental radiation doses by use of thermoluminescent dosimeters (TLDs). TLD results have remained essentially constant over the years.

During 2011, 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 total body dose calculated for a hypothetical individual at the station site boundary due to liquid and gaseous effluents released from the station during 2011 was 0.46 millirem. For reference, this dose may be compared to the 625 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 2011 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. Teledyne Brown Engineering Environmental Services (TBE) 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 2011 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 2011 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 TBE for North Anna Power Station during the year 2011.

TABLE 2-1

North Anna Power Station – 2011

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 Dr)	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	

* 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.

*** Air Sample Station at 01A was added in October 2007.

**** Station at 14B was added in October 2011 and Station 14A was deleted.

***** The dairy at Station 12 sold its dairy herd and ceased milking operations in May 2010.

TABLE 2-1

North Anna Power Station – 2011

RADIOLOGICAL SAMPLING STATION

DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
	NAPS Access Rd.	S-17/49	0.36	S	173°	Quarterly	
Environmental	Elk Creek Church	S-18/50	1.55	S	178°	Quarterly	
Thermoluminescent	NAPS Access Rd.	SSW-19/51	0.24	SSW	197°	Quarterly	
Dosimetry (TLD)	Route 618	SSW-20/52	5.30	SSW	205°	Quarterly	
	500kv Tower	SW-21/53	0.60	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 - Laydown Area	NW-29/61	0.52	NW	321°	Quarterly	
	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	
	Orange, VA	C-3/4	22.00	NW	325°	Quarterly	Control
	Mineral, VA	C-5/6	7.10	WSW	243°	Quarterly	
	Louisa, VA	C-7/8	11.54	WSW	257°	Quarterly	Control
Airborne Particulate	NAPS Sewage Treatment Plant	01	0.20	NE	42°	Weekly	
and Radioiodine	Biology Lab***	01A	0.64	SE	138°	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	

* 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.

*** Air Sample Station at 01A was added in October 2007.

**** Station at 14B was added in October 2011 and Station 14A was deleted.

***** The dairy at Station 12 sold its dairy herd and ceased milking operations in May 2010.

TABLE 2-1

North Anna Power Station – 2011

RADIOLOGICAL SAMPLING STATION

DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
	Bumpass, VA	07	7.30	SSE	167°	Weekly	
Airborne Particulate	End of Route 685	21	1.00	WNW	301°	Weekly	
and Radioiodine	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	

* 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.
*** Air Sample Station at 01A was added in October 2007.
**** Station at 14B was added in October 2011 and Station 14A was deleted.
***** The dairy at Station 12 sold its dairy herd and ceased milking operations in May 2010.

TABLE 2-1

North Anna Power Station – 2011

RADIOLOGICAL SAMPLING STATION

DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
	Mineral, VA	03	7.10	WSW	243°	Once/3 years	
	Wares Crossroads	04	5.10	WNW	287°	Once/3 years	
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	Lakeside Dairy	12A	7.50	NW	310°	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	Moody Lane****	14a	1.70	ESE	103°	Monthly if available or at harvest	
(Vegetation)	Stagecoach Road****	14B	1.22	NNE	40°	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	

* 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.

*** Air Sample Station at 01A was added in October 2007.

**** Station at 14B was added in October 2011 and Station 14A was deleted.

***** The dairy at Station 12 sold its dairy herd and ceased milking operations in May 2010.

TABLE 2-2

North Anna Power Station

SAMPLE ANALYSIS PROGRAM

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD	REPORT UNITS
Thermoluminescent Dosimetry (TLD)				
(84 TLDs)	Quarterly	Gamma Dose	2 mR±2mR	mR/std. Month
(12 TLDs)	Annually	Gamma Dose	2 mR±2mR	mR/std. Month
Airborne Radioiodine	Weekly	I-131	0.07	pCi/m^3
Airborne Particulate	Weekly	Gross Beta	0.01	pCi/m^3
	Quarterly (a)	Gamma Isotopic		pCi/m^3
		Cs-134	0.05	
		Cs-137	0.06	
	2^{nd} Quarter	Sr-89	(b)	pCi/m^3
	Composite	Sr-90	(b)	
Surface Water	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^{nd} Quarter	Sr-89	(b)	pCi/L
	Composite	Sr-90	(b)	
River Water	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	

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

(d) LLD applied are those for water samples. However, since this is a semi-annual composite no LLD is applied for these nuclides due to their short half-lives.

TABLE 2-2

North Anna Power Station

SAMPLE ANALYSIS PROGRAM

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD	REPORT UNITS
		La-140	15	
River Water	Quarterly(a)	Tritium (H-3)	2000	pCi/L
	2nd Quarter	Sr-89	(b)	pCi/L
	Composite	Sr-90	(b)	
Ground Water	Quarterly	Gamma Isotopic		pCi/L
(Well Water)		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		I-131	10(c)	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
	Quarterly(a)	Tritium (H-3)	2000	pCi/L
	2nd Quarter	Sr-89	(b)	pCi/L
		Sr-90	(b)	
Aquatic Sediment	Semi-Annually	Gamma Isotopic		pCi/kg (dry)
		Cs-134	150	
		Cs-137	180	
	Annually	Sr-89	(b)	pCi/kg (dry)
		Sr-90	(b)	
Precipitation	Monthly	Gross Beta	4	pCi/L
	Semi-Annual	Gamma Isotopic		pCi/L
	Composite (1)	Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		I-131(d)		
		Cs-134	15	
		Cs-137	18	
		Ba-140(d)		
		La-140(d)		
Shoreline Soil	Semi-Annually	Gamma Isotopic		pCi/kg (dry)
		Cs-134	150	
		Cs-137	180	

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

(d) LLD applied are those for water samples. However, since this is a semi-annual composite no LLD is applied for these nuclides due to their short half-lives.

TABLE 2-2
North Anna Power Station
SAMPLE ANALYSIS PROGRAM

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD	REPORT UNITS
	Annually	Sr-89	(b)	pCi/kg (dry)
		Sr-90	(b)	
Soil	Once per 3 years	Gamma Isotopic		pCi/kg (dry)
		Cs-134	150	
		Cs-137	180	
		Sr-89	(b)	pCi/kg (dry)
		Sr-90	(b)	
Milk	Monthly	I-131	1	pCi/L
	Monthly	Gamma Isotopic		
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
	Quarterly	Sr-89	(b)	pCi/L
		Sr-90	(b)	
Fish	Semi-Annually	Gamma Isotopic		pCi/kg (wet)
		Mn-54	130	
		Fe-59	260	
		Co-58	130	
		Co-60	130	
		Zn-65	260	
		Cs-134	130	
		Cs-137	150	
Food Products (Broadleaf Vegetation)	Monthly, if available, or at harvest	Gamma Isotopic		pCi/kg (wet)
		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 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
(d) LLD applied are those for water samples. However, since this is a semi-annual composite no LLD is applied for these nuclides due to their short half-lives.

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

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

(a) Indicates air sample station, annual and quarterly TLD, Triennial soil.
(b) In Orange
(c) In Lake Orange
(d) Station 14B replaced 14A in October 2011

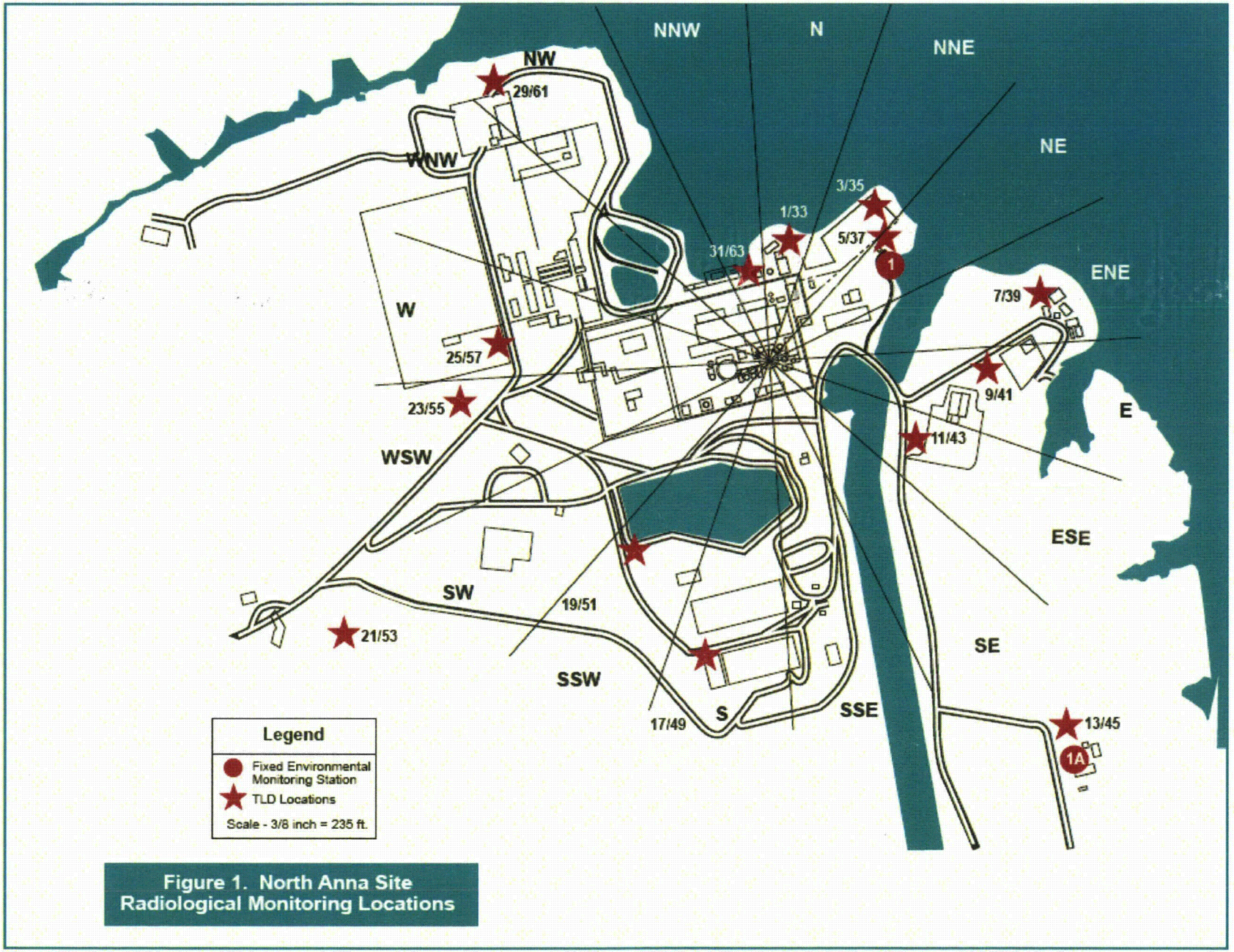
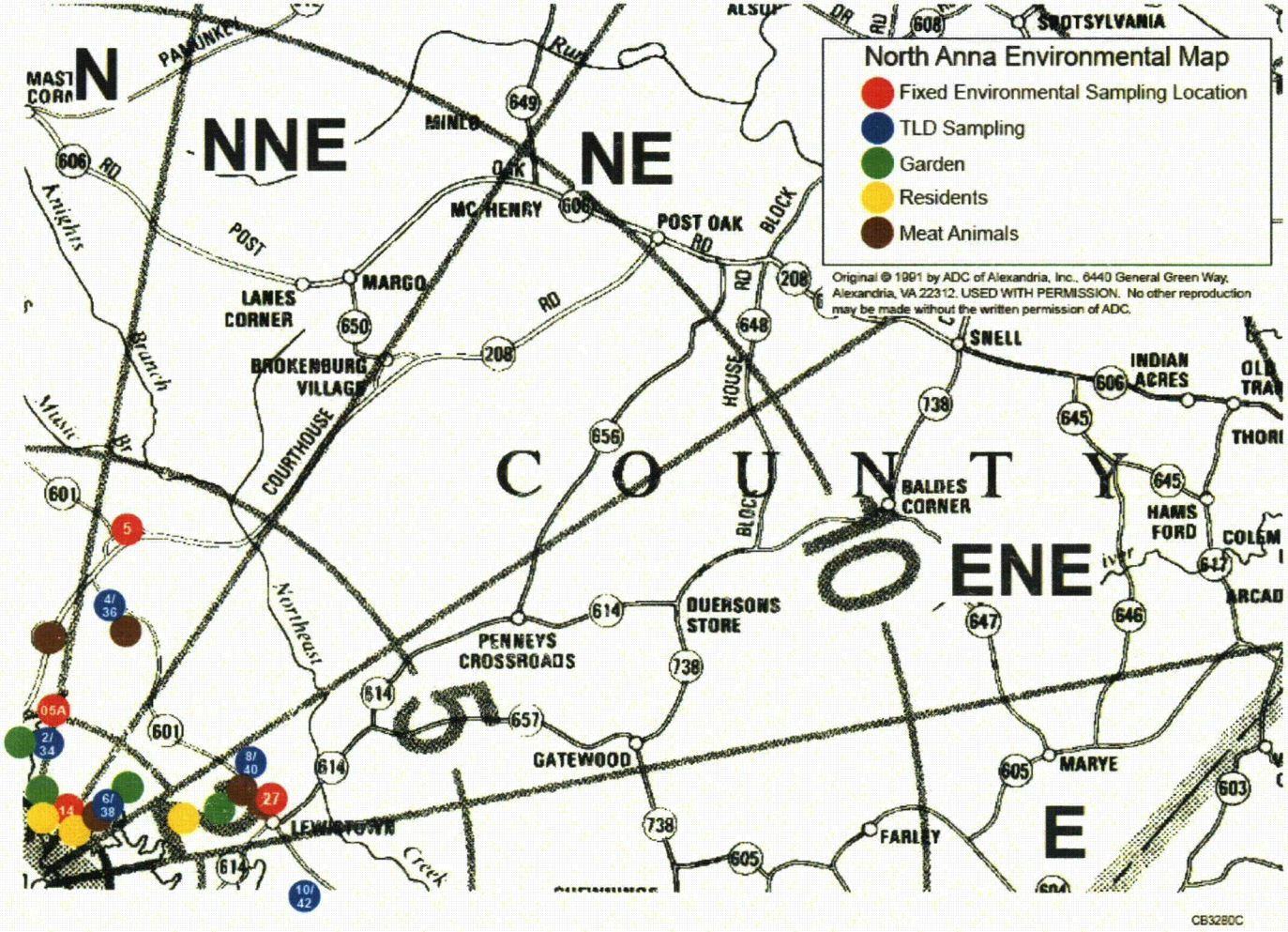
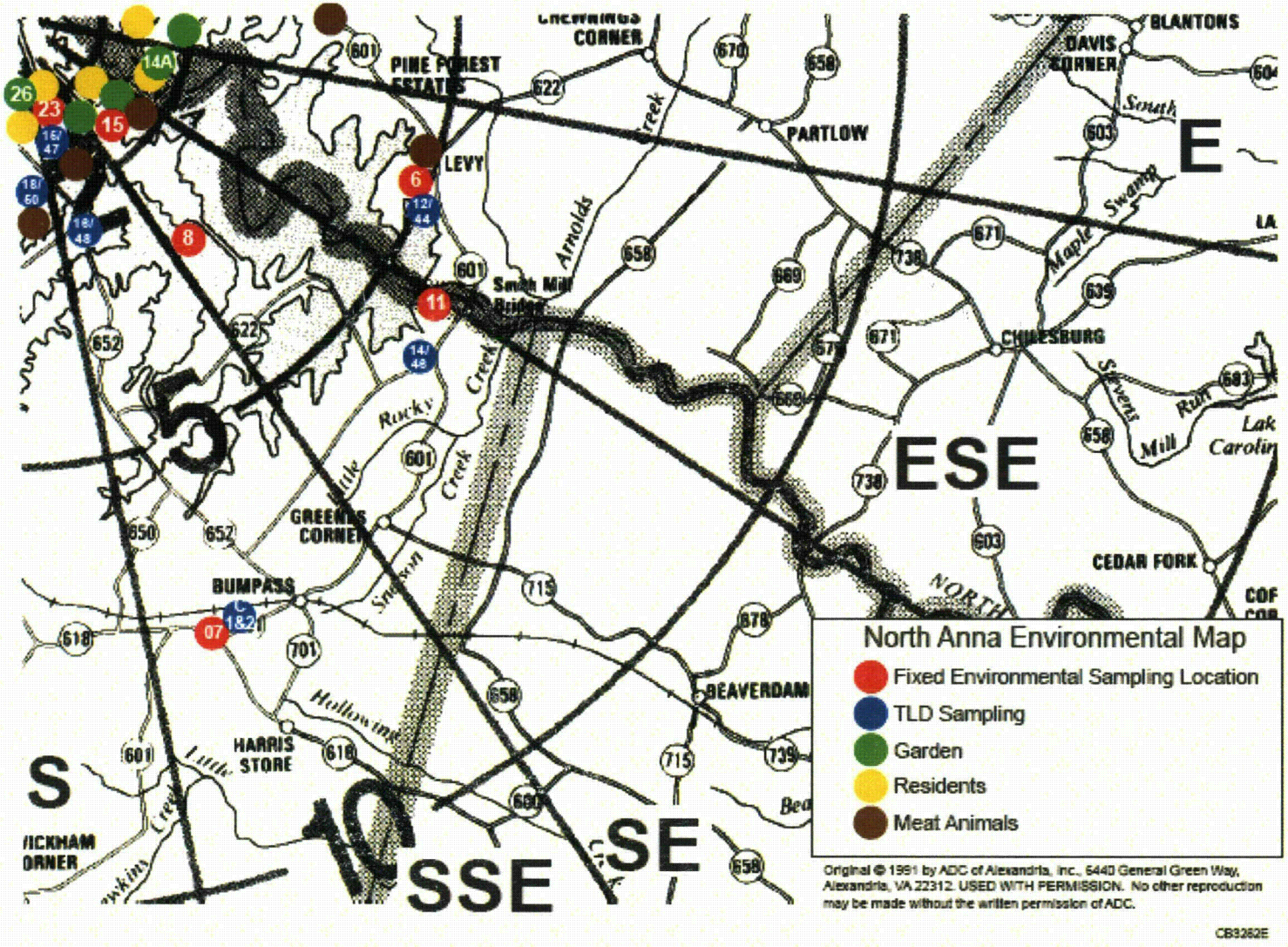


Figure 1. North Anna Site Radiological Monitoring Locations


North Anna Environmental Map
Fixed Environmental Sampling Location
TLD Sampling
Garden
Residents
Meat Animals
Original © 1991 by ADC of Alexandria, Inc., 6440 General Green Way, Alexandria, VA 22312. USED WITH PERMISSION. No other reproduction may be made without the written permission of ADC.
N
NNE
NE
ENE
E
COUNTY
SPOTSYLVANIA
MINERAL
MC HENRY
POST OAK
SNELL
INDIAN ACRES
LANES CORNER
MARGO
BROKENBURG VILLAGE
COURTHOUSE
BALDES CORNER
HAMS FORD
DUERSONS STORE
PENNEYS CROSSROADS
GATEWOOD
LEWISTOWN
MARYE
FARLEY
Northeast
Creek
CB3280C


North Anna Environmental Map
Fixed Environmental Sampling Location
TLD Sampling
Garden
Residents
Meat Animals
5
10
ESE
SSE
SE
E
S
PINE FOREST ESTATES
LEVY
PARTLOW
DAVIS CORNER
BLANTONS
CHILESBURG
CEDAR FORK
GREENES CORNER
BUMPASS
HARRIS STORE
BEAVERDAM
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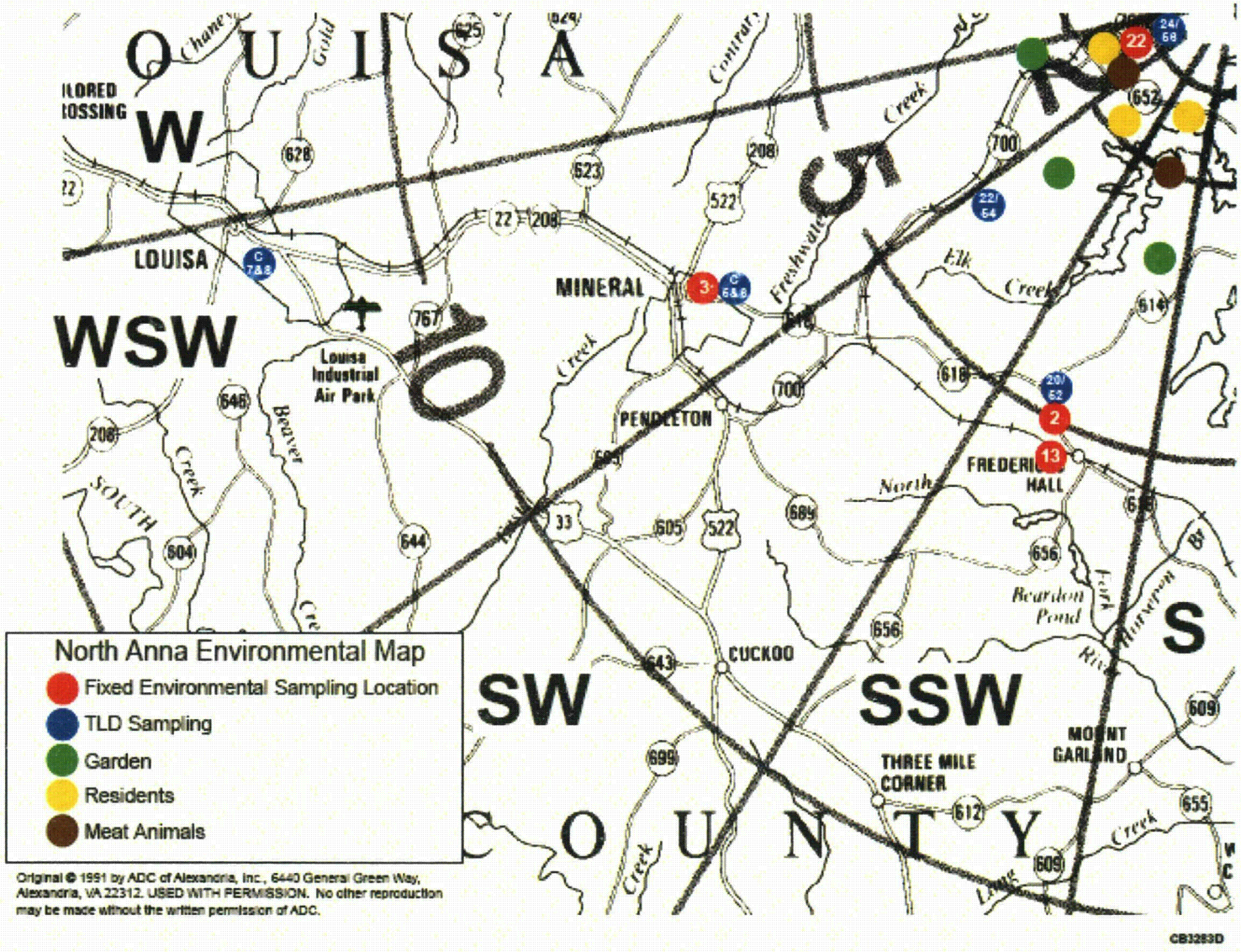
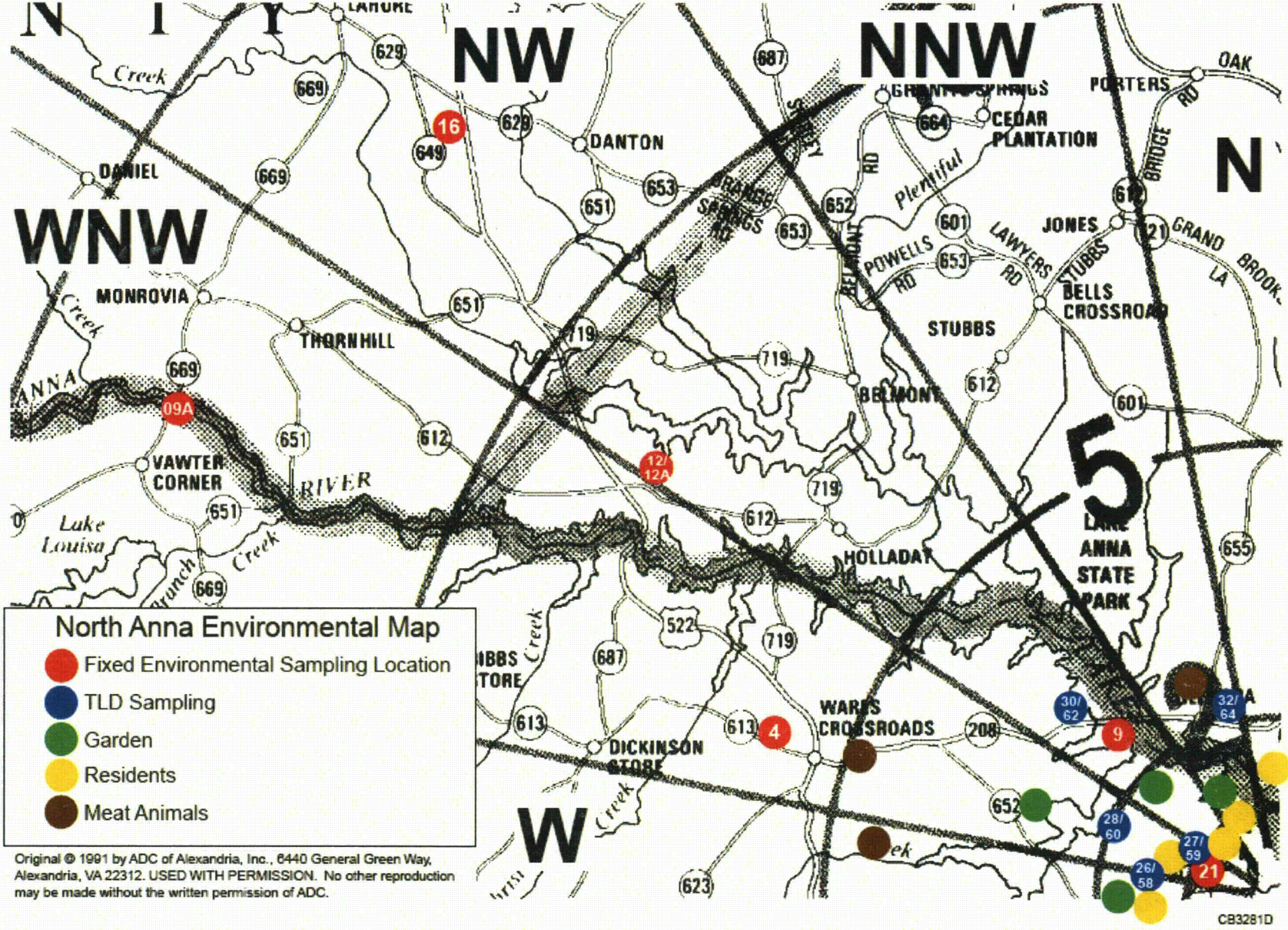
CB3262E


North Anna Environmental Map
Fixed Environmental Sampling Location
TLD Sampling
Garden
Residents
Meat Animals
LOUISA
MINERAL
PENDLETON
CUCKOO
THREE MILE CORNER
MOUNT GARLAND
Louisa Industrial Air Park
WSW
SW
SSW
S
COUNTY
Original © 1991 by ADC of Alexandria, Inc., 6440 General Green Way, Alexandria, VA 22312. USED WITH PERMISSION. No other reproduction may be made without the written permission of ADC.
CB3283D



CB3281D

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. The LLD listed value is taken from the ODCM. For radioanalytic analyses, the values listed in the columns indicated as "Mean/Range" include any results above the Minimum Detectable Concentration, MDC. Results are considered true positives when the measured value exceeds both the MDC and the 2σ error. For TLDs the mean and range include all values.

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.

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis		LLD[1] (pCi/unit)	All Indicator Locations	Indicator Location with Highest Mean			Control Location	Non-routine
	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	Reported Measure-ments
Direct Radiation (mR/std. Month) (Sector TLDs)	Gamma Dose	256	2	4.2(256/256) (1.5-10.7)	19/51	0.24 mi. SSW	7.1(8/8) (5.2-10.7)	3.2(16/16)* (2.3-4.7)	0
Direct Radiation (mR/std. Month) (Pre-operational TLDs)	Gamma Dose	32	2	2.6(16/16) (1.6-3.9)	C-1/2	7.3 mi. SSE	3.2 (8/8) (2.2-3.9)	3.2(16/16)* (2.3-4.7)	0
Direct Radiation (mR/std. Month) (Emergency Sector TLDs)	Gamma Dose	40	2	4.8(40/40) (1.2-8.9)	EPSP-09/10	0.37 mi. ENE	6.6(8/8) (1.8-8.9)	3.2(16/16)* (2.3-4.7)	0
Direct Radiation (mR/std. month) (Environmental TLDs)	Gamma Dose	48	2	3.3(44/44) (1.6-6.0)	23	0.93 mi. SSE	4.6(4/4) (3.4-6.0)	3.3(4/4) (2.4-4.1)	0
Direct Radiation (mR/std. Month) (Annual TLDs)	Gamma Dose	12	2	3.3(11/11) (2.2-4.7)	01	0.20 mi. NE	4.7(1/1) (4.7)	3.0(1/1) (3.0)	0
Airborne Particulates (1E-03 pCi/m^3)	Gross Beta	676	0.01	17.4(622/624) (4.43-42.7)	01	0.2 mi. NE	19.7(50/52) (6.69-42.7)	18.4(52/52) (5.42-45.1)	0
Air Iodine (pCi/m^3)	I-131	676	0.07	89.7(25/624) (26.8-129)	01	0.2 mi. NE	129(2/52) (128-129)	97.9(2/52) (80.8-115)	0
Airborne Particulates (1E-03 pCi/m^3)	Gamma	52							
	Be-7	52	-	154(48/48) (103-261)	05	4.20 mi. NNE	185(4/4) (163-220)	143(4/4) (114-191)	0
	Cs-134	52	0.05	(0/48)	N/A	N/A	N/A	(0/4)	0

(1) mR/std month for TLDs

* C-3/4, -7/8 used as control locations

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis Type	Analysis Total No.	LLD (pCi/unit)	All Indicator Locations Mean Range	Indicator Location with Highest Mean Name	Indicator Location with Highest Mean Distance Direction	Indicator Location with Highest Mean Mean Range	Control Location Mean Range	Non-routine Reported Measurements
Airborne Particulates	Cs-137	52	0.06	(0/48)	N/A	N/A	N/A	(0/4)	0
(1E-03 pCi/m^3)	Sr-89	13	-	(0/12)	N/A	N/A	N/A	(0/1)	0
	Sr-90	13	-	(0/12)	N/A	N/A	N/A	(0/1)	0
Soil*	Triennial								
(pCi/Kg) (dry)	Gamma	0							
	K-40	0	-	N/A	N/A	N/A	N/A	N/A	0
	Cs-134	0	150	N/A	N/A	N/A	N/A	N/A	0
	Cs-137	0	180	N/A	N/A	N/A	N/A	N/A	0
	Ra-226	0	-	N/A	N/A	N/A	N/A	N/A	0
	Th-228	0	-	N/A	N/A	N/A	N/A	N/A	0
	Th-232	0		N/A	N/A	N/A	N/A	N/A	0
	Sr-89	0	-	N/A	N/A	N/A	N/A	N/A	0
	Sr-90	0	-	N/A	N/A	N/A	N/A	N/A	0
Precipitation	Monthly								
(pCi/liter)	Gross Beta	12	4	6.15(8/12) (1.81-22.1)	01A	0.64 mi. SE	6.15(8/12) (1.81-22.1)	N/A	0
	Semiannual Gamma	2							
	Be-7	2	-	49.9(1/2) (49.9)	01A	0.64 mi. SE	49.9(1/2) (49.9)	N/A	0
	Mn-54	2	15	(0/2)	N/A	N/A	N/A	N/A	0
	Fe-59	2	30	(0/2)	N/A	N/A	N/A	N/A	0
	Co-58	2	15	(0/2)	N/A	N/A	N/A	N/A	0

* Soil Samples required triennially. Last samples were taken 2010. Not required in 2011.

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis		LLD (pCi/unit)	All Indicator Locations	Indicator Location with Highest Mean			Control Location	Non-routine
	Type	Total No.		Mean Range	Name	Distance Direction	Mean Range	Mean Range	Reported Measure-ments
Precipitation (pCi/liter)	Co-60	2	15	(0/2)	N/A	N/A	N/A	N/A	0
	Zn-65	2	30	(0/2)	N/A	N/A	N/A	N/A	0
	Zr-95	2	30	(0/2)	N/A	N/A	N/A	N/A	0
	Nb-95	2	15	(0/2)	N/A	N/A	N/A	N/A	0
	I-131	2		(0/2)	N/A	N/A	N/A	N/A	0
	Cs-134	2	15	(0/2)	N/A	N/A	N/A	N/A	0
	Cs-137	2	18	(0/2)	N/A	N/A	N/A	N/A	0
	Ba-140	2		(0/2)	N/A	N/A	N/A	N/A	0
	La-140	2		(0/2)	N/A	N/A	N/A	N/A	0
	Th-228	2		(0/2)	N/A	N/A	N/A	N/A	0
Precipitation* (pCi/liter)	Monthly Be-7	2	-	49.9(1/2) (49.9)	01A	0.64 mi. SE	49.9(1/2) (49.9)	N/A	0
	Mn-54	2	15	(0/2)	N/A	N/A	N/A	N/A	0
	Fe-59	2	30	(0/2)	N/A	N/A	N/A	N/A	0
	Co-58	2	15	(0/2)	N/A	N/A	N/A	N/A	0

*Monthly samples were analyzed for gamma emitters at the request of the station to determine any effects of the Fukushima event.

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis Type	Analysis Total No.	LLD (pCi/unit)	All Indicator Locations Mean Range	Indicator Location with Highest Mean Name	Indicator Location with Highest Mean Distance Direction	Indicator Location with Highest Mean Mean Range	Control Location Mean Range	Non-routine Reported Measure-ments
Precipitation (pCi/liter)	Co-60	2	15	(0/2)	N/A	N/A	N/A	N/A	0
	Zn-65	2	30	(0/2)	N/A	N/A	N/A	N/A	0
	Zr-95	2	30	(0/2)	N/A	N/A	N/A	N/A	0
	Nb-95	2	15	(0/2)	N/A	N/A	N/A	N/A	0
	I-131	2		1.83(2/2) (1.10-2.55)	01A	0.64 mi. SE	1.83(2/2) (1.10-2.55)	N/A	0
	Cs-134	2	15	(0/2)	N/A	N/A	N/A	N/A	0
	Cs-137	2	18	(0/2)	N/A	N/A	N/A	N/A	0
	Ba-140	2		(0/2)	N/A	N/A	N/A	N/A	0
	La-140	2		(0/2)	N/A	N/A	N/A	N/A	0
	Th-228	2		(0/2)	N/A	N/A	N/A	N/A	0
Milk (pCi/liter)	Gamma	12							
	K-40	12	-	1290(12/12) (1100-1450)	12A	7.50 mi. NW	1290(12/12) (1100-1450)	N/A	0
	I-131	12	1	1.28(1/12) (1.28)	12A	7.50 mi. NW	1.28(1/12) (1.28)	N/A	0
	Cs-137	12	18	(0/12)	N/A	N/A	N/A	N/A	0
	Ba-140	12	60	(0/12)	N/A	N/A	N/A	N/A	0
	La-140	12	15	(0/12)	N/A	N/A	N/A	N/A	0

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis Type	Analysis Total No.	LLD (pCi/unit)	All Indicator Locations Mean Range	Indicator Location with Highest Mean Name	Indicator Location with Highest Mean Distance Direction	Indicator Location with Highest Mean Mean Range	Control Location Mean Range	Non-routine Reported Measurements
Milk (pCi/liter)	Sr-89 (Quarterly)	4	-	(0/4)	N/A	N/A	N/A	N/A	0
	Sr-90 (Quarterly)	4	-	(0/4)	N/A	N/A	N/A	N/A	0
Food Vegetation (pCi/kg) (wet)	Gamma	30							
	Be-7	30	-	1690(24/24) (457-3060)	26	1.15 S	1620(5/6) (1280-3060)	1610(6/6) (798-2250)	0
	K-40	30	-	5840(24/24) (3970-8140)	15	1.37 SE	6660(6/6) (5150-8140)	5060(6/6) (4200-6910)	0
	I-131	30	60	(0/24)	N/A	N/A	N/A	(0/6)	0
	Cs-134	30	60	(0/24)	N/A	N/A	N/A	(0/6)	0
	Cs-137	30	80	(0/24)	N/A	N/A	N/A	(0/6)	0
Ground Well Water (pCi/liter)	Tritium	4	2000	(0/4)	N/A	N/A	N/A	N/A	0
	Gamma	4							
	Mn-54	4	15	(0/4)	N/A	N/A	N/A	N/A	0
	Fe-59	4	30	(0/4)	N/A	N/A	N/A	N/A	0
	Co-58	4	15	(0/4)	N/A	N/A	N/A	N/A	0
	Co-60	4	15	(0/4)	N/A	N/A	N/A	N/A	0
	Zn-65	4	30	(0/4)	N/A	N/A	N/A	N/A	0
	Zr-95	4	30	(0/4)	N/A	N/A	N/A	N/A	0
	Nb-95	4	15	8.45(1/4) (8.45)	01A	0.64 mi. SE	8.45(1/4) (8.45)	N/A	0
	I-131	4	10	(0/4)	N/A	N/A	N/A	N/A	0

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis Type	Analysis Total No.	LLD (pCi/unit)	All Indicator Locations Mean Range	Indicator Location with Highest Mean Name	Indicator Location with Highest Mean Distance Direction	Indicator Location with Highest Mean Mean Range	Control Location Mean Range	Non-routine Reported Measure-ments
Ground Well Water (pCi/liter)	Cs-134	4	15	(0/4)	N/A	N/A	N/A	N/A	0
	Cs-137	4	18	(0/4)	N/A	N/A	N/A	N/A	0
	Ba-140	4	60	(0/4)	N/A	N/A	N/A	N/A	0
	La-140	4	15	(0/4)	N/A	N/A	N/A	N/A	0
	Sr-89	1	-	(0/1)	N/A	N/A	N/A	N/A	0
	Sr-90	1	-	(0/1)	N/A	N/A	N/A	N/A	0
River Water (pCi/liter)	Tritium	4	2000	3590(4/4) (2790-4480)	11	5.80 mi. SE	3590(4/4) (2790-4480)	(0/4)*	0
	Gamma	12							
	Mn-54	12	15	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Fe-59	12	30	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Co-58	12	15	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Co-60	12	15	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Zn-65	12	30	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Zr-95	12	30	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Nb-95**	12	15	10.1(1/12) (10.1)	11	5.80 mi. SE	10.1(1/12) (10.1)	(0/12)*	0
	I-131	12	1	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Cs-134	12	15	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Cs-137	12	18	(0/12)	N/A	N/A	N/A	(0/12)*	0

*Results of surface water taken at Location 09A used as control value for river water

** Activity listed is due to forced activity calculation. Nuclide was not identified during analysis. False positive.

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis Type	Analysis Total No.	LLD (pCi/unit)	All Indicator Locations Mean Range	Indicator Location with Highest Mean Name	Indicator Location with Highest Mean Distance Direction	Indicator Location with Highest Mean Mean Range	Control Location Mean Range	Non-routine Reported Measurements
River Water (pCi/liter)	Ba-140	12	60	(0/12)	N/A	N/A	N/A	(0/12)*	0
	La-140	12	15	(0/12)	N/A	N/A	N/A	(0/12)*	0
	Sr-89	1	-	(1/0)	N/A	N/A	N/A	(1/0)*	0
	Sr-90	1	-	(1/0)	N/A	N/A	N/A	(1/0)*	0
Surface Water (pCi/L)	Tritium	8	2000	3350(4/4) (2270-3930)	08	3.37 mi. SSE	3350(4/4) (2270-3930)	(0/4)	0
	Gamma	24							
	Mn-54	24	15	(0/12)	N/A	N/A	N/A	(0/12)	0
	Fe-59	24	30	(0/12)	N/A	N/A	N/A	(0/12)	0
	Co-58	24	15	(0/12)	N/A	N/A	N/A	(0/12)	0
	Co-60	24	15	(0/12)	N/A	N/A	N/A	(0/12)	0
	Zn-65	24	30	(0/12)	N/A	N/A	N/A	(0/12)	0
	Zr-95	24	30	(0/12)	N/A	N/A	N/A	(0/12)	0
	Nb-95	24	30	(0/12)	N/A	N/A	N/A	(0/12)	0
	I-131	24	1	(0/12)	N/A	N/A	N/A	(0/12)	0
	Cs-134	24	15	(0/12)	N/A	N/A	N/A	(0/12)	0
	Cs-137	24	18	(0/12)	N/A	N/A	N/A	(0/12)	0
	Ba-140	24	60	(0/12)	N/A	N/A	N/A	(0/12)	0
	La-140	24	15	(0/12)	N/A	N/A	N/A	(0/12)	0

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis Type	Analysis Total No.	LLD (pCi/unit)	All Indicator Locations Mean Range	Indicator Location with Highest Mean Name	Indicator Location with Highest Mean Distance Direction	Indicator Location with Highest Mean Mean Range	Control Location Mean Range	Non-routine Reported Measure-ments
Surface Water (pCi/liter)	Sr-89	1	-	(0/1)	N/A	N/A	N/A	(0/1)	0
	Sr-90	1	-	(0/1)	N/A	N/A	N/A	(0/1)	0
Sediment Silt (pCi/kg)	Gamma	6							
	K-40	6	-	16600 (4/4) (14900-19500)	08	3.37 mi. SSE	18200(2/2) (16900 - 19500)	13400(2/2) (11900-14800)	0
	Cs-134	6	150	(0/4)	N/A	N/A	N/A	(0/2) (176)	0
	Cs-137	6	180	(0/4)	N/A	N/A.	N/A	(0/2)	0
	Ra-226	6	-	2260(3/4) (2070-2400)	08	3.37 mi. SSE	2320(1/2) (2320)	1560(1/2) (1560)	0
	Th-228	6	-	1810(4/4) (1090-2980)	08	3.37 mi. SSE	2460 (2/2) (1940-2980)	730(2/2) (557-902)	0
	Th-232	6	-	1610 (4/4) (1160-2130)	08	3.37 mi. SSE	2030(2/2) (1920-2130)	660(2/2) (587-732)	0
	(Annually) Sr-89	3	-	(0/2)	N/A	N/A	N/A	(0/1)	0
	Sr-90	3	-	(0/2)	N/A	N/A	N/A	(0/1)	0
Shoreline Soil (pCi/kg) (dry)	Gamma	2							
	K-40	2	-	2030(2/2) (1930-2130)	08	3.37 mi. SSE	2030(2/2) (1930-2130)	N/A	0
	Cs-134	2	150	(0/2)	N/A	N/A	(0/2)	N/A	0
	Cs-137	2	180	(0/2)	N/A	N/A	(0/2)	N/A	0
	Ra-226	2	-	1780(1/2) (1780)	08	3.37 mi. SSE	1780(1/2) (1780)	N/A	0

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2011

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Medium or Pathway Sampled (Unit)	Analysis Type	Analysis Total No.	LLD (pCi/unit)	All Indicator Locations Mean Range	Indicator Location with Highest Mean Name	Indicator Location with Highest Mean Distance Direction	Indicator Location with Highest Mean Mean Range	Control Location Mean Range	Non-routine Reported Measure-ments
Shoreline Soil (pCi/kg) (dry)	Ra-226	2	-	1780(1/2) (1780)	08	3.37 mi. SSE	1780(1/2) (1780)	N/A	0
	Th-228	2	-	385(2/2) (267-502)	08	3.37 mi. SSE	385(2/2) (267-502)	N/A	0
	Th-232	2	-	433(2/2) (412-454)	08	3.37 mi. SSE	433(2/2) (412-454)	N/A	0
	(Annually) Sr-89	1	-	(0/1)	N/A	N/A	N/A	N/A	0
	Sr-90	1	-	(0/1)	N/A	N/A	N/A	N/A	0
Fish (pCi/kg) (wet)	Gamma	8							
	K-40	8	-	2210(4/4) (1920-2400)	08	3.37 mi. SSE	2210(4/4) (1920-2400)	2730(4/4) (1680-3630)	0
	Mn-54	8	130	(0/4)	N/A	N/A	N/A	(0/4)	0
	Fe-59	8	260	(0/4)	N/A	N/A	N/A	(0/4)	0
	Co-58	8	130	(0/4)	N/A	N/A	N/A	(0/4)	0
	Co-60	8	130	(0/4)	N/A	N/A	N/A	(0/4)	0
	Zn-65	8	260	(0/4)	N/A	N/A	N/A	(0/4)	0
	Cs-134	8	130	(0/4)	N/A	N/A	N/A	(0/4)	0
	Cs-137	8	150	(0/4)	N/A	N/A	N/A	(0/4)	0

3.2 Analytical Results of 2011 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 (2σ) 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 true positives when the measured value exceeds both the MDC and the 2σ error.

Because of counting statistics, negative values, zeros and numbers below the Minimum Detectable Level (MDL) are statistically valid pieces of data[1]. For clarity of this report only detectable results are presented. TBE'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

[1] 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 MEASURMENTS - SECTOR QUARTERLY TLD RESULTS

mR/Std. Month (30.4 days) ± 2 Sigma

Station	First Quarter 12/282010 3/29/2011	Second Quarter 3/29/2011 6/29/2011	Third Quarter 6/29/2011 9/28/2011	Fourth Quarter 9/28/2011 12/28/2011	Quarterly* Average +/- 2 s.d.
N-1	4.9	4.0	3.8	5.9	4.7 +/- 1.7
N-33	4.6	4.2	4.1	5.9	
N-2	3.0	2.2	3.6	4.2	3.2 +/- 1.4
N-34	2.9	3.7	2.5	3.8	
NNE-3	6.7	5.7	5.5	8.0	6.5 +/- 1.8
NNE-35	7.1	5.6	6.0	7.3	
NNE-4	4.0	3.1	3.6	4.7	3.9 +/- 1.4
NNE 36	4.1	3.1	3.5	4.9	
NE-5	5.7	4.5	3.6	4.0	4.4 +/- 1.4
NE-37	5.2	3.9	4.1	4.2	
NE-6	3.2	2.4	3.2	4.4	3.3 +/- 1.4
NE-38	3.7	2.9	2.6	4.2	
ENE-7	5.3	4.0	4.2	6.3	5.0 +/- 1.9
ENE-39	5.4	4.2	4.2	6.2	
ENE-8	3.3	2.5	2.8	4.7	3.2 +/- 1.7
ENE-40	3.9	2.1	2.5	3.4	
E-9	4.3	5.4	4.3	5.7	4.7 +/- 1.3
E-41	4.7	4.0	4.1	5.2	
E-10	4.2	4.3	3.6	5.2	4.3 +/- 1.1
E-42	4.7	3.5	4.5	4.1	
ESE-11	4.1	3.6	3.4	5.2	4.0 +/- 1.5
ESE-43	4.2	3.4	3.3	5.0	
ESE-12	4.4	3.4	3.5	4.4	4.1 +/- 1.3
ESE-44	4.8	3.6	3.7	5.2	
SE-13	4.4	3.4	3.7	6.0	4.3 +/- 1.9
SE-45	4.4	3.5	3.5	5.4	
SE-14	7.3	5.3	5.5	7.7	6.2 +/- 2.0
SE-46	6.3	5.1	5.4	6.8	
SSE-15	5.6	3.9	4.0	5.4	4.7 +/- 1.5
SSE-47	4.5	3.8	5.0	5.3	
SSE-16	3.1	2.1	2.1	3.7	2.7 +/- 1.3
SSE-48	2.9	1.8	3.1	3.1	

*Average of collocated TLDs.

TABLE 3-2

DIRECT RADIATION MEASURMENTS - SECTOR QUARTERLY TLD RESULTS

mR/Std. Month (30.4 days) ± 2 Sigma

Station	First Quarter 12/282010 3/29/2011	Second Quarter 3/29/2011 6/29/2011	Third Quarter 6/29/2011 9/28/2011	Fourth Quarter 9/28/2011 12/28/2011	Quarterly* Average +/- 2 s.d.
S-17	6.1	3.6	3.8	6.2	4.9 +/- 2.4
S-49	5.3	4.0	3.9	6.3	
S-18	3.1	1.6	1.8	2.4	2.2 +/- 1.1
S-50	2.7	1.6	2.1	2.1	
SSW-19	10.4	5.4	5.7	7.4	7.1 +/- 4.5
SSW-51	10.7	5.4	5.2	6.4	
SSW-20	3.2	1.9	2.6	2.2	2.3 +/- 1.2
SSW-52	2.4	1.5	1.6	3.0	
SW-21	5.7	4.9	5.1	5.3	5.0 +/- 1.1
SW-53	5.2	4.0	4.6	5.4	
SW-22	3.8	3.4	3.2	4.5	3.8 +/- 0.9
SW-54	4.2	3.6	3.5	4.3	
WSW-23	6.6	4.3	4.2	5.5	5.5 +/- 2.1
WSW-55	6.4	4.6	5.3	6.7	
WSW-24	3.9	2.9	3.5	5.2	3.8 +/- 1.6
WSW-56	3.8	3.1	3.4	4.8	
W-25	6.9	5.6	7.2	8.1	6.7 +/- 2.0
W-57	7.1	5.7	5.5	7.8	
W-26	3.0	2.8	2.5	3.5	3.0 +/- 1.1
W-58	4.0	2.3	2.6	3.2	
WNW-27	3.1	2.1	2.5	3.1	2.9 +/- 1.3
WNW-59	3.3	2.3	2.5	4.1	
WNW-28	3.0	2.7	2.1	3.0	2.8 +/- 0.8
WNW-60	3.2	2.5	2.4	3.2	
NW-29	5.6	5.7	5.9	8.5	6.4 +/- 2.3
NW-61	5.9	5.7	5.7	7.8	
NW-30	2.5	1.6	1.6	2.6	2.1 +/- 0.9
NW-62	2.4	1.6	1.8	2.5	
NNW-31	3.9	2.7	2.5	4.0	3.2 +/- 1.3
NNW-63	3.8	2.6	2.8	3.2	
NNW-32	3.7	2.6	4.0	3.5	3.4 +/- 1.1
NNW-64	3.7	3.1	2.7	4.0	
Mean					4.2 +/- 1.6

*Average of collocated TLDs.

TABLE 3-2
DIRECT RADIATION MEASURMENTS – PRE-OPERATIONAL LOCATIONS
& EMERGENCY SECTOR
QUARTERLY TLD RESULTS
mR/Std. Month (30.4 days) ± 2 Sigma

Station	First Quarter 12/282010 3/29/2011	Second Quarter 3/29/2011 6/29/2011	Third Quarter 6/29/2011 9/28/2011	Fourth Quarter 9/28/2011 12/28/2011	Quarterly* Average +/- 2 s.d.
C-1	3.2	2.2	3.6	3.9	3.2 +/- 1.5
C-2	3.9	2.3	2.7	3.9	
C-3**	3.4	3.5	2.6	3.3	3.1 +/- 1.1
C-4**	3.6	2.3	2.7	3.7	
C-5	2.3	1.7	1.7	2.7	2.1 +/- 0.8
C-6	2.1	1.6	2.0	2.4	
C-7**	3.1	2.5	3.0	3.7	3.3 +/- 1.3
C-8**	3.4	3.3	3.0	4.7	
				Mean Indicator	2.6 +/- 1.6
				Control**	3.2 +/- 1.2
EPSA-01***	4.9	3.9	4.0	4.9	4.5 +/- 1.4
EPSA-02***	5.0	3.9	3.9	5.7	
EPSF-03***	4.9	3.8	3.8	5.5	4.4 +/- 1.2
EPSF-04***	4.8	3.9	4.1	4.5	
EPSR-05***	5.5	3.8	4.5	4.3	4.6 +/- 1.4
EPSR-06***	5.1	3.9	3.9	5.4	
EPSJ-07***	4.9	3.2	3.3	4.1	3.7 +/- 2.4
EPSJ-08***	1.2	3.3	4.5	4.8	
EPSP-09***	1.8	5.9	6.4	8.7	6.6 +/- 4.5
EPSP-10***	7.7	6.2	7.2	8.9	
Mean					4.8 +/- 3.1

*Average of collocated TLDs.
** Control Station
*** Emergency Plan TLDs.

TABLE 3-2

DIRECT RADIATION MEASURMENTS - ENVIRONMENTAL QUARTERLY TLD RESULTS

mR/Std. Month (30.4 days) ± 2 Sigma

Station	First Quarter 12/282010 3/29/2011	Second Quarter 3/29/2011 6/29/2011	Third Quarter 6/29/2011 9/28/2011	Fourth Quarter 9/28/2011 12/28/2011	Quarterly Average +/- 2 s.d.	Annual TLD
STA-01	5.0	4.0	3.6	5.2	4.5 +/- 1.5	4.7
STA-02	2.3	1.7	2.2	2.7	2.2 +/- 0.8	2.4
STA-03	2.9	1.6	2.2	2.8	2.4 +/- 1.2	2.2
STA-04	2.5	1.8	2.1	3.2	2.4 +/- 1.2	2.7
STA-05	3.5	2.5	3.2	4.1	3.3 +/- 1.3	3.0
STA-05A	2.8	2.5	2.4	4.0	2.9 +/- 1.5	2.6
STA-06	3.9	3.1	3.9	4.7	3.9 +/- 1.3	4.2
STA-07	3.1	2.2	2.6	4.3	3.1 +/- 1.8	3.7
STA-21	2.9	2.3	2.6	4.0	3.0 +/- 1.5	2.5
STA-22	3.9	3.3	4.0	4.3	3.9 +/- 0.8	3.9
STA-23	6.0	3.4	4.6	4.5	4.6 +/- 2.1	4.0
STA-24*	3.2	2.4	3.4	4.1	3.3 +/- 0.7	3.0
			Mean - Indicator Locations		3.3 +/- 1.0	3.3 +/- 1.7

*Control

Table 3-3
Air Particulate
Gross Beta Radioactivity
[10^{-3} pCi/m^3]

Period Ending	Station 01			Station 02			Station 03			Station 04			Station 05			Station 06			Station 07		
01/04/11	2.53E+01	+/-	3.47E+00	2.07E+01	+/-	3.29E+00	2.53E+01	+/-	3.50E+00	2.42E+01	+/-	3.47E+00	3.06E+01	+/-	3.70E+00	2.25E+01	+/-	3.36E+00	2.48E+01	+/-	3.45E+00
01/11/11	1.96E+01	+/-	3.24E+00	1.94E+01	+/-	3.23E+00	2.13E+01	+/-	3.32E+00	2.53E+01	+/-	3.50E+00	2.43E+01	+/-	3.45E+00	2.45E+01	+/-	3.46E+00	2.66E+01	+/-	3.55E+00
01/18/11	2.07E+01	+/-	3.33E+00	2.15E+01	+/-	3.33E+00	1.43E+01	+/-	3.04E+00	1.81E+01	+/-	3.23E+00	2.20E+01	+/-	3.35E+00	1.73E+01	+/-	3.14E+00	1.60E+01	+/-	3.08E+00
01/25/11	1.86E+01	+/-	3.36E+00	1.71E+01	+/-	3.33E+00	1.84E+01	+/-	3.33E+00	2.29E+01	+/-	3.55E+00	2.43E+01	+/-	3.67E+00	1.85E+01	+/-	3.43E+00	2.08E+01	+/-	3.49E+00
02/01/11	2.26E+01	+/-	3.33E+00	2.24E+01	+/-	3.32E+00	1.93E+01	+/-	3.19E+00	2.33E+01	+/-	3.37E+00	2.09E+01	+/-	3.26E+00	2.16E+01	+/-	3.29E+00	2.05E+01	+/-	3.24E+00
02/08/11	1.62E+01	+/-	3.09E+00	1.44E+01	+/-	3.01E+00	1.38E+01	+/-	2.98E+00	1.71E+01	+/-	3.13E+00	2.00E+01	+/-	3.27E+00	1.47E+01	+/-	3.02E+00	1.46E+01	+/-	3.02E+00
02/15/11	1.55E+01	+/-	2.84E+00	9.40E+00	+/-	2.49E+00	1.52E+01	+/-	2.82E+00	1.01E+01	+/-	2.54E+00	1.58E+01	+/-	2.85E+00	1.42E+01	+/-	2.76E+00	1.11E+01	+/-	2.59E+00
02/23/11	1.20E+01	+/-	2.61E+00	1.11E+01	+/-	2.58E+00	8.90E+00	+/-	2.46E+00	1.31E+01	+/-	2.68E+00	1.35E+01	+/-	2.70E+00	1.32E+01	+/-	2.68E+00	1.20E+01	+/-	2.62E+00
03/01/11	6.69E+00	+/-	2.87E+00	1.32E+01	+/-	3.23E+00	1.15E+01	+/-	3.20E+00	1.46E+01	+/-	3.34E+00	1.76E+01	+/-	3.46E+00	1.31E+01	+/-	3.22E+00	1.72E+01	+/-	3.44E+00
03/08/11		<	2.84E+00	1.03E+01	+/-	2.46E+00	1.08E+01	+/-	2.46E+00	1.31E+01	+/-	2.63E+00	1.10E+01	+/-	2.50E+00	1.34E+01	+/-	2.64E+00	1.26E+01	+/-	2.59E+00
03/15/12	1.24E+01	+/-	2.54E+00	1.18E+01	+/-	2.50E+00	9.80E+00	+/-	2.36E+00	1.32E+01	+/-	2.58E+00	1.58E+01	+/-	2.72E+00	1.18E+01	+/-	2.50E+00	1.30E+01	+/-	2.57E+00
03/22/11	1.09E+01	+/-	2.50E+00	1.23E+01	+/-	2.55E+00	6.33E+00	+/-	2.23E+00	1.62E+01	+/-	2.80E+00	1.68E+01	+/-	2.83E+00	1.29E+01	+/-	2.62E+00	1.55E+01	+/-	2.76E+00
03/29/11	3.52E+01	+/-	3.41E+00	3.74E+01	+/-	3.52E+00	1.42E+01	+/-	2.31E+00	4.27E+01	+/-	3.71E+00	3.75E+01	+/-	3.50E+00	3.57E+01	+/-	3.42E+00	4.10E+01	+/-	3.64E+00
04/06/11	3.54E+01	+/-	3.70E+00	2.19E+01	+/-	3.12E+00	9.67E+00	+/-	2.60E+00	2.62E+01	+/-	3.30E+00	2.89E+01	+/-	3.40E+00	2.31E+01	+/-	3.17E+00	2.27E+01	+/-	3.15E+00
04/13/11	1.92E+01	+/-	3.05E+00	1.33E+01	+/-	2.74E+00	1.39E+01	+/-	2.76E+00	1.28E+01	+/-	2.71E+00	1.85E+01	+/-	3.01E+00	1.82E+01	+/-	2.66E+00	1.55E+01	+/-	2.86E+00
04/20/11	2.12E+01	+/-	2.98E+00	1.58E+01	+/-	2.67E+00	1.64E+01	+/-	2.80E+00	1.84E+01	+/-	2.83E+00	1.97E+01	+/-	2.88E+00	1.42E+01	+/-	2.59E+00	1.72E+01	+/-	2.76E+00
04/27/11	1.30E+01	+/-	3.02E+00	9.48E+00	+/-	2.89E+00	1.08E+01	+/-	2.89E+00	1.04E+01	+/-	2.91E+00	1.47E+01	+/-	3.14E+00	8.55E+00	+/-	2.83E+00	1.29E+01	+/-	3.05E+00
05/03/11	1.50E+01	+/-	3.38E+00	1.09E+01	+/-	3.17E+00	1.52E+01	+/-	3.41E+00	1.15E+01	+/-	3.19E+00	1.62E+01	+/-	3.44E+00	1.25E+01	+/-	3.25E+00	1.02E+01	+/-	3.12E+00
05/11/11	1.49E+01	+/-	2.64E+00	1.22E+01	+/-	2.50E+00	1.53E+01	+/-	2.65E+00	1.42E+01	+/-	2.60E+00	1.57E+01	+/-	2.67E+00	1.38E+01	+/-	2.58E+00	1.40E+01	+/-	2.59E+00
05/18/11	1.11E+01	+/-	2.53E+00	8.40E+00	+/-	2.37E+00	1.03E+01	+/-	2.48E+00	9.15E+00	+/-	2.42E+00	6.70E+00	+/-	2.27E+00	6.02E+00	+/-	2.22E+00	1.00E+01	+/-	2.47E+00
05/24/11	1.70E+01	+/-	3.18E+00	1.26E+01	+/-	2.93E+00	1.42E+01	+/-	3.04E+00	1.22E+01	+/-	2.91E+00	1.58E+01	+/-	3.11E+00	1.21E+01	+/-	2.90E+00	1.51E+01	+/-	3.07E+00
06/01/11	2.85E+01	+/-	3.30E+00	1.24E+01	+/-	2.59E+00	2.63E+01	+/-	3.21E+00	1.98E+01	+/-	2.94E+00	2.24E+01	+/-	3.05E+00	1.83E+01	+/-	2.87E+00	2.09E+01	+/-	2.99E+00
06/08/11	2.89E+01	+/-	2.73E+00	1.84E+01	+/-	2.42E+00	1.81E+01	+/-	2.41E+00	2.00E+01	+/-	2.47E+00	2.29E+01	+/-	2.56E+00	1.52E+01	+/-	2.33E+00	1.70E+01	+/-	2.38E+00
06/14/11	2.66E+01	+/-	3.66E+00	1.54E+01	+/-	3.16E+00	2.11E+01	+/-	3.52E+00	2.21E+01	+/-	3.54E+00	2.48E+01	+/-	3.64E+00	1.83E+01	+/-	3.31E+00	2.21E+01	+/-	3.51E+00
06/21/11	2.16E+01	+/-	3.38E+00	1.17E+01	+/-	2.86E+00	1.71E+01	+/-	3.07E+00	1.48E+01	+/-	2.99E+00	1.88E+01	+/-	3.20E+00	1.28E+01	+/-	2.91E+00	1.83E+01	+/-	3.18E+00
06/29/11	1.70E+01	+/-	2.67E+00	9.34E+00	+/-	2.26E+00	9.93E+00	+/-	2.30E+00	8.74E+00	+/-	2.23E+00	1.59E+01	+/-	2.61E+00	1.13E+01	+/-	2.37E+00	9.59E+00	+/-	2.27E+00

Table 3-3

Air Particulate
Gross Beta Radioactivity
[10^{-3} pCi/m^3]

Period Ending	Station 21			Station 22			Station 23			Station 24*			Station 01A			Station 05A		
01/04/11	2.04E+01	+/-	3.27E+00	2.33E+01	+/-	3.39E+00	2.26E+01	+/-	3.36E+00	2.26E+01	+/-	3.38E+00	2.55E+01	+/-	3.48E+00	2.44E+01	+/-	3.45E+00
01/11/11	1.92E+01	+/-	3.22E+00	2.57E+01	+/-	3.51E+00	2.62E+01	+/-	3.53E+00	2.78E+01	+/-	3.60E+00	2.42E+01	+/-	3.44E+00	2.16E+01	+/-	3.33E+00
01/18/11	1.68E+01	+/-	3.14E+00	1.59E+01	+/-	3.11E+00	1.90E+01	+/-	3.19E+00	2.56E+01	+/-	3.55E+00	1.43E+01	+/-	3.03E+00	2.17E+01	+/-	3.34E+00
01/25/11	1.94E+01	+/-	3.39E+00	1.82E+01	+/-	3.34E+00	1.82E+01	+/-	3.40E+00	2.41E+01	+/-	3.58E+00	2.25E+01	+/-	3.53E+00	2.22E+01	+/-	3.58E+00
02/01/11	1.76E+01	+/-	3.13E+00	2.23E+01	+/-	3.32E+00	2.53E+01	+/-	3.48E+00	2.47E+01	+/-	3.42E+00	1.65E+01	+/-	3.05E+00	2.01E+01	+/-	3.22E+00
02/08/11	1.43E+01	+/-	3.00E+00	1.56E+01	+/-	3.06E+00	1.35E+01	+/-	2.96E+00	1.99E+01	+/-	3.26E+00	1.51E+01	+/-	3.04E+00	1.77E+01	+/-	3.17E+00
02/15/11	1.26E+01	+/-	2.68E+00	1.30E+01	+/-	2.70E+00	1.39E+01	+/-	2.75E+00	1.87E+01	+/-	2.99E+00	1.39E+01	+/-	2.75E+00	1.75E+01	+/-	2.94E+00
02/23/11	1.13E+01	+/-	2.58E+00	1.33E+01	+/-	2.68E+00	1.21E+01	+/-	2.63E+00	1.53E+01	+/-	2.78E+00	1.61E+01	+/-	2.81E+00	1.22E+01	+/-	2.63E+00
03/01/11	1.52E+01	+/-	3.34E+00	1.64E+01	+/-	3.40E+00	1.36E+01	+/-	3.26E+00	2.10E+01	+/-	3.63E+00	1.75E+01	+/-	3.46E+00	1.59E+01	+/-	3.37E+00
03/08/11	1.24E+01	+/-	2.58E+00	1.29E+01	+/-	2.61E+00	1.11E+01	+/-	2.50E+00	1.45E+01	+/-	2.70E+00	1.29E+01	+/-	2.61E+00	1.12E+01	+/-	2.51E+00
03/15/12	1.42E+01	+/-	2.66E+00	1.32E+01	+/-	2.58E+00	1.32E+01	+/-	2.58E+00	1.59E+01	+/-	2.73E+00	1.56E+01	+/-	2.72E+00	1.32E+01	+/-	2.58E+00
03/22/11	1.33E+01	+/-	2.64E+00	1.24E+01	+/-	2.59E+00	1.25E+01	+/-	2.59E+00	2.50E+01	+/-	3.24E+00	1.21E+01	+/-	2.57E+00	1.50E+01	+/-	2.73E+00
03/29/11	3.62E+01	+/-	3.44E+00	3.62E+01	+/-	3.44E+00	4.01E+01	+/-	3.60E+00	4.51E+01	+/-	3.80E+00	3.83E+01	+/-	3.54E+00	3.67E+01	+/-	3.46E+00
04/06/11	2.12E+01	+/-	3.09E+00	2.54E+01	+/-	3.26E+00	2.58E+01	+/-	3.32E+00	3.14E+01	+/-	3.50E+00	2.60E+01	+/-	3.28E+00	2.52E+01	+/-	3.26E+00
04/13/11	1.46E+01	+/-	2.81E+00	1.29E+01	+/-	2.73E+00	1.30E+01	+/-	2.73E+00	1.56E+01	+/-	2.86E+00	1.44E+01	+/-	2.80E+00	1.30E+01	+/-	2.73E+00
04/20/11	1.48E+01	+/-	2.65E+00	1.85E+01	+/-	2.85E+00	1.76E+01	+/-	2.83E+00	2.27E+01	+/-	3.06E+00	1.81E+01	+/-	2.83E+00	9.76E+00	+/-	2.33E+00
04/27/11	1.28E+01	+/-	3.02E+00	1.12E+01	+/-	2.94E+00	9.61E+00	+/-	2.85E+00	1.31E+01	+/-	3.01E+00	1.32E+01	+/-	3.10E+00	1.48E+01	+/-	3.14E+00
05/03/11	8.32E+00	+/-	3.02E+00	1.33E+01	+/-	3.30E+00	1.47E+01	+/-	3.37E+00	1.46E+01	+/-	3.38E+00	9.53E+00	+/-	3.09E+00	1.36E+01	+/-	3.30E+00
05/11/11	1.34E+01	+/-	2.57E+00	1.17E+01	+/-	2.48E+00	1.23E+01	+/-	2.51E+00	1.51E+01	+/-	2.65E+00	1.32E+01	+/-	2.56E+00	1.27E+01	+/-	2.53E+00
05/18/11	5.13E+00	+/-	2.16E+00	7.80E+00	+/-	2.34E+00	1.04E+01	+/-	2.50E+00	8.32E+00	+/-	2.37E+00	6.16E+00	+/-	2.23E+00	6.55E+00	+/-	2.26E+00
05/24/11	1.19E+01	+/-	2.89E+00	1.15E+01	+/-	2.86E+00	1.46E+01	+/-	3.04E+00	1.34E+01	+/-	2.99E+00	1.21E+01	+/-	2.90E+00	1.19E+01	+/-	2.89E+00
06/01/11	1.87E+01	+/-	2.89E+00	1.93E+01	+/-	2.92E+00	2.25E+01	+/-	3.06E+00	1.92E+01	+/-	2.91E+00	2.11E+01	+/-	3.00E+00	2.23E+01	+/-	3.05E+00
06/08/11	1.66E+01	+/-	2.37E+00	1.58E+01	+/-	2.35E+00	1.84E+01	+/-	2.43E+00	1.50E+01	+/-	2.32E+00	2.10E+01	+/-	2.51E+00	1.82E+01	+/-	2.42E+00
06/14/11	1.75E+01	+/-	3.24E+00	1.85E+01	+/-	3.28E+00	2.09E+01	+/-	3.42E+00	1.86E+01	+/-	3.38E+00	2.21E+01	+/-	3.45E+00	2.24E+01	+/-	3.52E+00
06/21/11	1.36E+01	+/-	2.98E+00	1.72E+01	+/-	3.16E+00	1.68E+01	+/-	3.13E+00	1.16E+01	+/-	2.81E+00	1.85E+01	+/-	3.23E+00	1.51E+01	+/-	3.02E+00
06/29/11	9.34E+00	+/-	2.26E+00	1.39E+01	+/-	2.51E+00	1.10E+01	+/-	2.35E+00	1.25E+01	+/-	2.44E+00	1.17E+01	+/-	2.40E+00	1.24E+01	+/-	2.43E+00

* Control Station

Table 3-3
Air Particulate
Gross Beta Radioactivity
[10^{-3} pCi/m^3]

Period	Station			Station			Station			Station			Station			Station			Station		
Ending	01			02			03			04			05			06			07		
07/05/11	2.14E+01	+/-	3.57E+00	1.37E+01	+/-	3.19E+00	1.65E+01	+/-	3.35E+00	1.12E+01	+/-	3.05E+00	1.61E+01	+/-	3.20E+00	1.02E+01	+/-	2.99E+00	1.43E+01	+/-	3.25E+00
07/12/11	2.23E+01	+/-	3.15E+00	1.53E+01	+/-	2.80E+00	1.95E+01	+/-	3.00E+00	1.86E+01	+/-	2.96E+00	2.25E+01	+/-	3.15E+00	1.67E+01	+/-	2.87E+00	1.95E+01	+/-	3.01E+00
07/19/11	2.08E+01	+/-	3.01E+00	1.28E+01	+/-	2.59E+00	1.81E+01	+/-	2.87E+00	1.45E+01	+/-	2.63E+00	1.33E+01	+/-	2.62E+00	1.39E+01	+/-	2.65E+00	1.31E+01	+/-	2.60E+00
07/26/11	3.50E+01	+/-	3.74E+00	2.15E+01	+/-	3.16E+00	2.62E+01	+/-	3.37E+00	2.20E+01	+/-	3.18E+00	2.25E+01	+/-	3.20E+00	2.70E+01	+/-	3.41E+00	2.30E+01	+/-	3.22E+00
08/02/11	3.19E+01	+/-	3.55E+00	2.04E+01	+/-	3.03E+00	2.78E+01	+/-	3.43E+00	2.36E+01	+/-	3.21E+00	3.20E+01	+/-	3.56E+00	2.26E+01	+/-	3.14E+00	2.67E+01	+/-	3.33E+00
08/09/11	2.93E+01	+/-	3.81E+00	1.76E+01	+/-	3.36E+00	2.25E+01	+/-	3.48E+00	1.85E+01	+/-	3.34E+00	2.15E+01	+/-	3.48E+00	2.12E+01	+/-	3.48E+00	2.23E+01	+/-	3.57E+00
08/16/11	2.78E+01	+/-	3.51E+00	1.89E+01	+/-	3.12E+00	2.04E+01	+/-	3.19E+00	2.07E+01	+/-	3.22E+00	2.32E+01	+/-	3.32E+00	1.79E+01	+/-	3.07E+00	1.89E+01	+/-	3.12E+00
08/23/11	2.54E+01	+/-	3.32E+00	1.05E+01	+/-	2.57E+00	1.68E+01	+/-	2.91E+00	1.93E+01	+/-	3.04E+00	2.37E+01	+/-	3.24E+00	2.05E+01	+/-	3.09E+00	2.02E+01	+/-	3.08E+00
08/30/11	1.94E+01	+/-	3.34E+00	1.18E+01	+/-	2.90E+00	1.24E+01	+/-	2.94E+00	1.50E+01	+/-	3.13E+00	1.46E+01	+/-	3.06E+00	1.58E+01	+/-	3.12E+00	1.45E+01	+/-	3.04E+00
09/06/11	2.85E+01	+/-	3.71E+00	1.58E+01	+/-	3.71E+00	2.01E+01	+/-	3.38E+00	2.29E+01	+/-	3.48E+00	2.47E+01	+/-	3.56E+00	2.02E+01	+/-	3.38E+00	1.73E+01	+/-	3.24E+00
09/14/11	2.47E+01	+/-	3.05E+00	1.29E+01	+/-	2.48E+00	1.96E+01	+/-	2.80E+00	1.70E+01	+/-	2.69E+00	1.54E+01	+/-	2.61E+00	1.69E+01	+/-	2.68E+00	1.71E+01	+/-	2.70E+00
09/21/11	1.64E+01	+/-	2.86E+00	9.71E+00	+/-	2.49E+00	1.31E+01	+/-	2.69E+00	1.66E+01	+/-	2.87E+00	1.58E+01	+/-	2.83E+00	1.56E+01	+/-	2.82E+00	1.23E+01	+/-	2.64E+00
09/28/11	8.80E+00	+/-	2.37E+00	4.85E+00	+/-	2.10E+00	7.55E+00	+/-	2.28E+00	7.64E+00	+/-	2.29E+00	8.01E+00	+/-	2.31E+00	5.80E+00	+/-	2.16E+00	6.62E+00	+/-	2.22E+00
10/04/11	1.17E+01	+/-	3.17E+00	9.48E+00	+/-	3.07E+00	1.38E+01	+/-	3.32E+00	1.03E+01	+/-	3.11E+00	4.43E+00	+/-	2.77E+00	1.02E+01	+/-	3.10E+00	1.14E+01	+/-	3.17E+00
10/11/11	3.48E+01	+/-	3.57E+00	2.30E+01	+/-	3.03E+00	2.72E+01	+/-	3.21E+00	2.91E+01	+/-	3.29E+00	2.34E+01	+/-	3.04E+00	2.34E+01	+/-	3.04E+00	2.54E+01	+/-	3.13E+00
10/18/11	1.80E+01	+/-	2.81E+00	2.23E+01	+/-	3.04E+00	2.03E+01	+/-	2.96E+00	2.10E+01	+/-	3.00E+00	2.20E+01	+/-	3.04E+00	2.73E+01	+/-	3.30E+00	2.34E+01	+/-	3.11E+00
10/25/11	1.23E+01	+/-	3.01E+00	1.86E+01	+/-	3.30E+00	1.68E+01	+/-	3.22E+00	1.59E+01	+/-	3.18E+00	1.94E+01	+/-	3.34E+00	1.67E+01	+/-	3.21E+00	1.35E+01	+/-	3.06E+00
11/01/11	1.48E+01	+/-	2.87E+00	2.00E+01	+/-	3.13E+00	1.63E+01	+/-	2.95E+00	2.06E+01	+/-	3.16E+00	2.08E+01	+/-	3.17E+00	1.83E+01	+/-	3.05E+00	2.01E+01	+/-	3.14E+00
11/08/11	1.62E+01	+/-	2.71E+00	2.13E+01	+/-	2.97E+00	1.71E+01	+/-	2.75E+00	1.78E+01	+/-	2.79E+00	2.17E+01	+/-	2.99E+00	1.91E+01	+/-	2.86E+00	1.62E+01	+/-	2.71E+00
11/15/11	1.30E+01	+/-	2.89E+00	2.67E+01	+/-	3.53E+00	1.97E+01	+/-	3.22E+00	2.15E+01	+/-	3.31E+00	2.85E+01	+/-	3.61E+00	2.33E+01	+/-	3.39E+00	1.90E+01	+/-	3.20E+00
11/22/11	1.01E+01	+/-	2.72E+00	1.39E+01	+/-	2.92E+00	1.20E+01	+/-	2.82E+00	1.26E+01	+/-	2.85E+00	1.52E+01	+/-	2.98E+00	1.27E+01	+/-	2.86E+00	1.25E+01	+/-	2.85E+00
11/29/11	1.00E+01	+/-	2.62E+00	1.43E+01	+/-	2.85E+00	1.08E+01	+/-	2.67E+00	1.25E+01	+/-	2.76E+00	1.45E+01	+/-	2.87E+00	1.53E+01	+/-	2.90E+00	1.35E+01	+/-	2.81E+00
12/06/11	1.58E+01	+/-	2.87E+00	1.49E+01	+/-	2.83E+00	1.22E+01	+/-	2.69E+00	1.48E+01	+/-	2.82E+00	1.73E+01	+/-	2.95E+00	1.52E+01	+/-	2.85E+00	1.26E+01	+/-	2.71E+00
12/13/11	1.35E+01	+/-	2.83E+00	1.36E+01	+/-	2.83E+00	1.61E+01	+/-	2.96E+00	1.58E+01	+/-	2.94E+00	1.93E+01	+/-	3.12E+00	1.52E+01	+/-	2.92E+00	1.32E+01	+/-	2.81E+00
12/20/11	2.70E+01	+/-	3.39E+00	3.26E+01	+/-	3.63E+00	3.24E+01	+/-	3.62E+00	3.36E+01	+/-	3.67E+00	3.76E+01	+/-	3.82E+00	3.14E+01	+/-	3.57E+00	2.88E+01	+/-	3.47E+00
12/28/11	1.28E+01	+/-	2.39E+00	1.44E+01	+/-	2.47E+00	1.30E+01	+/-	2.38E+00	1.50E+01	+/-	2.48E+00	1.66E+01	+/-	2.59E+00	1.56E+01	+/-	2.53E+00	1.32E+01	+/-	2.41E+00
MEAN	1.98E+01	+/-	3.10E+00	1.58E+01	+/-	2.92E+00	1.65E+01	+/-	2.94E+00	1.77E+01	+/-	3.00E+00	1.97E+01	+/-	3.09E+00	1.70E+01	+/-	2.96E+00	1.73E+01	+/-	2.98E+00

Table 3-3

Air Particulate
Gross Beta Radioactivity
[10^{-3} pCi/m^3]

Period Ending	Station 21			Station 22			Station 23			Station 24*			Station 01A			Station 05A		
07/05/11	1.40E+01	+/-	3.20E+00	1.54E+01	+/-	3.28E+00	1.38E+01	+/-	3.19E+00	1.24E+01	+/-	3.12E+00	1.42E+01	+/-	3.21E+00	1.52E+01	+/-	3.27E+00
07/12/11	1.87E+01	+/-	2.98E+00	2.06E+01	+/-	3.07E+00	1.72E+01	+/-	2.90E+00	1.32E+01	+/-	2.68E+00	2.00E+01	+/-	3.04E+00	1.79E+01	+/-	2.93E+00
07/19/11	1.56E+01	+/-	2.74E+00	1.51E+01	+/-	2.71E+00	1.81E+01	+/-	2.87E+00	1.65E+01	+/-	2.82E+00	1.59E+01	+/-	2.75E+00	1.44E+01	+/-	2.68E+00
07/26/11	2.23E+01	+/-	3.20E+00	2.56E+01	+/-	3.35E+00	2.80E+01	+/-	3.45E+00	2.77E+01	+/-	3.43E+00	2.64E+01	+/-	3.53E+00	2.05E+01	+/-	3.11E+00
08/02/11	2.31E+01	+/-	3.16E+00	2.71E+01	+/-	3.34E+00	2.27E+01	+/-	3.15E+00	2.26E+01	+/-	3.14E+00	2.18E+01	+/-	3.10E+00	2.82E+01	+/-	3.40E+00
08/09/11	1.45E+01	+/-	3.19E+00	1.77E+01	+/-	3.33E+00	2.03E+01	+/-	3.44E+00	1.99E+01	+/-	3.42E+00	1.98E+01	+/-	3.43E+00	1.76E+01	+/-	3.38E+00
08/16/11	1.60E+01	+/-	2.96E+00	1.59E+01	+/-	2.96E+00	1.75E+01	+/-	3.04E+00	1.94E+01	+/-	3.14E+00	2.06E+01	+/-	3.19E+00	1.07E+01	+/-	2.70E+00
08/23/11	1.33E+01	+/-	2.73E+00	1.96E+01	+/-	3.06E+00	1.98E+01	+/-	3.06E+00	1.44E+01	+/-	2.79E+00	2.08E+01	+/-	3.11E+00	2.07E+01	+/-	3.11E+00
08/30/11	1.11E+01	+/-	2.87E+00	1.04E+01	+/-	2.83E+00	1.49E+01	+/-	3.05E+00	1.39E+01	+/-	3.01E+00	1.03E+01	+/-	2.82E+00	1.62E+01	+/-	3.13E+00
09/06/11	1.69E+01	+/-	3.22E+00	1.90E+01	+/-	3.31E+00	1.89E+01	+/-	3.31E+00	1.95E+01	+/-	3.32E+00	1.99E+01	+/-	3.35E+00	1.87E+01	+/-	3.30E+00
09/14/11	1.19E+01	+/-	2.43E+00	1.92E+01	+/-	2.80E+00	1.46E+01	+/-	2.57E+00	1.52E+01	+/-	2.61E+00	1.29E+01	+/-	2.49E+00	1.60E+01	+/-	2.64E+00
09/21/11	1.45E+01	+/-	2.76E+00	1.22E+01	+/-	2.63E+00	1.25E+01	+/-	2.65E+00	1.28E+01	+/-	2.67E+00	1.39E+01	+/-	2.72E+00	1.62E+01	+/-	2.85E+00
09/28/11	7.21E+00	+/-	2.26E+00	7.29E+00	+/-	2.27E+00	6.47E+00	+/-	2.21E+00	6.00E+00	+/-	2.17E+00	5.69E+00	+/-	2.17E+00	7.64E+00	+/-	2.29E+00
10/04/11	5.73E+00	+/-	2.84E+00	6.51E+00	+/-	2.89E+00	7.72E+00	+/-	2.96E+00	5.42E+00	+/-	2.84E+00	7.86E+00	+/-	2.96E+00	8.00E+00	+/-	2.98E+00
10/11/11	2.41E+01	+/-	3.09E+00	2.82E+01	+/-	3.28E+00	2.34E+01	+/-	3.06E+00	2.55E+01	+/-	3.13E+00	2.86E+01	+/-	3.30E+00	2.30E+01	+/-	3.01E+00
10/18/11	2.27E+01	+/-	3.05E+00	2.59E+01	+/-	3.21E+00	2.49E+01	+/-	3.17E+00	2.14E+01	+/-	3.02E+00	2.53E+01	+/-	3.18E+00	2.54E+01	+/-	3.21E+00
10/25/11	1.55E+01	+/-	3.15E+00	1.50E+01	+/-	3.13E+00	1.65E+01	+/-	3.20E+00	1.35E+01	+/-	3.07E+00	1.47E+01	+/-	3.12E+00	1.50E+01	+/-	3.13E+00
11/01/11	1.61E+01	+/-	2.94E+00	2.08E+01	+/-	3.17E+00	2.12E+01	+/-	3.19E+00	1.90E+01	+/-	3.08E+00	1.82E+01	+/-	3.05E+00	1.85E+01	+/-	3.06E+00
11/08/11	7.45E+00	+/-	2.18E+00	1.87E+01	+/-	2.85E+00	1.75E+01	+/-	2.78E+00	1.90E+01	+/-	2.85E+00	2.04E+01	+/-	2.93E+00	1.82E+01	+/-	2.81E+00
11/15/11	1.83E+01	+/-	3.15E+00	2.54E+01	+/-	3.47E+00	2.31E+01	+/-	3.37E+00	2.80E+01	+/-	3.59E+00	2.24E+01	+/-	3.34E+00	2.20E+01	+/-	3.33E+02
11/22/11	1.04E+01	+/-	2.74E+00	1.21E+01	+/-	2.83E+00	1.03E+01	+/-	2.73E+00	1.05E+01	+/-	2.74E+00	7.75E+00	+/-	2.59E+00	1.05E+01	+/-	2.74E+00
11/29/11	1.23E+01	+/-	2.75E+00	1.13E+01	+/-	2.70E+00	1.43E+01	+/-	2.85E+00	1.32E+01	+/-	2.80E+00	1.38E+01	+/-	2.83E+00	1.49E+01	+/-	2.88E+00
12/06/11	1.38E+01	+/-	2.77E+00	1.08E+01	+/-	2.60E+00	1.42E+01	+/-	2.79E+00	1.57E+01	+/-	2.87E+00	1.43E+01	+/-	2.79E+00	1.43E+01	+/-	2.80E+00
12/13/11	1.54E+01	+/-	2.93E+00	1.31E+01	+/-	2.81E+00	1.13E+01	+/-	2.71E+00	1.41E+01	+/-	2.86E+00	1.33E+01	+/-	2.82E+00	1.58E+01	+/-	2.95E+00
12/20/11	2.58E+01	+/-	3.34E+00	3.49E+01	+/-	3.72E+00	2.80E+01	+/-	3.43E+00	3.03E+01	+/-	3.53E+00	3.21E+01	+/-	3.61E+00	3.20E+01	+/-	3.60E+00
12/28/11	1.31E+01	+/-	2.40E+00	1.41E+01	+/-	2.45E+00	1.54E+01	+/-	2.52E+00	1.40E+01	+/-	2.44E+00	1.29E+01	+/-	2.39E+00	1.41E+01	+/-	2.46E+00
MEAN	1.54E+01	+/-	2.89E+00	1.73E+01	+/-	2.98E+00	1.73E+01	+/-	2.98E+00	1.84E+01	+/-	3.03E+00	1.74E+01	+/-	2.99E+00	1.73E+01	+/-	9.32E+00
													Mean - All Indicator Locations			1.74E+01	+/-	3.55E+00

* Control Station

Table 3-4
Airborne Iodine
I-131
[10^{-3} pCi/m^3]

Period Ending	Station 01			Station 02			Station 03			Station 04			Station 05			Station 06			Station 07		
01/04/11		<	1.78E+01		<	3.28E+01		<	3.29E+01		<	3.32E+01		<	3.27E+01		<	3.52E+01		<	3.52E+01
01/11/11		<	3.45E+01		<	3.45E+01		<	3.46E+01		<	3.46E+01		<	3.52E+01		<	3.52E+01		<	3.52E+01
01/18/11		<	3.03E+01		<	4.78E+01		<	4.98E+01		<	5.00E+01		<	4.88E+01		<	4.32E+01		<	4.32E+01
01/25/11		<	1.41E+01		<	2.60E+01		<	2.54E+01		<	2.57E+01		<	2.63E+01		<	2.75E+01		<	2.70E+01
02/01/11		<	1.04E+01		<	2.44E+01		<	2.44E+01		<	2.44E+01		<	2.44E+01		<	1.70E+01		<	1.70E+01
02/08/11		<	3.26E+01		<	3.26E+01		<	3.26E+01		<	3.26E+01		<	1.76E+01		<	1.76E+01		<	1.76E+01
02/15/11		<	2.24E+01		<	2.23E+01		<	2.23E+01		<	2.24E+01		<	2.35E+01		<	2.34E+01		<	2.34E+01
02/23/11		<	1.54E+01		<	2.52E+01		<	2.52E+01		<	2.52E+01		<	2.52E+01		<	3.02E+01		<	3.02E+01
03/01/11		<	1.60E+01		<	2.89E+01		<	2.97E+01		<	2.93E+01		<	2.89E+01		<	3.63E+01		<	3.63E+01
03/08/11		<	4.25E+01		<	1.82E+01		<	4.20E+01		<	4.24E+01		<	4.26E+01		<	3.66E+01		<	3.66E+01
03/15/11		<	1.13E+01		<	2.05E+01		<	2.03E+01		<	2.05E+01		<	2.05E+01		<	2.60E+01		<	2.60E+01
03/22/11		<	4.48E+01		<	3.83E+01		<	2.30E+01		<	4.56E+01		<	4.31E+01		<	4.64E+01		<	3.62E+01
03/29/11*	1.29E+02	+/-	3.26E+01	1.03E+02	+/-	2.51E+01	4.41E+01	+/-	1.79E+01	1.22E+02	+/-	2.12E+01	1.16E+02	+/-	3.54E+01	9.54E+01	+/-	2.29E+01	1.27E+02	+/-	2.64E+01
04/06/11*	1.28E+02	+/-	3.25E+01	7.00E+01	+/-	2.69E+01	2.93E+01	+/-	2.73E+01	1.05E+02	+/-	2.69E+01	7.14E+01	+/-	3.49E+01	9.07E+01	+/-	2.82E+01	6.63E+01	+/-	2.45E+01
04/13/11		<	5.26E+01		<	2.54E+01		<	2.51E+01		<	3.12E+01		<	3.21E+01		<	2.71E+01		<	3.44E+01
04/20/11		<	3.15E+01		<	3.10E+01		<	3.26E+01		<	3.14E+01		<	3.43E+01		<	3.43E+01		<	3.43E+01
04/27/11		<	2.93E+01		<	5.41E+01		<	5.27E+01		<	5.35E+01		<	5.39E+01		<	4.26E+01		<	4.26E+01
05/03/11		<	1.88E+01		<	1.88E+01		<	1.89E+01		<	1.88E+01		<	2.16E+01		<	9.21E+00		<	2.16E+01
05/11/11		<	4.55E+01		<	4.53E+01		<	4.53E+01		<	4.53E+01		<	4.66E+01		<	4.67E+01		<	4.67E+01
05/18/11		<	6.30E+01		<	6.32E+01		<	6.28E+01		<	6.33E+01		<	6.33E+01		<	6.32E+01		<	2.69E+01
05/24/11		<	5.96E+01		<	5.96E+01		<	6.02E+01		<	6.00E+01		<	6.74E+01		<	6.74E+01		<	6.74E+01
06/01/11		<	6.78E+01		<	6.78E+01		<	6.77E+01		<	6.78E+01		<	5.99E+01		<	5.99E+01		<	5.99E+01
06/08/11		<	3.02E+01		<	3.01E+01		<	3.01E+01		<	3.01E+01		<	3.95E+01		<	3.96E+01		<	3.95E+01
06/14/11		<	3.71E+01		<	3.80E+01		<	3.89E+01		<	3.85E+01		<	4.49E+01		<	4.50E+01		<	4.50E+01
06/21/11		<	3.30E+01		<	3.24E+01		<	3.17E+01		<	3.20E+01		<	3.37E+01		<	3.37E+01		<	3.37E+01
06/29/11		<	2.26E+01		<	2.25E+01		<	2.25E+01		<	2.25E+01		<	3.05E+01		<	3.05E+01		<	3.05E+01

* Postive iodine results on these dates attributted to Fukushima Daiichi event. See text for more details.

Table 3-4
Airborne Iodine
I-131
[10^{-3} pCi/m^3]

Period Ending	Station 21	Station 22	Station 23	Station 24*	Station 01A	Station 05A
01/04/11	< 3.53E+01	< 3.52E+01	< 2.83E+01	< 2.85E+01	< 2.82E+01	< 2.83E+01
01/11/11	< 3.51E+01	< 3.89E+01	< 3.89E+01	< 3.89E+01	< 3.89E+01	< 1.66E+01
01/18/11	< 4.37E+01	< 4.38E+01	< 5.30E+01	< 5.47E+01	< 5.44E+01	< 5.37E+01
01/25/11	< 2.67E+01	< 2.67E+01	< 2.63E+01	< 2.54E+01	< 1.39E+01	< 2.63E+01
02/01/11	< 1.72E+01	< 1.70E+01	< 2.09E+01	< 2.06E+01	< 2.06E+01	< 2.06E+01
02/08/11	< 1.76E+01	< 3.97E+01	< 3.97E+01	< 3.97E+01	< 3.97E+01	< 3.97E+01
02/15/11	< 2.35E+01	< 1.94E+01	< 2.59E+01	< 2.59E+01	< 2.60E+01	< 2.60E+01
02/23/11	< 3.01E+01	< 3.01E+01	< 3.74E+01	< 3.74E+01	< 3.73E+01	< 3.74E+01
03/01/11	< 3.63E+01	< 3.64E+01	< 4.40E+01	< 4.40E+01	< 4.40E+01	< 4.39E+01
03/08/11	< 3.66E+01	< 3.66E+01	< 4.32E+01	< 4.33E+01	< 4.33E+01	< 4.33E+01
03/15/11	< 2.63E+01	< 2.61E+01	< 4.11E+01	< 4.09E+01	< 4.11E+01	< 4.10E+01
03/22/11	< 3.37E+01	< 5.13E+01	< 2.56E+01	< 4.65E+01	< 3.83E+01	< 3.70E+01
03/29/11**	9.58E+01 +/- 3.04E+01	8.72E+01 +/- 2.26E+01	1.04E+02 +/- 2.15E+01	1.15E+02 +/- 3.07E+01	8.08E+01 +/- 2.25E+01	1.23E+02 +/- 3.31E+01
04/06/11**	8.00E+01 +/- 2.19E+01	1.03E+02 +/- 2.40E+01	6.97E+01 +/- 2.41E+01	8.08E+01 +/- 2.60E+01	7.90E+01 +/- 2.85E+01	9.64E+01 +/- 2.48E+01
04/13/11	< 2.95E+01	< 2.62E+01	< 3.45E+01	< 3.01E+01	2.68E+01*** +/- 2.71E+01	< 2.78E+01
04/20/11	< 3.46E+01	< 4.38E+01	< 4.44E+01	< 4.38E+01	< 4.38E+01	< 1.84E+01
04/27/11	< 4.21E+01	< 4.20E+01	< 2.09E+01	< 2.07E+01	< 2.15E+01	< 2.11E+01
05/03/11	< 2.17E+01	< 2.17E+01	< 1.87E+01	< 1.88E+01	< 1.87E+01	< 1.87E+01
05/11/11	< 4.67E+01	< 3.59E+01	< 3.59E+01	< 3.59E+01	< 3.60E+01	< 1.53E+01
05/18/11	< 6.32E+01	< 6.32E+01	< 5.33E+01	< 5.33E+01	< 5.32E+01	< 5.34E+01
05/24/11	< 6.73E+01	< 5.59E+01	< 5.59E+01	< 5.62E+01	< 5.59E+01	< 5.60E+01
06/01/11	< 5.99E+01	< 6.86E+01	< 6.86E+01	< 6.86E+01	< 6.86E+01	< 6.86E+01
06/08/11	< 3.96E+01	< 4.87E+01	< 4.87E+01	< 4.86E+01	< 4.87E+01	< 4.86E+01
06/14/11	< 1.89E+01	< 4.41E+01	< 3.18E+01	< 3.28E+01	< 3.14E+01	< 3.21E+01
06/21/11	< 3.41E+01	< 3.22E+01	< 3.21E+01	< 3.11E+01	< 3.23E+01	< 1.35E+01
06/29/11	< 3.05E+01	< 1.30E+01	< 1.64E+01	< 1.65E+01	< 1.65E+01	< 1.64E+01

*Control Station

** Postive iodine results on these dates attributted to Fukushima Daiichi event. See text for more details.

*** Result is < 2-s error. Considered to be false positive.

Table 3-4
Airborne Iodine
I-131
[10^{-3} pCi/m^3]

Period Ending	Station 01		Station 02		Station 03		Station 04		Station 05		Station 06		Station 07	
07/05/11	< 5.61E+01		< 5.66E+01		< 5.68E+01		< 5.66E+01		< 4.12E+01		< 4.12E+01		< 4.17E+0	
07/12/11	< 7.27E+00		< 1.70E+01		< 1.69E+01		< 1.70E+01		< 1.70E+01		< 1.28E+01		< 1.28E+0	
07/19/11	< 1.73E+01		< 4.08E+01		< 4.08E+01		< 4.09E+01		< 4.09E+01		< 5.13E+01		< 5.13E+0	
07/26/11	< 3.06E+01		< 3.05E+01		< 3.05E+01		< 3.05E+01		< 4.32E+01		< 4.33E+01		< 4.33E+0	
08/02/11	< 1.80E+01		< 1.80E+01		< 1.85E+01		< 1.83E+01		< 1.81E+01		< 1.71E+01		< 1.71E+0	
08/09/11	< 1.58E+01		< 1.60E+01		< 1.54E+01		< 1.56E+01		< 1.20E+01		< 1.20E+01		< 1.22E+0	
08/16/11	< 2.82E+01		< 4.63E+01		< 4.62E+01		< 4.66E+01		< 4.63E+02		< 3.73E+01		< 3.73E+0	
08/23/11	< 2.71E+01		< 4.41E+01		< 4.41E+01		< 4.42E+01		< 4.41E+01		< 3.31E+01		< 3.31E+0	
08/30/11	< 2.23E+01		< 3.93E+01		< 3.95E+01		< 4.05E+01		< 3.96E+01		< 5.38E+01		< 5.33E+0	
09/06/11	< 1.04E+01		< 1.91E+01		< 1.92E+01		< 1.91E+01		< 1.91E+01		< 2.22E+01		< 2.21E+0	
09/14/11	< 1.41E+01		< 2.56E+01		< 2.54E+01		< 2.56E+01		< 2.56E+01		< 2.72E+01		< 2.73E+0	
09/21/11	< 2.69E+01		< 1.03E+01		< 2.70E+01		< 2.70E+01		< 2.70E+01		< 3.49E+01		< 3.49E+0	
09/28/11	< 5.63E+01		< 5.60E+01		< 5.59E+01		< 5.60E+01		< 3.67E+01		< 3.67E+01		< 3.68E+0	
10/04/11	< 5.24E+01		< 5.28E+01		< 2.26E+01		< 5.28E+01		< 5.28E+01		< 3.78E+01		< 3.78E+0	
10/11/11	< 1.15E+01		< 2.06E+01		< 2.04E+01		< 2.04E+01		< 2.05E+01		< 3.30E+01		< 3.30E+0	
10/18/11	< 4.41E+01		< 4.44E+01		< 4.47E+01		< 1.91E+01		< 4.48E+01		< 2.95E+01		< 2.95E+0	
10/25/11	< 1.70E+01		< 3.08E+01		< 3.09E+01		< 3.08E+01		< 3.08E+01		< 3.90E+01		< 3.90E+0	
11/01/11	< 2.17E+01		< 2.17E+01		< 2.17E+01		< 2.17E+01		< 1.17E+01		< 6.62E+00		< 6.62E+0(	
11/08/11	< 1.92E+01		< 3.49E+01		< 3.48E+01		< 3.48E+01		< 3.48E+01		< 3.93E+01		< 3.93E+0	
11/15/11	< 6.23E+00		< 6.26E+00		< 6.26E+00		< 6.28E+00		< 6.89E+00		< 3.73E+00		< 6.88E+0(	
11/22/11	< 1.76E+01		< 3.20E+01		< 3.19E+01		< 3.19E+01		< 3.20E+01		< 4.64E+01		< 4.64E+0	
11/29/11	< 2.05E+01		< 2.05E+01		< 2.05E+01		< 2.05E+01		< 1.89E+01		< 1.89E+01		< 8.05E+0(	
12/06/11	< 1.05E+01		< 1.91E+01		< 1.92E+01		< 1.91E+01		< 1.91E+01		< 3.14E+01		< 3.14E+0	
12/13/11	< 4.08E+01		< 4.08E+01		< 4.07E+01		< 4.07E+01		< 3.85E+01		< 3.85E+01		< 3.85E+0	
12/20/11	< 1.15E+01		< 2.70E+01		< 2.70E+01		< 2.70E+01		< 2.70E+01		< 2.86E+01		< 2.86E+0	
12/28/11	< 2.33E+01		< 2.32E+01		< 2.31E+01		< 2.29E+01		< 3.42E+01		< 3.42E+01		< 3.42E+0	
Mean	1.29E+02	+/- 3.26E+01	8.65E+01	+/- 2.60E+01	3.67E+01	+/- 2.26E+01	1.14E+02	+/- 2.41E+01	9.37E+01	+/- 3.52E+01	9.31E+01	+/- 2.56E+01	9.67E+01	+/- 2.55E+0

Table 3-4
Airborne Iodine
I-131
[10^{-3} pCi/m^3]

Period Ending	Station 21	Station 22	Station 23	Station 24*	Station 01A	Station 05A
07/05/11	< 4.12E+01	< 4.30E+01	< 4.30E+01	< 4.30E+01	< 4.29E+01	< 1.83E+01
07/12/11	< 1.28E+01	< 1.28E+01	< 8.35E+00	< 1.95E+01	< 1.96E+01	< 1.95E+01
07/19/11	< 5.11E+01	< 5.11E+01	< 3.02E+01	< 3.07E+01	< 3.02E+01	< 3.03E+01
07/26/11	< 4.34E+02	< 4.54E+01	< 4.53E+01	< 2.49E+01	< 4.83E+02	< 4.52E+01
08/02/11	< 1.70E+01	< 1.70E+01	< 1.79E+01	< 1.79E+01	< 1.79E+01	< 1.79E+01
08/09/11	< 1.20E+01	< 1.12E+01	< 1.11E+01	< 1.11E+01	< 4.75E+00	< 4.85E+00
08/16/11	< 3.72E+01	< 3.72E+01	< 4.06E+01	< 4.07E+01	< 4.05E+01	< 4.07E+01
08/23/11	< 3.31E+01	< 3.31E+01	< 2.95E+01	< 2.95E+01	< 2.95E+01	< 1.62E+01
08/30/11	< 5.33E+01	< 5.33E+01	< 4.67E+01	< 4.67E+01	< 4.67E+01	< 4.70E+01
09/06/11	< 2.20E+01	< 2.20E+01	< 3.31E+01	< 3.30E+01	< 3.31E+01	< 3.32E+01
09/14/11	< 2.73E+01	< 2.73E+01	< 2.21E+01	< 2.21E+01	< 2.21E+01	< 2.20E+01
09/21/11	< 3.49E+01	< 3.49E+01	< 1.86E+01	< 1.86E+01	< 1.86E+01	< 1.86E+01
09/28/11	< 3.68E+01	< 5.11E+00	< 5.10E+00	< 5.08E+00	< 5.13E+00	< 2.81E+00
10/04/11	< 3.78E+01	< 3.78E+01	< 3.76E+01	< 3.79E+01	< 3.75E+01	< 3.77E+01
10/11/11	< 3.33E+01	< 3.33E+01	< 3.34E+01	< 3.29E+01	< 3.35E+01	< 3.30E+01
10/18/11	< 2.92E+01	< 2.92E+01	< 4.29E+01	< 4.33E+01	< 4.27E+01	< 4.33E+01
10/25/11	< 3.90E+01	< 3.90E+01	< 4.64E+01	< 4.66E+01	< 4.64E+01	< 4.64E+01
11/01/11	< 6.62E+00	< 6.62E+00	< 2.90E+01	< 2.90E+01	< 2.90E+01	< 2.90E+01
11/08/11	< 3.94E+01	< 3.94E+01	< 4.48E+01	< 4.45E+01	< 4.48E+01	< 4.46E+01
11/15/11	< 6.84E+00	< 6.84E+00	< 7.43E+00	< 7.48E+00	< 7.43E+00	< 7.48E+00
11/22/11	< 4.65E+01	< 4.65E+01	< 3.19E+01	< 3.19E+01	< 3.19E+01	< 3.18E+01
11/29/11	< 1.89E+01	< 1.89E+01	< 1.34E+01	< 1.34E+01	< 1.34E+01	< 1.34E+01
12/06/11	< 3.14E+01	< 3.14E+01	< 2.74E+01	< 2.74E+01	< 2.74E+01	< 2.74E+01
12/13/11	< 1.65E+01	< 3.86E+01	< 3.80E+01	< 3.79E+01	< 3.80E+01	< 3.79E+01
12/20/11	< 2.86E+01	< 2.86E+01	< 4.63E+01	< 4.62E+01	< 4.63E+01	< 4.62E+01
12/28/11	< 3.41E+01	< 1.45E+01	< 3.03E+01	< 3.02E+01	< 3.04E+01	< 3.04E+01
MEAN	8.79E+01 +/- 2.62E+01	9.51E+01 +/- 2.33E+01	8.69E+01 +/- 2.28E+01	9.79E+01 +/- 2.84E+01	6.22E+01 +/- 2.60E+01	1.10E+02 +/- 2.90E+01
					Indicator Locations Mean	8.97E+01 +/- 2.65E+01

Table 3-5
Airborne Particulate
Gamma Spectra
[10^{-3} pCi/m^3]

Quarter 1

Sampling Location	Be-7	Cs-134**	Cs-137**
01	1.31E+02 +/- 2.86E+01	< 1.76E+00	< 1.82E+00
01A	1.06E+02 +/- 2.97E+01	< 1.32E+00	< 1.81E+00
02	1.53E+02 +/- 3.35E+01	< 1.93E+00	< 1.80E+00
03	1.06E+02 +/- 2.64E+01	< 1.50E+00	< 1.46E+00
04	1.58E+02 +/- 2.79E+01	< 1.28E+00	< 1.81E+00
05	1.87E+02 +/- 2.98E+01	< 1.72E+00	< 1.45E+00
05A	1.41E+02 +/- 3.11E+01	< 1.56E+00	< 1.85E+00
06	1.22E+02 +/- 3.16E+01	< 1.40E+00	< 1.51E+00
07	1.70E+02 +/- 3.80E+01	< 1.69E+00	< 1.67E+00
21	1.48E+02 +/- 3.36E+01	< 1.90E+00	< 2.01E+00
22	1.42E+02 +/- 2.60E+01	< 1.43E+00	< 1.65E+00
23	1.55E+02 +/- 3.31E+01	< 1.66E+00	< 1.51E+00
24*	1.29E+02 +/- 2.74E+01	< 1.28E+00	< 1.32E+00

Quarter 2

Sampling Location	Be-7	Cs-134**	Cs-137**	Sr-89	Sr-90
01	2.15E+02 +/- 3.37E+01	< 1.68E+00	< 1.87E+00	< 4.27E+00	< 1.77E+00
01A	1.88E+02 +/- 3.51E+01	< 2.22E+00	< 1.87E+00	< 3.47E+00	< 1.74E+00
02	1.61E+02 +/- 2.97E+01	< 2.36E+00	< 1.89E+00	< 4.40E+00	< 1.93E+00
03	1.91E+02 +/- 2.65E+01	< 1.42E+00	< 1.29E+00	< 3.97E+00	< 1.60E+00
04	1.79E+02 +/- 4.36E+01	< 2.08E+00	< 1.98E+00	< 9.14E+00	< 2.16E+00
05	2.20E+02 +/- 3.45E+01	< 2.11E+00	< 1.88E+00	< 4.02E+00	< 2.61E+00
05A	2.61E+02 +/- 3.95E+01	< 1.97E+00	< 2.05E+00	< 3.42E+00	< 1.97E+00
06	1.59E+02 +/- 2.64E+01	< 1.33E+00	< 1.28E+00	< 4.35E+00	< 1.69E+00
07	1.68E+02 +/- 3.31E+01	< 2.49E+00	< 1.99E+00	< 4.33E+00	< 2.05E+00
21	1.45E+02 +/- 3.03E+01	< 1.73E+00	< 1.62E+00	< 4.05E+00	< 1.77E+00
22	2.27E+02 +/- 3.79E+01	< 1.99E+00	< 1.92E+00	< 4.15E+00	< 2.08E+00
23	1.70E+02 +/- 3.25E+01	< 1.64E+00	< 1.55E+00	< 3.79E+00	< 1.73E+00
24*	1.91E+02 +/- 2.66E+01	< 1.52E+00	< 1.24E+00	< 3.21E+00	< 1.56E+00

*Control Station ** LLD identified in ODCM

Table 3-5
Airborne Particulate
Gamma Spectra
[10^{-3} pCi/m^3]

Quarter 3

Sampling Location	Be-7			Cs-134**		Cs-137**	
01	2.00E+02	+/-	3.94E+01	<	1.60E+00	<	1.20E+00
01A	1.59E+02	+/-	2.95E+01	<	1.23E+00	<	1.16E+00
02	1.15E+02	+/-	3.63E+01	<	1.53E+00	<	1.41E+00
03	1.18E+02	+/-	3.40E+01	<	1.95E+00	<	1.57E+00
04	1.25E+02	+/-	2.41E+01	<	1.37E+00	<	1.24E+00
05	1.63E+02	+/-	3.43E+01	<	1.44E+00	<	1.26E+00
05A	1.29E+02	+/-	2.78E+01	<	1.29E+00	<	1.09E+00
06	1.33E+02	+/-	2.39E+01	<	1.19E+00	<	9.54E-01
07	1.60E+02	+/-	3.27E+01	<	1.73E+00	<	1.40E+00
21	1.03E+02	+/-	3.07E+01	<	1.62E+00	<	1.28E+00
22	1.33E+02	+/-	3.69E+01	<	1.90E+00	<	1.40E+00
23	1.20E+02	+/-	2.66E+01	<	1.26E+00	<	1.52E+00
24*	1.37E+02	+/-	4.33E+01	<	2.15E+00	<	1.93E+00

MEAN

Quarter 4

Sampling Location	Be-7			Cs-134**		Cs-137**		Mean Be-7		
01	1.22E+02	+/-	3.10E+01	<	1.25E+00	<	1.32E+00	1.67E+02	+/-	3.32E+01
01A	1.59E+02	+/-	2.79E+01	<	1.55E+00	<	1.31E+00	1.53E+02	+/-	3.06E+01
02	1.45E+02	+/-	2.55E+01	<	9.86E-01	<	1.08E+00	1.44E+02	+/-	3.13E+01
03	1.51E+02	+/-	2.83E+01	<	1.26E+00	<	1.22E+00	1.42E+02	+/-	2.88E+01
04	1.56E+02	+/-	3.23E+01	<	2.04E+00	<	1.88E+00	1.55E+02	+/-	3.20E+01
05	1.70E+02	+/-	2.66E+01	<	1.51E+00	<	1.55E+00	1.85E+02	+/-	3.13E+01
05A	1.33E+02	+/-	3.01E+01	<	1.14E+00	<	1.27E+00	1.66E+02	+/-	3.21E+01
06	1.71E+02	+/-	2.62E+01	<	1.32E+00	<	1.32E+00	1.46E+02	+/-	2.70E+01
07	1.34E+02	+/-	2.15E+01	<	1.06E+00	<	8.00E-01	1.58E+02	+/-	3.13E+01
21	1.12E+02	+/-	2.39E+01	<	1.04E+00	<	9.98E-01	1.27E+02	+/-	2.96E+01
22	1.50E+02	+/-	2.70E+01	<	1.46E+00	<	1.04E+00	1.63E+02	+/-	3.20E+01
23	1.22E+02	+/-	2.22E+01	<	9.37E-01	<	1.02E+00	1.42E+02	+/-	2.86E+01
24*	1.14E+02	+/-	1.90E+01	<	1.15E+00	<	9.07E-01	1.43E+02	+/-	2.91E+01

* Control Station ** LLD identified in ODCM

Mean of All Indicator Location: 1.54E+02 +/- 3.06E+01

Table 3-6
Soil
[pCi/kg]

Soil sampled on triennial basis. Last taken 2010. Not required in 2011

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

Sampling Date	Gross Beta				Rainfall (inches)
01/25/11	2.21E+01	+/-	2.63E+00		0.78
02/23/11	6.72E+00	+/-	1.74E+00		2.06
03/29/11		<	2.43E+00		5.35
04/27/11	3.00E+00	+/-	1.56E+00		2.60
06/01/11	5.83E+00	+/-	1.72E+00		5.17
06/29/11		<	2.23E+00		4.35
07/26/11	4.48E+00	+/-	1.62E+00		3.20
08/30/11	2.83E+00	+/-	1.19E+00		6.21
09/28/11		<	2.16E+00		6.07
10/25/11		<	2.07E+00		2.76
11/29/11	2.43E+00	+/-	1.42E+00		4.22
12/28/11	1.81E+00	+/-	1.13E+00		6.19
Mean	6.15E+00	+/-	1.63E+00	Total	48.96

* LLD identified in ODCM

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

Sampling Location	Be-7			Mn-54			Fe-59			Co-58			Co-60		
01A															
06/29/11		<	3.86E+01	<	7.48E+01		<	2.35E+01		<	6.65E+00		<	2.31E+00	
12/28/11	4.99E+01	+/-	2.70E+01	<	1.05E+00		<	7.41E+00		<	1.05E+00		<	9.52E-01	
	Zn-65			Zr-95			Nb-95			Cs-134			Cs-137		
01A															
06/29/11		<	6.74E+00	<	1.20E+01		<	7.17E+00		<	2.30E+00		<	2.60E+00	
12/28/11		<	2.22E+00	<	4.38E+00		<	2.53E+00		<	8.99E-01		<	8.70E-01	
	Ba-140			La-140			I-131			Th-228					
01A															
06/29/11		<	2.70E+03	<	8.45E+02		<	2.69E+04		<	4.91E+00				
12/28/11		<	8.89E+02	<	2.50E+02		<	6.05E+03		<	2.78E+00				

MEAN

Sampling Location	Be-7			Mn-54		Fe-59		Co-58		Co-60	
01A											
	4.99E+01	+/-	2.70+01	+/-		+/-		+/-		+/-	
	Zn-65			Zr-95		Nb-95		Cs-134		Cs-137	
01A											
		+/-		+/-		+/-		+/-		+/-	
	Ba-140			La-140		I-131		Th-228			
01A											

+/- +/- +/- +/-

Precipitation – Monthly*
Gamma Spectra
[pCi/L]

Sampling Location	Be-7	Mn-54	Fe-59	Co-58	Co-60
01A					
03/29/11	< 4.56E+01	< 4.04E+00	< 1.03E+01	< 4.63E+00	< 4.01E+00
04/27/11	< 6.95E+01	< 5.48E+01	< 1.74E+01	< 7.90E+00	< 5.55E+00

	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137
01A					
03/29/11	< 9.38E+00	< 7.46E+00	< 4.77E+00	< 4.39E+00	< 4.81E+00
04/27/11	< 1.35E+01	< 1.35E+01	< 8.50E+00	< 6.02E+00	< 7.21E+00

	Ba-140	La-140	I-131	Th-228
01A				
03/29/11	< 1.96E+01	< 5.43E+00	2.55E+00 +/- 6.07E-01	< 9.48E+00
04/27/11	< 1.08E+2	< 2.67E+01	1.10E+00 +/- 4.53E-01	< 1.17E+01

MEAN

Sampling Location	Be-7	Mn-54	Fe-59	Co-58	Co-60
01A	+/-	+/-	+/-	+/-	+/-

	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137
01A	+/-	+/-	+/-	+/-	+/-

	Ba-140	La-140	I-131	Th-228
01A	+/-	+/-	1.83E+00 +/- 5.30E-01	+/-

* Monthly samples not normally counted for gamma emitters. Samples counted for gamma emitters due to Fushima Daiichi event. Positve iodine results likely due to Fukushima. See text for more details

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

Station 12

Sampling Date	K-40			Sr-89		Sr-90		I-131*			Cs-134*	
01/18/11	1.45E+03	+/-	1.67E+02	[a]		[a]		<	7.67E-01	<	6.06E+00	
02/15/11	1.32E+03	+/-	1.23E+02	[a]		[a]		<	7.38E-01	<	4.00E+00	
03/15/11	1.28E+03	+/-	1.24E+02	<	4.65E+00	<	1.38E+00	<	7.06E-01	<	9.13E+00	
04/20/11	1.32E+03	+/-	1.39E+02	[a]		[a]		1.28E+00**	+/- 4.85E-01	<	6.20E+00	
05/18/11	1.22E+03	+/-	1.24E+02	[a]		[a]		<	6.74E-01	<	5.48E+00	
06/21/11	1.32E+03	+/-	8.80E+01	<	3.64E+00	<	7.27E-01	<	8.53E-01	<	3.80E+00	
07/19/11	1.24E+03	+/-	1.52E+02	[a]		[a]		<	5.54E-01	<	5.86E+00	
08/16/11	1.10E+03	+/-	9.87E+01	[a]		[a]		<	6.91E-01	<	3.88E+00	
09/21/11	1.28E+03	+/-	1.39E+02	<	1.62E+00	<	8.79E-01	<	6.15E-01	<	5.54E+00	
10/18/11	1.36E+03	+/-	1.42E+02	[a]		[a]		<	8.47E-01	<	6.96E+00	
11/15/11	1.26E+03	+/-	1.47E+02	[a]		[a]		<	6.25E-01	<	6.22E+00	
12/20/11	1.30E+03	+/-	1.46E+02	<	3.12E+00	<	7.15E-01	<	6.90E-01	<	6.44E+00	
Sta. Mean	1.43E+03	+/-	1.35E+02					1.28E+00	+/- 4.85E-01			

Sampling Date	Cs-137*		Ba-140*		La-140*	
01/18/11	<	6.89E+00	<	3.84E+01	<	9.59E+00
02/15/11	<	4.78E+00	<	2.18E+01	<	6.54E+00
03/15/11	<	7.79E+00	<	4.25E+01	<	1.08E+01
04/20/11	<	6.03E+00	<	4.39E+01	<	1.21E+01
05/18/11	<	5.81E+00	<	4.23E+01	<	1.03E+01
06/21/11	<	3.64E+00	<	4.33E+01	<	1.28E+01
07/19/11	<	6.12E+00	<	2.84E+01	<	1.01E+01
08/16/11	<	4.47E+00	<	1.91E+01	<	5.35E+00
09/21/11	<	6.64E+00	<	2.78E+01	<	8.44E+00
10/18/11	<	7.25E+00	<	3.45E+01	<	1.33E+01
11/15/11	<	6.78E+00	<	3.95E+01	<	1.27E+01
12/20/11	<	6.55E+00	<	3.65E+01	<	9.56E+00
Sta. Mean	+/-		+/-		+/-	

* LLD identified in ODCM. [a] Sr-89/90 performed quarterly

** Attributed to Fukushima event.

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

Sampling Location	Sampling Date	Be-7			K-40			I-131*			Cs-134*			Cs-137*		
14A	05/11/11	8.43E+02	+/-	2.81E+02	5.74E+03	+/-	7.03E+02	<	2.84E+01	<	3.13E+01	<	2.92E+01			
	06/14/11	1.15E+03	+/-	4.70E+02	7.15E+03	+/-	1.01E+03	<	2.73E+01	<	3.53E+01	<	4.46E+01			
	07/12/11	1.44E+03	+/-	5.31E+02	4.15E+03	+/-	7.67E+02	<	2.88E+01	<	3.06E+01	<	3.95E+01			
	08/09/11	1.07E+03	+/-	2.95E+02	5.74E+03	+/-	5.47E+02	<	2.51E+01	<	2.52E+01	<	2.76E+01			
	09/14/11	2.98E+03	+/-	3.86E+02	6.08E+03	+/-	6.54E+02	<	3.09E+01	<	2.79E+01	<	2.63E+01			
14B	10/11/11	8.61E+02	+/-	1.64E+02	5.00E+03	+/-	3.36E+02	<	2.82E+01	<	1.35E+01	<	1.52E+01			
	11/08/11	1.43E+03	+/-	3.28E+02	6.95E+03	+/-	7.24E+02	<	3.39E+01	<	2.82E+01	<	2.83E+01			
14A	Mean	1.50E+03	+/-	3.93E+02	5.77E+03	+/-	7.36E+02	+/-		+/-		+/-				
14B	Mean	1.15E+03	+/-	2.46E+02	5.98E+03	+/-	5.30E+02	+/-		+/-		+/-				

Sampling Location	Sampling Date	Be-7			K-40			I-131*			Cs-134*			Cs-137*		
15	05/11/11	7.45E+02	+/-	3.69E+02	6.45E+03	+/-	8.50E+02	<	3.36E+01	<	3.95E+01	<	3.65E+01			
	06/14/11	2.12E+03	+/-	5.26E+02	7.13E+03	+/-	9.14E+02	<	2.78E+01	<	4.33E+01	<	4.68E+01			
	07/12/11	5.76E+02	+/-	2.01E+02	8.14E+03	+/-	4.17E+02	<	3.08E+01	<	1.54E+01	<	1.70E+01			
	08/09/11	4.61E+02	+/-	1.86E+02	5.15E+03	+/-	4.78E+02	<	2.38E+01	<	2.29E+01	<	2.39E+01			
	09/14/11	1.53E+03	+/-	3.56E+02	7.28E+03	+/-	7.40E+02	<	2.76E+01	<	2.51E+01	<	2.55E+01			
	10/11/11	4.57E+02	+/-	1.58E+02	6.34E+03	+/-	3.86E+02	<	2.59E+01	<	1.39E+01	<	1.54E+01			
	11/08/11	2.34E+03	+/-	3.25E+02	6.14E+03	+/-	5.87E+02	<	3.58E+01	<	2.28E+01	<	2.92E+01			
	Mean	1.18E+03	+/-	3.03E+02	6.66E+03	+/-	6.25E+02	+/-		+/-		+/-				

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

Sampling Location	Sampling Date	Be-7			K-40			I-131*		Cs-134*		Cs-137*	
16**	05/11/11	1.54E+03	+/-	3.75E+02	4.20E+03	+/-	7.02E+02	<	3.76E+01	<	3.42E+01	<	3.96E+01
** Control Station	06/14/11	1.36E+03	+/-	4.56E+02	4.47E+03	+/-	7.20E+02	<	2.55E+01	<	3.12E+01	<	2.95E+01
	07/12/11	8.97E+02	+/-	2.81E+02	4.94E+03	+/-	5.79E+02	<	2.37E+01	<	2.98E+01	<	3.15E+01
	08/09/11	7.98E+02	+/-	2.71E+02	4.04E+03	+/-	4.68E+02	<	4.56E+01	<	2.54E+01	<	2.60E+01
	09/14/11	2.20E+03	+/-	3.74E+02	4.67E+03	+/-	6.25E+02	<	3.06E+01	<	2.98E+01	<	3.29E+01
	10/11/11	2.25E+03	+/-	1.26E+02	6.91E+03	+/-	2.28E+02	<	3.00E+01	<	8.94E+00	<	9.58E+00
	11/08/11	2.20E+03	+/-	3.01E+02	6.20E+03	+/-	6.38E+02	<	3.65E+01	<	2.37E+01	<	2.73E+01
	Mean	1.61E+03	+/-	3.12E+02	5.06E+03	+/-	5.66E+02	+/-		+/-		+/-	

* LLD identified in ODCM

Sampling Location	Sampling Date	Be-7			K-40			I-131*		Cs-134*		Cs-137*	
23	05/11/11	9.56E+02	+/-	3.94E+02	4.80E+03	+/-	7.02E+02	<	3.90E+01	<	3.90E+01	<	4.17E+01
	06/14/11	5.80E+03	+/-	8.03E+02	4.67E+03	+/-	9.57E+02	<	3.01E+01	<	5.58E+01	<	5.66E+01
	07/12/11	9.98E+02	+/-	4.10E+02	7.96E+03	+/-	1.10E+03	<	2.76E+01	<	3.40E+01	<	4.87E+01
	08/09/11	8.24E+02	+/-	2.10E+02	6.78E+03	+/-	5.73E+02	<	2.73E+01	<	2.58E+01	<	2.62E+01
	09/14/11	3.11E+03	+/-	3.90E+02	4.91E+03	+/-	6.18E+02	<	3.54E+01	<	2.52E+01	<	3.00E+01
	10/11/11	8.95E+02	+/-	1.03E+02	5.92E+03	+/-	2.13E+02	<	2.71E+01	<	9.24E+00	<	1.03E+01
	11/08/11	1.75E+03	+/-	3.18E+02	6.29E+03	+/-	6.00E+02	<	3.86E+01	<	2.64E+01	<	2.98E+01
	Mean	2.05E+03	+/-	3.75E+02	5.90E+03	+/-	6.80E+02	+/-		+/-		+/-	

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

Sampling Location	Sampling Date	Be-7			K-40			I-131*			Cs-134*			Cs-137*		
26	05/11/11	1.39E+03	+/-	3.71E+02	5.23E+03	+/-	7.34E+02	<	3.92E+01		<	3.92E+01		<	3.30E+02	
	06/14/11	2.19E+03	+/-	6.61E+02	5.98E+03	+/-	1.15E+03	<	3.37E+01		<	5.56E+01		<	5.98E+01	
	07/12/11	2.07E+03	+/-	6.52E+02	5.09E+03	+/-	9.19E+02	<	2.73E+01		<	5.34E+01		<	5.75E+01	
	08/09/11	1.28E+03	+/-	2.06E+02	5.22E+03	+/-	4.88E+02	<	2.45E+01		<	1.97E+01		<	2.17E+01	
	09/14/11	2.24E+03	+/-	3.64E+02	4.42E+03	+/-	6.41E+02	<	3.60E+01		<	2.93E+01		<	2.98E+01	
	10/11/11	3.06E+03	+/-	1.43E+02	3.97E+03	+/-	2.09E+02	<	3.01E+01		<	1.04E+01		<	1.12E+01	
	11/08/11	2.77E+03	+/-	3.32E+02	4.72E+03	+/-	6.36E+02	<	3.84E+01		<	2.50E+01		<	3.18E+01	
	Mean	2.14E+03	+/-	3.90E+02	4.95E+03	+/-	6.82E+02	+/-			+/-			+/-		
Indicator locations		1.69E+03	+/-	3.55E+02	5.84E+03	+/-	6.66E+02									

* LLD identified in ODCM

Table 3-10

Well Water

Gamma Spectra, Strontium, and Tritium

[pCi/L]

Station 01A

Sampling Date	H-3	Sr-89	Sr-90	Mn-54	Fe-59	Co-58	Co-60	Zn-65
03/29/11	< 9.98E+02	[a]	[a]	< 6.31E+00	< 1.19E+01	< 5.49E+00	< 5.12E+00	< 9.79E+00
06/29/11	< 9.81E+02	< 4.19E+00	< 9.84E-01	< 4.68E+00	< 1.04E+01	< 5.18E+00	< 4.25E+00	< 1.06E+01
09/28/11	< 5.28E+02	[a]	[a]	< 5.48E+00	< 1.23E+01	< 5.96E+00	< 5.88E+00	< 1.32E+01
12/28/11	< 5.91E+02	[a]	[a]	< 4.77E+00	< 8.10E+00	< 4.42E+00	< 4.51E+00	< 1.05E+01
Mean								

Sampling Date	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
03/29/11	< 9.82E+00	< 5.76E+00	< 6.71E-01	< 4.50E+00	< 4.87E+00	< 3.52E+01	< 9.88E+00
06/29/11	< 8.81E+00	< 5.33E+00	< 8.51E-01	< 4.89E+00	< 4.48E+00	< 3.32E+01	< 1.18E+01
09/28/11	< 9.24E+00	8.45E+00 +/- 4.72E+00	< 5.90E-01	< 7.16E+00	< 6.53E+00	< 2.77E+01	< 1.00E+01
12/28/11	< 8.66E+00	< 4.39E+00	< 5.73E-01	< 4.39E+00	< 4.68E+00	< 3.29E+01	< 8.20E+00
Mean		8.45E+00 +/- 4.72E+00					

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

Table 3-11

River Water

Gamma Spectra, Strontium, and Tritium

[pCi/L]

Station 11

Sampling Date	H-3*	Sr-89	Sr-90	Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*
01/11/11	[a]	[b]	[b]	< 4.73E+00	< 9.24E+00	< 4.44E+00	< 5.15E+00	< 9.32E+00
02/15/11	[a]	[b]	[b]	< 3.95E+00	< 8.62E+00	< 4.09E+00	< 4.05E+00	< 7.71E+00
03/14/11	3.01E+03 +/- 7.29E+02	[b]	[b]	< 3.57E+00	< 6.90E+00	< 3.64E+00	< 3.46E+00	< 7.24E+00
04/12/11	[a]	[b]	[b]	< 3.24E+00	< 7.26E+00	< 4.12E+00	< 3.58E+00	< 6.78E+00
05/16/11	[a]	[b]	[b]	< 3.90E+00	< 9.56E+00	< 4.43E+00	< 4.30E+00	< 8.44E+00
06/13/11	2.79E+03 +/- 6.53E+02	< 4.28E+00	< 7.25E-01	< 1.09E+00	< 2.96E+00	< 1.21E+00	< 1.31E+00	< 2.27E+00
07/11/11	[a]	[b]	[b]	< 2.99E+00	< 6.19E+00	< 3.47E+00	< 3.74E+00	< 6.07E+00
08/14/11	[a]	[b]	[b]	< 3.79E+00	< 7.90E+00	< 3.54E+00	< 3.02E+00	< 6.58E+00
09/13/11	4.07E+03 +/- 7.71E+02	[b]	[b]	< 5.71E+00	< 1.16E+01	< 6.05E+00	< 6.76E+00	< 1.35E+01
10/10/11	[a]	[b]	[b]	< 4.88E+00	< 1.21E+01	< 5.40E+00	< 4.57E+00	< 9.58E+00
11/14/11	[a]	[b]	[b]	< 2.79E+00	< 9.79E+00	< 4.36E+00	< 4.62E+00	< 7.71E+00
12/13/11	4.48E+03 +/- 5.64E+02	[b]	[b]	< 4.34E+00	< 9.76E+00	< 4.88E+00	< 4.11E+00	< 1.08E+01
MEAN	3.59E+03 +/- 6.79E+02	+/-	+/-	+/-	+/-	+/-	+/-	+/-

Sampling Date	Nb-95*	Zr-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/11/11	1.01E+01 +/- 3.56E+00	< 9.15E+00	< 3.69E-01	< 4.61E+00	< 5.36E+00	< 2.59E+01	< 9.69E+00
02/15/11	< 4.14E+00	< 7.32E+00	< 2.65E-01	< 3.78E+00	< 3.86E+00	< 2.20E+01	< 5.75E+00
03/14/11	< 6.33E+00	< 4.04E+00	< 8.36E-01	< 3.47E+00	< 3.49E+00	< 2.31E+01	< 6.84E+00
04/12/11	< 6.99E+00	< 3.98E+00	< 6.52E-01	< 3.41E+00	< 3.81E+00	< 2.66E+01	< 8.62E+00
05/16/11	< 6.78E+00	< 3.98E+00	< 6.42E-01	< 3.56E+00	< 4.59E+00	< 2.59E+01	< 8.13E+00
06/13/11	< 2.17E+00	< 1.42E+00	< 6.80E-01	< 9.19E-01	< 1.26E+00	< 1.45E+01	< 3.60E+00
07/11/11	< 6.13E+00	< 3.59E+00	< 6.94E-01	< 2.72E+00	< 3.61E+00	< 2.23E+01	< 7.27E+00
08/14/11	< 5.98E+00	< 4.29E+00	< 7.11E-01	< 3.49E+00	< 3.31E+00	< 1.92E+01	< 5.80E+00
09/13/11	< 1.01E+01	< 5.80E+00	< 6.99E-01	< 6.06E+00	< 5.80E+00	< 2.60E+01	< 9.83E+00
10/10/11	< 9.41E+00	< 5.30E+00	< 5.28E-01	< 5.27E+00	< 5.81E+00	< 2.84E+01	< 8.15E+00
11/14/11	< 8.38E+00	< 3.88E+00	< 7.83E-01	< 3.94E+00	< 5.15E+00	< 2.70E+01	< 8.48E+00
12/13/11	< 8.34E+00	< 5.79E+00	< 6.42E-01	< 4.96E+00	< 4.98E+00	< 2.47E+01	< 7.85E+00
MEAN	1.01E+01 +/- 3.56E+00	+/-	+/-	+/-	+/-	+/-	+/-

* LLD identified in ODCM

[a] Tritium analyses on quarterly composite.

[b] Sr-89/90 performed annually on 2nd quarter composite sample.

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

Station 08

Sampling Date	H-3*	Sr-89	Sr-90	Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*
01/11/11	[a]	[b]	[b]	< 3.35E+00	< 7.48E+00	< 3.04E+00	< 3.18E+00	< 6.87E+00
02/15/11	[a]	[b]	[b]	< 3.09E+00	< 9.87E+00	< 4.19E+00	< 4.32E+00	< 8.74E+00
03/14/11	3.87E+03 +/- 7.76E+02	[b]	[b]	< 3.14E+00	< 5.67E+00	< 2.82E+00	< 3.41E+00	< 6.66E+00
04/12/11	[a]	[b]	[b]	< 4.08E+00	< 9.93E+00	< 3.97E+00	< 4.08E+00	< 8.17E+00
05/16/11		[b]	[b]	< 3.42E+00	< 8.76E+00	< 4.03E+00	< 3.82E+00	< 7.41E+00
06/13/11	2.27E+03 +/- 6.24E+02	< 4.08E+00	< 6.02E-01	< 1.16E+00	< 3.31E+00	< 1.07E+00	< 1.26E+00	< 2.38E+00
07/11/11	[a]	[b]	[b]	< 2.20E+00	< 4.85E+00	< 2.29E+00	< 2.95E+00	< 5.27E+00
08/14/11	[a]	[b]	[b]	< 4.52E+00	< 1.06E+01	< 3.86E+00	< 6.52E+00	< 1.08E+01
09/13/11	3.93E+03 +/- 7.70E+02	[b]	[b]	< 4.21E+00	< 1.25E+01	< 5.24E+00	< 5.02E+00	< 1.17E+01
10/10/11	[a]	[b]	[b]	< 4.67E+00	< 8.59E+00	< 4.36E+00	< 4.94E+00	< 9.59E+00
11/14/11	[a]	[b]	[b]	< 5.53E+00	< 1.17E+01	< 5.30E+00	< 4.87E+00	< 9.50E+00
12/13/11	3.32E+03 +/- 5.30E+02	[b]	[b]	< 5.33E+00	< 1.18E+01	< 4.36E+00	< 5.15E+00	< 1.05E+01
Mean	3.35E+03 +/- 6.75E+02	+/-	+/-	+/-	+/-	+/-	+/-	+/-

Sampling Date	Zr-95*	Nb-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/11/11	< 6.22E+00	< 3.49E+00	< 4.20E-01	< 3.36E+00	< 3.49E+00	< 1.52E+01	< 4.75E+00
02/15/11	< 7.27E+00	< 4.53E+00	< 2.68E+00	< 3.73E+00	< 4.04E+00	< 1.96E+01	< 6.68E+00
03/14/11	< 5.91E+00	< 3.34E+00	< 7.59E-01	< 3.20E+00	< 2.86E+00	< 2.08E+01	< 7.14E+00
04/12/11	< 6.51E+00	< 3.70E+00	< 6.85E-01	< 3.43E+00	< 3.95E+00	< 2.75E+01	< 7.87E+00
05/16/11	< 6.95E+00	< 4.51E+00	< 6.32E-01	< 3.33E+00	< 4.03E+00	< 2.75E+01	< 8.34E+00
06/13/11	< 2.66E+00	< 1.38E+00	< 7.52E-01	< 1.92E+00	< 2.48E+00	< 1.51E+01	< 5.89E+00
07/11/11	< 4.67E+00	< 2.73E+00	< 6.66E-01	< 4.76E+00	< 5.29E+00	< 2.40E+01	< 8.00E+00
08/14/11	< 8.66E+00	< 4.96E+00	< 6.66E-01	< 4.76E+00	< 5.29E+00	< 2.40E+01	< 8.00E+00
09/13/11	< 8.60E+00	< 5.39E+00	< 7.70E-01	< 4.09E+00	< 5.36E+00	< 2.80E+01	< 9.16E+00
10/10/11	< 9.46E+00	< 4.48E+00	< 5.90E-01	< 4.49E+00	< 4.79E+00	< 2.54E+01	< 1.14E+01
11/14/11	< 9.45E+00	< 5.54E+00	< 7.83E-01	< 5.55E+00	< 5.69E+00	< 1.91E+01	< 9.42E+00
12/13/11	< 7.59E+00	< 5.81E+00	< 6.29E-01	< 5.46E+00	< 5.87E+00	< 2.30E+01	< 7.86E+00
Mean	+/-	+/-	+/-	+/-	+/-	+/-	+/-

* LLD identified in ODCM

[a] Tritium analyses on quarterly composite.

[b] Sr-89/90 performed annually on 2nd quarter composite sample.

Table 3-12

Surface Water

Gamma Spectra, Strontium, Tritium

[pCi/L]

Station 09A

Sampling Date	H-3*	Sr-89	Sr-90	Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*
01/11/11	[a]	[b]	[b]	< 3.51E+00	< 7.42E+00	< 3.71E+00	< 3.84E+00	< 7.67E+00
02/15/11	[a]	[b]	[b]	< 3.41E+00	< 8.03E+00	< 3.87E+00	< 3.75E+00	< 7.50E+00
03/14/11	< 8.67E+02	[b]	[b]	< 3.13E+00	< 6.62E+00	< 3.20E+00	< 2.87E+00	< 4.53E+00
04/12/11	[a]	[b]	[b]	< 3.74E+00	< 8.22E+00	< 4.44E+00	< 3.80E+00	< 7.10E+00
05/16/11	[a]	[b]	[b]	< 3.69E+00	< 8.40E+00	< 4.40E+00	< 3.93E+00	< 8.08E+00
06/13/11	< 8.50E+02	< 4.21E+00	< 6.12E-01	< 1.55E+00	< 3.41E+00	< 1.40E+00	< 1.25E+00	< 3.37E+00
07/11/11	[a]	[b]	[b]	< 2.46E+00	< 4.91E+00	< 2.24E+00	< 2.62E+00	< 4.57E+00
08/14/11	[a]	[b]	[b]	< 4.41E+00	< 1.04E+01	< 4.44E+00	< 4.99E+00	< 8.86E+00
09/13/11	< 9.37E+02	[b]	[b]	< 5.16E+00	< 1.07E+01	< 5.07E+00	< 6.08E+00	< 9.94E+00
10/10/11	[a]	[b]	[b]	< 5.02E+00	< 9.92E+00	< 5.08E+00	< 5.36E+00	< 1.07E+01
11/14/11	[a]	[b]	[b]	< 3.66E+00	< 9.55E+00	< 4.70E+00	< 4.06E+00	< 7.28E+00
12/13/11	< 6.11E+02	[b]	[b]	< 4.59E+00	< 1.03E+01	< 5.62E+00	< 6.69E+00	< 8.75E+00
MEAN	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-

Sampling Date	Zr-95*	Nb-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/11/11	< 7.00E+00	< 3.98E+00	< 3.69E-01	< 3.71E+00	< 4.05E+00	< 2.12E+01	< 6.33E+00
02/15/11	< 6.03E+00	< 3.93E+00	< 5.21E-01	< 3.77E+00	< 3.68E+00	< 1.84E+01	< 7.50E+00
03/14/11	< 5.02E+00	< 3.06E+00	< 7.76E-01	< 2.56E+00	< 3.01E+00	< 1.90E+01	< 4.55E+00
04/12/11	< 8.20E+00	< 4.49E+00	< 8.17E-01	< 3.61E+00	< 4.09E+00	< 2.87E+01	< 8.25E+00
05/16/11	< 5.49E+00	< 4.00E+00	< 5.47E-01	< 3.83E+00	< 4.58E+00	< 2.53E+01	< 8.12E+00
06/13/11	< 2.80E+00	< 1.51E+00	< 8.13E-01	< 1.14E+00	< 1.26E+00	< 1.58E+01	< 5.56E+00
07/11/11	< 4.67E+00	< 2.54E+00	< 7.99E-01	< 2.10E+00	< 2.39E+00	< 1.68E+01	< 5.61E+00
08/14/11	< 9.02E+00	< 5.39E+00	< 6.72E-01	< 4.50E+00	< 4.78E+00	< 2.51E+01	< 8.88E+00
09/13/11	< 1.01E+01	< 5.60E+00	< 8.71E-01	< 4.83E+00	< 6.67E+00	< 2.77E+01	< 9.07E+00
10/10/11	< 8.25E+00	< 4.87E+00	< 5.24E-01	< 4.72E+00	< 4.84E+00	< 2.55E+01	< 1.06E+01
11/14/11	< 8.33E+00	< 5.00E+00	< 7.15E-01	< 4.58E+00	< 5.49E+00	< 2.66E+01	< 8.35E+00
12/13/11	< 8.46E+00	< 6.26E+00	< 6.53E-01	< 6.06E+00	< 5.79E+00	< 2.94E+01	< 1.16E+01
MEAN							

* LLD identified in ODCM

[a] Tritium analyses on quarterly composite.

[b] Sr-89/90 performed annually on 2nd quarter composite sample.

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

Sample Date	Sr-89	Sr-90	K-40	Cs-134*	Cs-137*
4/18/2011					
Station 08	[a]	[a]	1.95E+04 +/- 1.46E+03	< 5.17E+01	< 5.63E+01
Station 09A**	[a]	[a]	1.19E+04 +/- 1.16E+03	< 4.85E+01	< 5.19E+01
Station 11	[a]	[a]	1.51E+04 +/- 1.30E+03	< 4.97E+01	< 5.90E+01

	Ra-226	Th-228	Th-232
04/18/2011			
Station 08	< 1.39E+03	2.98E+03 +/- 2.30E+02	2.13E+03 +/- 3.02E+02
Station 09A**	1.56E+03 +/- 9.57E+02	5.57E+02 +/- 7.64E+01	5.87E+02 +/- 1.31E+02
Station 11	2.40E+03 +/- 1.27E+03	1.09E+03 +/- 1.15E+02	1.23E+03 +/- 1.67E+02

Sample Date	Sr-89	Sr-90	K-40	Cs-134*	Cs-137*
10/10/2011					
Station 08	< 8.72E+01	< 3.67E+01	1.69E+04 +/- 1.78E+03	< 6.59E+01	< 8.71E+01
Station 09A**	< 9.32E+01	< 4.92E+01	1.48E+04 +/- 1.64E+03	< 7.47E+01	< 1.04E+02
Station 11	< 8.98E+01	< 4.53E+01	1.49E+04 +/- 1.56E+03	< 6.78E+01	< 7.81E+01

	Ra-226	Th-228	Th-232
10/10/2011			
Station 08	2.32E+03 +/- 1.56E+03	1.94E+03 +/- 1.44E+02	1.92E+03 +/- 2.16E+02
Station 09A**	< 1.49E+03	9.02E+02 +/- 1.33E+02	7.32E+02 +/- 1.86E+02
Station 11	2.07E+03 +/- 1.85E+03	1.23E+03 +/- 1.33E+02	1.16E+03 +/- 2.05E+02

MEAN

	Sr-89	Sr-90	K-40	Cs-134*	Cs-137*
Indicator	+/-	+/-	1.66E+04 +/- 1.53E+03	+/-	+/-
Control	+/-	+/-	1.34E+04 +/- 1.40E+03	+/-	+/-

	Ra-226	Th-228	Th-232
Indicator	2.26E+03 +/- 1.56E+03	1.81E+03 +/- 1.56E+02	1.61E+03 +/- 2.23E+02
Control	1.56E+03 +/- 9.57E+02	7.30E+02 +/- 1.05E+02	6.60E+02 +/- 1.59E+02

* LLD identified in ODCM

** Control Station

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

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

Sample Date	Sr-89	Sr-90	K-40	Cs-134	Cs-137
4/18/2011					
Station 08	[a]	[a]	1.93E+03 +/- 5.05E+02	< 3.71E+01	< 5.27E+01

	Ra-226	Th-228	Th-232
	1.78E+03 +/- 9.45E+02	5.02E+02 +/- 8.10E+01	4.54E+02 +/- 1.25E+02

Sample Date	Sr-89	Sr-90	K-40	Cs-134	Cs-137
10/10/2011					
Station 08	< 8.71E+01	< 4.25E+01	2.13E+03 +/- 9.06E+02	< 8.45E+01	< 1.05E+02

	Ra-226	Th-228	Th-232
	< 2.03E+03	2.67E+02 +/- 1.52E+02	4.12E+02 +/- 1.61E+02

MEAN	Sr-89	Sr-90	K-40	Cs-134	Cs-137
	+/-	+/-	2.03E+03 +/- 7.06E+02	+/-	+/-

	Ra-226	Th-228	Th-232
	1.78E+03 +/- 9.45E+02	3.85E+02 +/- 1.17E+02	4.33E+02 +/- 1.43E+02

* LLD identified in ODCM
[a] Sr-89/90 analyses performed annually.

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

Fish [a]

Sampling Date	K-40			Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*	Cs-134*	Station 08 Cs-137*
04/20/11	2.40E+03	+/-	1.04E+03	< 9.03E+01	< 2.52E+02	< 9.63E+01	< 8.07E+01	< 1.83E+02	< 7.98E+01	< 7.83E+01
10/11/11	2.15E+03	+/-	3.03E+02	< 2.14E+01	< 5.08E+01	< 2.31E+01	< 2.37E+01	< 4.33E+01	< 1.93E+01	< 2.18E+01

Sampling Date	K-40			Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*	Cs-134*	Station 25** Cs-137*
04/19/11	1.68E+03	+/-	7.51E+02	< 6.01E+01	< 2.00E+02	< 7.75E+01	< 4.63E+01	< 1.44E+02	< 5.50E+01	< 5.83E+01
10/11/11	3.63E+03	+/-	5.59E+02	< 2.97E+01	< 7.03E+01	< 3.49E+01	< 3.66E+01	< 6.05E+01	< 2.93E+01	< 3.44E+01

catfish [b]

Sampling Date	K-40			Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*	Cs-134*	Station 08 Cs-137*
04/21/11	2.35E+03	+/-	9.28E+02	< 6.90E+01	< 1.98E+02	< 7.62E+01	< 6.92E+01	< 1.47E+02	< 6.77E+01	< 7.41E+01
10/12/11	1.92E+03	+/-	1.55E+03	< 9.98E+01	< 2.40E+02	< 1.07E+02	< 9.81E+01	< 2.60E+02	< 1.07E+02	< 8.89E+01

Sampling Date	K-40			Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*	Cs-134*	Station 25** Cs-137*
04/19/11	2.44E+03	+/-	7.62E+02	< 6.45E+01	< 1.84E+02	< 9.13E+01	< 8.28E+01	< 1.51E+02	< 7.15E+01	< 6.21E+01
10/19/10	3.15E+03	+/-	9.31E+02	< 6.19E+01	< 1.85E+02	< 8.47E+01	< 7.63E+01	< 1.91E+02	< 5.89E+01	< 8.02E+01

Mean	2.47E+03	+/-	8.53E+02
Indicator	2.21E+03	+/-	9.55E+02
Control	2.73E+03	+/-	7.51E+02

* LLD identified in ODCM

** Control Station

[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 2011 and tabulated in Section 3, are discussed below. Except for TLDs, TBE analyzed all samples throughout the year. The procedures and specifications followed for these analyses are as required in the TBE 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 B.

The predominant radioactivity detected throughout 2011 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, Th-228 and Th-232 were detected in numerous samples. Th-228 & Th-232 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 2011 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 the 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 CaSO4:Dy in Teflon TLDs in January 2001. The dose with the replacement TLDs is lower than that of the previously used TLDs. This will continue to be monitored.

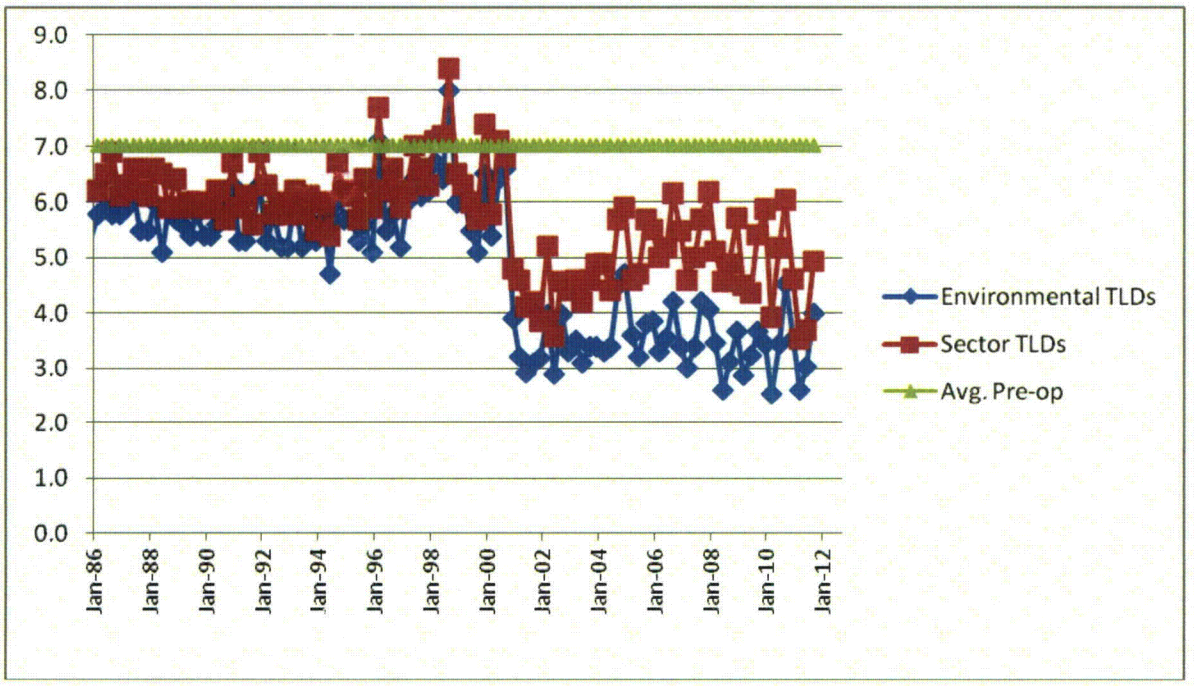

Figure 4-1 TLD (mrem/Standard Month)

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 4.2 mR/standard month with a range of 1.6 to 10.7 mR/standard month. The highest quarterly average reading for any single location was obtained at location SSW-19/51. This value was 7.1 mR/standard month. This location was on site directly across the access road from the Independent Spent Fuel Storage Facility for a portion of the first quarter. It was subsequently relocated due to U-3 construction activities farther from the ISFSI. The higher values in the first quarter can 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 indicator locations within 10 miles of the station the average quarterly reading was 3.3 mR/standard month with a range of 1.6 to 6.0 mR/standard month. The average annual reading for these locations was 3.3 mR/standard month with a range from 2.2 to 4.7 mR/standard month. The control location showed a quarterly average of 3.3 mR/standard month with a range of 2.4 to 4.1 mR/standard month. Its annual reading was 3.0 mR/standard month. 10 emergency sector TLDs, which are all located onsite had a quarterly average of 4.8 mR/standard month with EPSP-9/10 having the highest quarterly average of 6.6 mR/standard month. Eight other TLDs, designated C-1 thru C-8, which were pre-operational controls, were collected quarterly from four locations. Stations C-3/4 and C-7/8 are designated controls. These had a quarterly average of 3.2, while Station C-1/2 and C-5/6 had a quarterly average of 2.6 mR/standard month with a range of 1.6 to 3.9

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 historical plot in Figure 4-2, indicates gross beta activity levels have remained relatively unchanged. The drop indicated in 2009 may be a function a return to the vendor used from 1988 until 2001. This will be monitored in the future to see if this in fact the case. 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^3 to a high of 0.75 pCi/m^3.

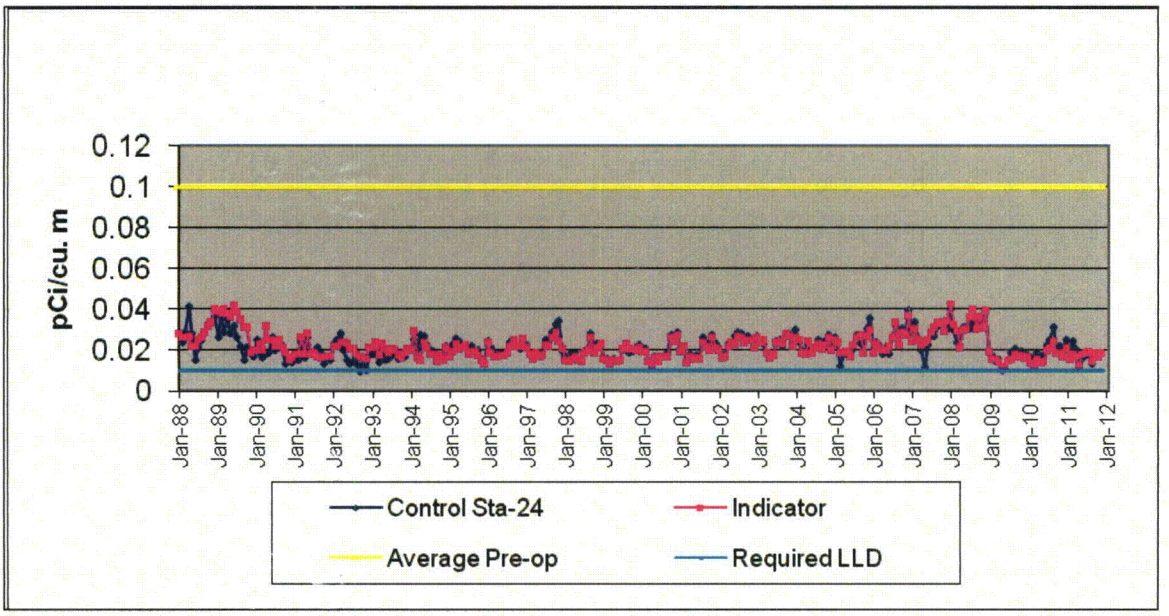

Figure 4-2 Historical Gross Beta in Air Particulates

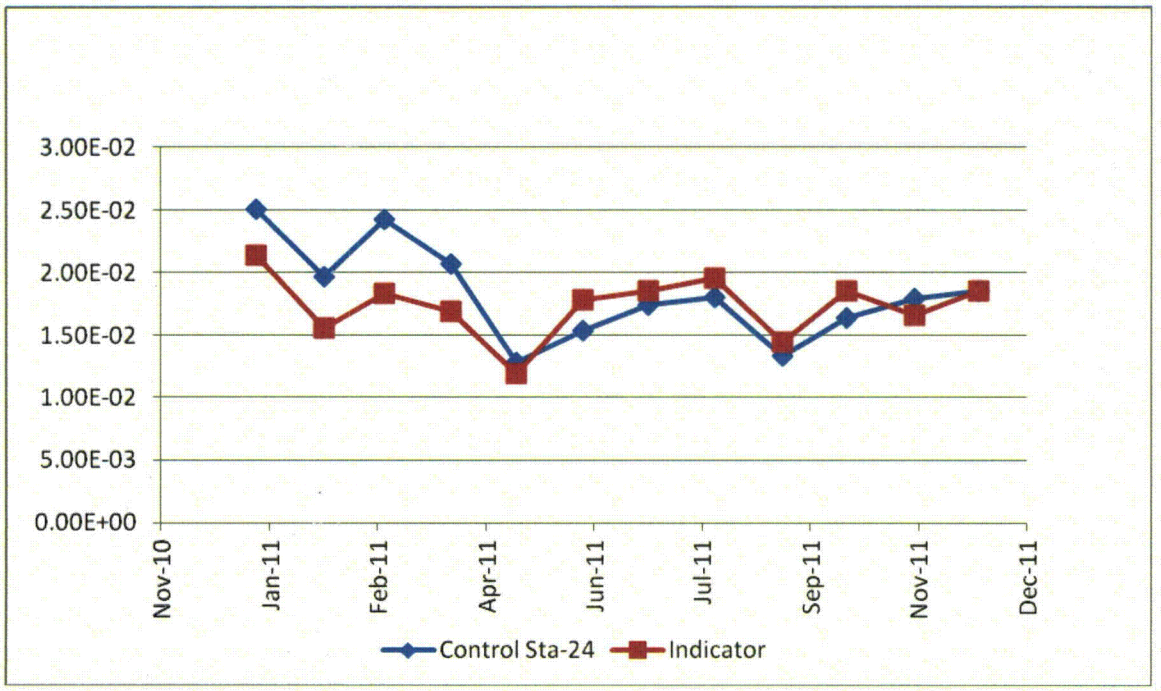

Figure 4-3 2011 Gross Beta in Air Particulates (pCi/m^3)

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. 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 and the effect of the Fukushima Daiichi event. During the last week of march and the first week of April positive results were seen on all samples taken. Each week all results were roughly similar. The indicator locations averaged 89.7 fCi/m^3, while the control location averaged 97.9 fCi/m^3. This indicates the iodine detected was unrelated to plant activities, but instead due to the Fukushima Daiichi event. One sample taken at station 01A the second week of April showed an airborne I-131 concentration of 26.8 fCi/m3. However, this is considered to be a false positive, since it was less than the 2-σ error, though greater than MDA.

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. The results of these analyses indicate the lack of station effects on the

environment.

4.5 Air Particulate Strontium

Strontium-89 and 90 analyses are performed on the second quarter composites of air particulate filters from all monitoring stations. There has been no detection of these fission products at any of the indicator or control stations in recent years.

4.6 Soil

Soil samples, which are collected every three years from twelve stations, were collected in 2010 and thus were not collected in 2011. In 2010 Cs-137 was identified in several samples. For the indicator stations the average was 283 pCi/Kg while for the control station the average was 223 pCi/Kg. During the preoperational phase Cs-137 was routinely detected and was attributed to fallout. Levels during this phase varied by location and date and ranged from 88 to 1390 pCi/Kg. The average was 645 pCi/kg. The 2010 levels also varied significantly by location and date and averaged lower than preoperational levels at 283 pCi/Kg. The decrease in the average and the fact that the averages for the control location and the indicator locations are similar is indicative of fallout. Cs-134 was detected in three samples in 2010, but these were considered false positives since the peak was not identified during the analysis, but the force activity calculation resulted in an activity concentration that exceeded the 2σ value and the MDC.

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. 12 precipitation samples were obtained in 2011. Semi-annual composites are prepared and analyzed for gamma emitting isotopes in accordance with program requirements. Following the detection of I-131 in the airborne radioiodine samples in March the plant requested monthly analyses of precipitation samples for March and April. The samples were positive for I-131 with an average of 1.83 pCi/L and ranging from 1.10 pCi/L to 2.55 pCi/L. To confirm that this was due to the Fukushima Daiichi event, the plant also analyzed samples taken from several employee residences around the station in a variety of distances, up to 30 miles away, and directions, NW, NE, SW, and SSW of the station. These samples were analyzed on-site and are not included as part in this report, but ranged from 13.6 to 437 pCi/L, with the highest values being obtained from a location about 30 miles from the plant in the NW direction. This confirms the positive results seen were due to

the Fukushima Daiichi event. Thus it can be concluded that no positive indications of plant related gamma emitting radioisotopes were observed in 2011. Naturally occurring gamma emitting radioisotopes were detected. 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 cannot be made to the 2011 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 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. The sample taken in April was positive for I-131 at a level of 1.28 pci/L. No other samples indicated positive results. This level is in approximately the same as seen in many locations throughout the United States following the Fukushima Daiichi event. According to the EPA RadNEt Laboratory data milk sample results taken between March 11 and June 30 in the continental US ranged from 0.77 to 8.9 pCi/L. Based on this and the airborne radiodine samples and precipitation sample results, the most likely cause of the positive results is the Fukushima Daiichi event. Results of gamma ray spectroscopy did not detect the presence of any isotopes related to the operation of North Anna. In years past, Cs-137 has been detected sporadically. The occurrences were attributed to residual global fallout from past atmospheric weapons testing. Naturally occurring K-40 was detected in all samples.

Once each quarter a sample from each of the two collection stations is analyzed for strontium-89 and strontium-90. Neither Sr-89 nor Sr-90 was detected. 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 gaseous 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

Food/vegetation samples were collected from five locations and analyzed by gamma spectrometry. The results of the analyses are presented in Table 3-9. Low levels of Cs-137, attributable to fallout, have been seen periodically in vegetation samples. As expected, naturally occurring potassium-40 and, cosmogenic beryllium-7 were detected in most samples, and thorium-228 and other natural products, including Bi-214, were detected in some samples.

4.10 Well Water

Water was sampled quarterly from the onsite 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. The September sample reported Nb-95 results greater than the 2-σ error and MDA. However the peak was identified during the analysis, but the activity listed is the result of a forced activity calculation, not Nb-95 radioactivity. This is considered a false positive, thus no plant related isotopes were 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. Additionally, the second quarter samples are analyzed for strontium-89 and strontium-90 in accordance with program requirements. There has been no detection of these fission products at any of the indicator or control stations in recent years.

No gamma emitting radioisotopes were positively identified in any of the samples. The January sample reported Nb-95 results greater than the 2-σ error and MDA. However the peak was identified during the analysis, but the activity listed is the result of a forced activity calculation, not Nb-95 radioactivity. This is considered a false positive. There was no measured activity of strontium-89 or strontium-90. Tritium was measured in all four samples with an average annual concentration of 3590 pCi/liter and a range of 2790 to 4480 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.

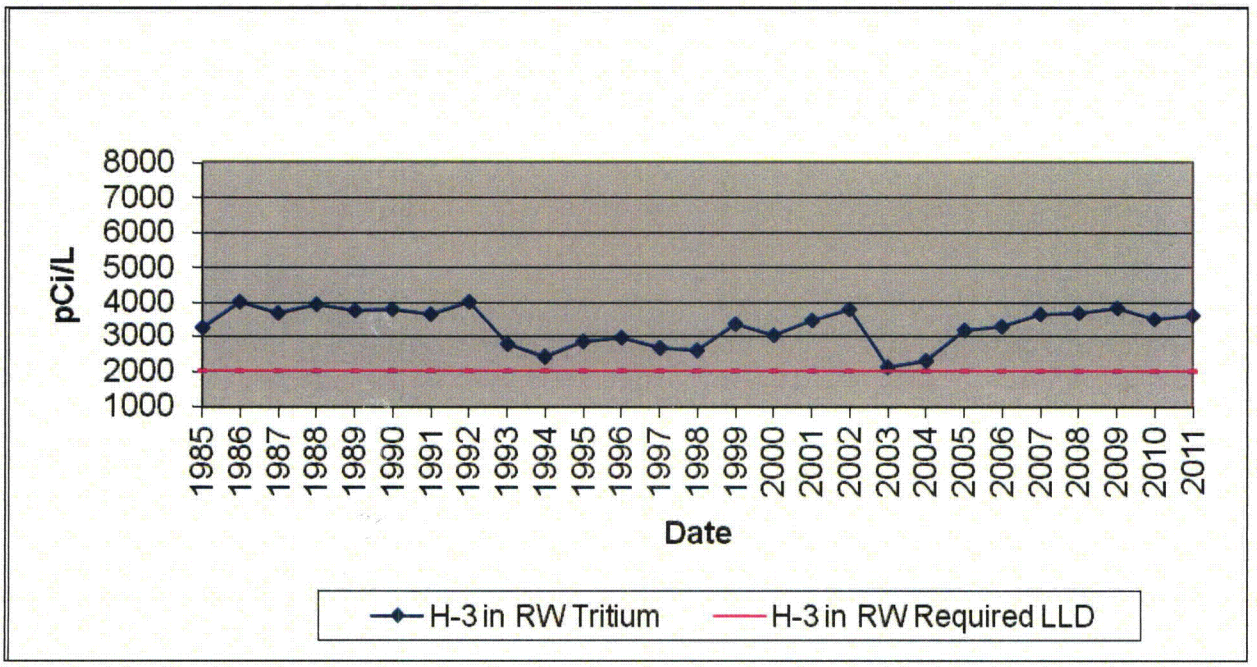

Figure 4-4Tritium in River water

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. Additionally, the second quarter samples are analyzed for strontium-89 and strontium-90. There has been no positive indication of these fission products at any of the indicator or control stations in recent years. The results are presented in Table 3-12.

No non-naturally occurring gamma emitting radioisotopes, including iodine were detected in any of the other samples. No tritium was detected at the control location. The average level of tritium activity at the indicator station was 3350 pCi/liter with a range of 2270 to 3930 pCi/liter. Levels of tritium have increased 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.

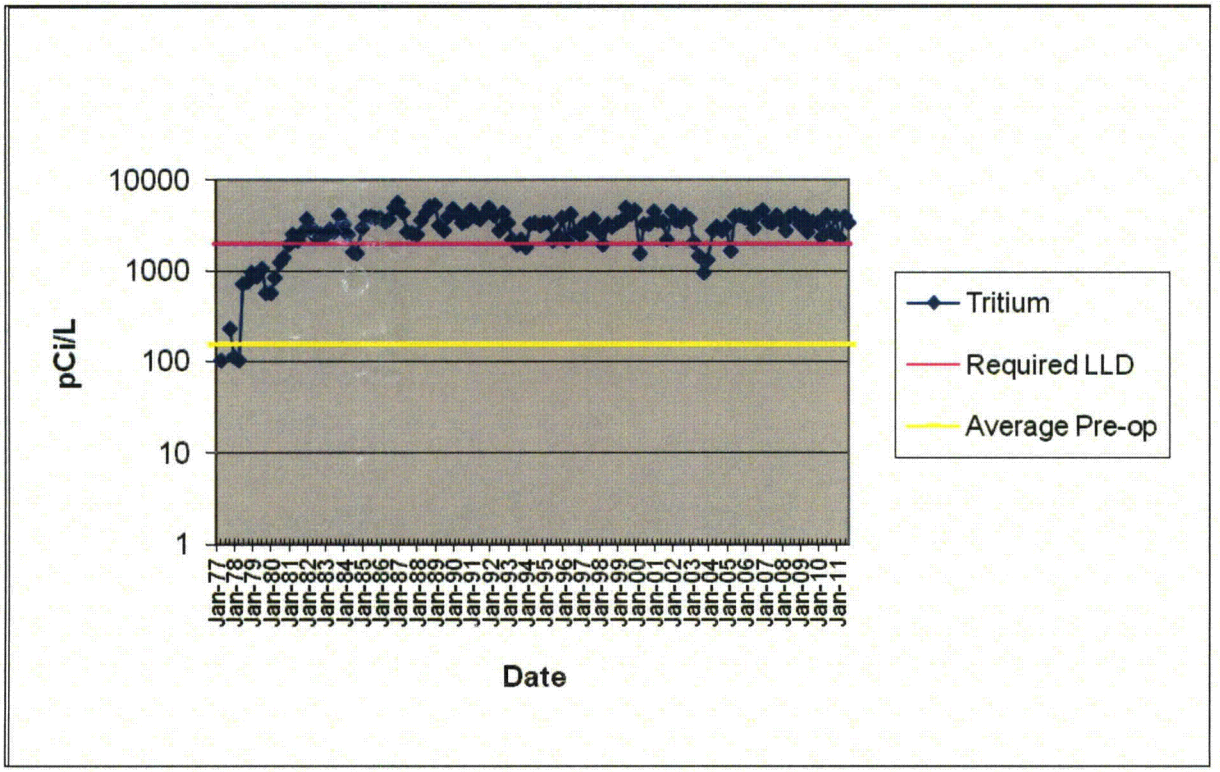

Figure 4.5Tritium in Surface Water

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.

No plant related isotopes were detected in 2011. 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 also analyzed by gamma ray spectroscopy.

Neither Strontium-89 nor Strontium-90 was detected any samples of aquatic sediment/silt in 2011. Strontium-90 has been detected occasionally in the past at

both the indicator and control locations and is attributable to fallout from past bomb tests. A number of naturally occurring radioisotopes were detected in these samples at background levels.

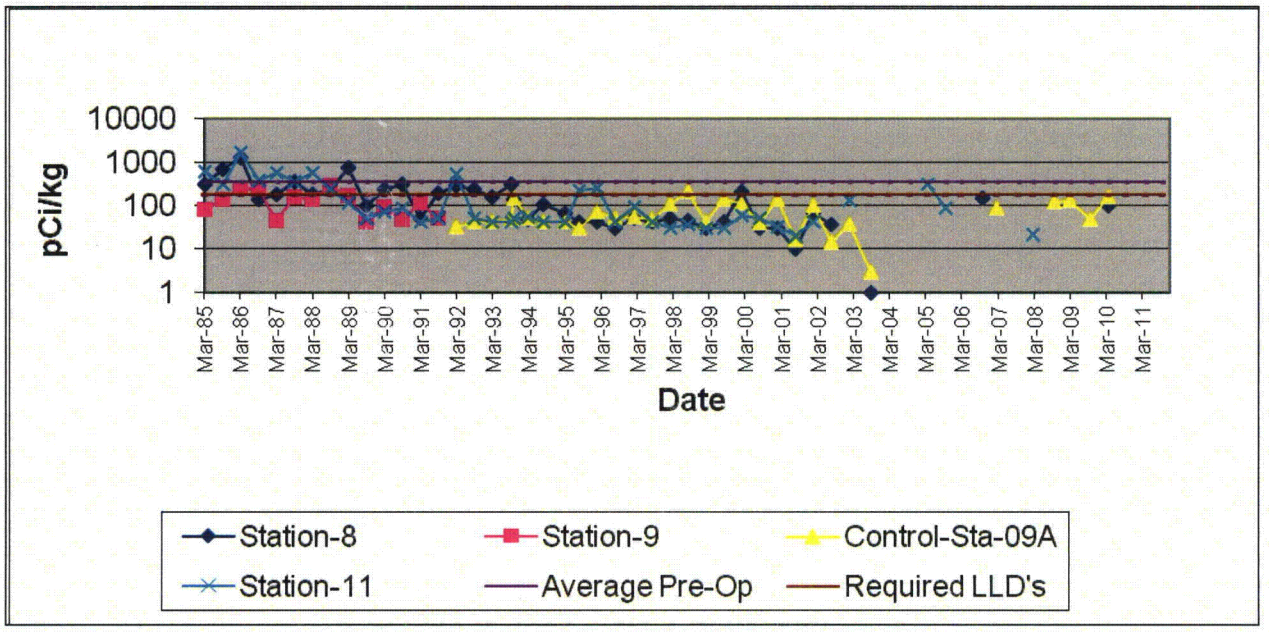

Figure 4-6 Cs-137 in Sediment/Silt

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. Samples of shoreline soil were collected in April and October from indicator station 08. The samples were analyzed by gamma ray spectrometry. The October 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. No plant related isotopes were detected in the two samples analyzed. Strontium-90 is often 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 2011 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. Naturally occurring K-40 was detected in all samples. No plant related isotopes were detected. Cs-137 was measured in pre-operational environmental fish samples.

5. PROGRAM EXCEPTIONS

REMP Exceptions for Scheduled Sampling and Analysis during 2011 – North Anna

Location	Description	Date of Sampling	Reason(s) for Loss/Exception
14A,15,16,23, 26	Vegetation	01/11/11	Seasonal unavailability
14A,15,16,23, 26	Vegetation	02/08/11	Seasonal unavailability
01	AP/Char	03/08/11	Patch was not discolored, hwoevr air sampler indicated normal sample volume
14A,15,16,23, 26	Vegetation	03/08/11	Seasonal unavailability
14A,15,16,23, 26	Vegetation	04/12/11	Seasonal unavailability
01A	Well Water	01/25-06/29/11	Gamma Analysis was run on March and April monthly samples during Fukushima Daiichi event. These were not included in semiannual composite.
14B,15,16,23, 26	Vegetation	12/14/11	Seasonal unavailability

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," 27th 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 2011

LAND USE CENSUS

North Anna Power Station
North Anna County, Virginia

January 1 to December 31, 2011

Direction	Distance *(miles)*					
	Nearest Site Boundary	Nearest Resident	Nearest Garden (> 50m^2)	Nearest Meat Animal	Nearest Milch Cow	Nearest Milch Goat
N	0.9	1.3	1.7	2.9	NONE	NONE
NNE	0.9	0.9	1.2	3.1	NONE	NONE
NE	0.8	0.9	1.6	1.6	NONE	NONE
ENE	0.8	2.2	2.4	2.7	NONE	NONE
E	0.8	1.3	2.0	3.5	NONE	NONE
ESE	0.9	1.7	1.7	4.9	NONE	NONE
SE	0.9	1.4	1.5	1.4	NONE	NONE
SSE	0.9	1.0	1.0	1.6	NONE	NONE
S	0.9	1.0	1.0	2.0	NONE	NONE
SSW	1	1.3	3.1	2.0	NONE	NONE
SW	1.1	1.7	2.6	NONE	NONE	NONE
WSW	1.1	1.6	2.4	1.6	NONE	NONE
W	1.1	1.5	1.9	4.4	NONE	NONE
WNW	1	1.1	2.6	5.0	NONE	NONE
NW	1	1.0	2.0	NONE	NONE	NONE
NNW	0.9	1.0	1.2	2.3	NONE	NONE

2010 to 2011 Land Use Census Changes			
Nearest	**Direction**	**2010 Distance**	**2011 Distance**
Site Boundary	NONE		
Resident	NONE		
Garden	N	1.9	1.7
	NNE	1.7	1.2
	SW	3.0	2.6
	W	1.5	1.9
	NNW	2.2	1.2
	NW	NONE	2.0
Meat Animal	NNW	NONE	2.3
Milch Cow	NONE		
Milch Goat	NONE		

APPENDIX B: SUMMARY OF INTERLABORATORY COMPARISONS

YEAR 2011

INTRODUCTION

This appendix covers the Intercomparison Program of the Teledyne Brown Engineering – Environmental Services as required by technical specifications for the Radiological Environmental Monitoring Program (REMP). TBE uses QA/QC samples provided by Eckert & Zeigler Analytics, Inc, DOE's Mixed Analyte Performance Evaluation Program (MAPEP) and Environmental Resource Associates, (ERA) to monitor the quality of analytical processing associated with the REMP. The suite of samples is designed to be comparable with the pre-1996 US EPA Interlaboratory Cross-Check Program in terms of sample number, matrices, and nuclides. This includes:

E & Z Analytics:

- Milk for gamma emitters, Iodine-131, Fe-55, Sr-89 and Sr-90 analyses once per quarter.
- Air particulate for gamma emitters once per quarter
- Charcoal for I-131 once per quarter
-

ERA

- Water for tritium, gamma, Iodine-131, Sr-89, Sr-90, gross alpha and beta during the 2nd and 4th quarters.
- Water for natural uranium during the 2nd quarter

DOE

- Water and soil for gamma, Iodine-131, U-233/234, U-238, transuranics, tritium, Fe-55, Ni-63, Sr-90 and Tc-99 analyses during the 1st quarter.
- Water for gross alpha and beta during the 1st and 3rd quarters.
- Air particulates and vegetation for gamma, Iodine-131, U-233/234, U-238, transuranics, Sr-90 analyses during the 1st and 3rd quarters.
- Air filter for gross alpha and beta analyses during the 1st and 3rd quarters.

RESULTS

NCR 11-01 Failed MAPEP Series 23 water Pu-238 and Pu-239/240. At the time of the 2010 report this item was still under investigation, and the results of the investigation and corrective action were to be included in this year's report. The samples were rerun, confirming the original results. The samples were then rerun using a pyrosulfate fusion prep method. The fusion prep method failed due to zero (0%) chemical recovery. Due to limited sample volume, only one sample (L43697-1) was aliquoted for microwave digestion prep. The results fell within the acceptance criteria. Environmental water samples will use microwave digestion as

the prep method. Procedure TBE-2001, Alpha Isotopic and Pu-241, has been revised to include the following statement:

> *For Pu-238 and Pu-239/240 in environmental water samples, prepare samples by microwave digestion. Evaporate the required sample volume down to approximately 10-15 m. Do not take to dryness. Transfer to a digestion vessel. Then microwave digest as per procedure TBE-3010, Microwave Digestion System Use and Maintenance*

Interlaboratory comparison program results are evaluated using TBE#'s criterion. Any sample analysis result that does not pass the criteria is investigated by TBE. For the primary laboratory, 14 out of 18 analytes met the specified acceptance criteria. Four analytes (one sample each of Cr-51, Sr-89 and Sr-90 and two Gross Alpha samples) did not meet the specified acceptance criteria. Nonconformance Reports were generated and corrective actions taken as a result of this program.

- NCR-11-08: ERA Rad85 Gross alpha failed high. Results of investigation showed evaporated samples exceeded EPA solids requirement of 100 mg and beyond the range of the efficiency curve. Corrective action was to coach the technician and to annotate the template with the following statement:

  > *"Solids on the planchet should be less than 0.100 grams for gross alpha."*

- NCR 11-11: DOE's MAPEP Gross Alpha AP failed high. Spiked side of AP was incorrectly placed facing down in the planchet. Acceptable results were obtained when the AP was placed in the planchet facing upward and recounted. Technician was coached to place a small dot on filter to indicate which side faces upwards. Sr-90 in soil, air particulate and vegetation were non-reports that were evaluated as failed. MAPEP evaluated the non-reports as failed due to not reporting a previously reported analyte. No further aqction necessary.
- NCR 11-13: Cr-51 failed high on first quarter E &Z Analytics. All results were biased slightly high, ~100 – 115%. Correcitive action was to review 2nd quarter results. These results were acceptable and showed no bias.
- NCR 11-16 In-house ERA Crosscheck results for Sr-89 failed high. The result was within the acceptance criteria for Teledyne Brown Engineeringof ± 20%. No corrective action necessary

A summary of TBE's results is provided in the tables on the following pages for the required sample matrix types and isotopic distribution. Delineated in the table for

each of the media/analysis combinations, are: the specific radionuclide; its result; analytical date; the known values supplied by the providers; pass or fail criteria.

TABLE F-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2011	E7460-396	Milk	Sr-89	pCi/L	98.8	97.4	1.01	A
			Sr-90	pCi/L	15.2	15.8	0.96	A
	E7461-396	Milk	I-131	pCi/L	92.9	96.9	0.96	A
			Ce-141	pCi/L	not provided by Analytics for this study			
			Cr-51	pCi/L	398	298	1.34	N (1)
			Cs-134	pCi/L	130	130	1.00	A
			Cs-137	pCi/L	232	205	1.13	A
			Co-58	pCi/L	121	113	1.07	A
			Mn-54	pCi/L	289	266	1.09	A
			Fe-59	pCi/L	201	175	1.15	A
			Zn-65	pCi/L	287	261	1.10	A
			Co-60	pCi/L	186	172	1.08	A
	E7463-396	AP	Ce-141	pCi	not provided by Analytics for this study			
			Cr-51	pCi	243	215	1.13	A
			Cs-134	pCi	85.0	94.2	0.90	A
			Cs-137	pCi	168	148	1.14	A
			Co-58	pCi	89.2	81.8	1.09	A
			Mn-54	pCi	171	192	0.89	A
			Fe-59	pCi	129	126	1.02	A
			Zn-65	pCi	159	189	0.84	A
			Co-60	pCi	132	124	1.06	A
	E7462-396	Charcoal	I-131	pCi	96.5	96.3	1.00	A
June 2011	E7851-396	Milk	Sr-89	pCi/L	96.7	103	0.94	A
			Sr-90	pCi/L	13.8	15.6	0.88	A
	E7852-396	Milk	I-131	pCi/L	110	103.0	1.07	A
			Ce-141	pCi/L	68.1	79.9	0.85	A
			Cr-51	pCi/L	186	206	0.90	A
			Cs-134	pCi/L	164	190	0.86	A
			Cs-137	pCi/L	140	138	1.01	A
			Co-58	pCi/L	141	152	0.93	A
			Mn-54	pCi/L	136	138	0.99	A
			Fe-59	pCi/L	128	123	1.04	A
			Zn-65	pCi/L	263	261	1.01	A
			Co-60	pCi/L	189	195	0.97	A

TABLE F-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2011	E7854-396	AP	Ce-141	pCi	49.9	42.9	1.16	A
			Cr-51	pCi	95.6	110	0.87	A
			Cs-134	pCi	104	102	1.02	A
			Cs-137	pCi	83.8	74.0	1.13	A
			Co-58	pCi	90.7	81.3	1.12	A
			Mn-54	pCi	74.5	73.9	1.01	A
			Fe-59	pCi	62.0	66.1	0.94	A
			Zn-65	pCi	140	140	1.00	A
			Co-60	pCi	119	104	1.14	A
	E7853-396	Charcoal	I-131	pCi	76.2	86.1	0.89	A
September 2011	E8070-396	Milk	Sr-89	pCi/L	102	90.8	1.12	A
			Sr-90	pCi/L	13.2	14.7	0.90	A
	E8071-396	Milk	I-131	pCi/L	74.2	89.2	0.83	A
			Ce-141	pCi/L	66.9	66.7	1.00	A
			Cr-51	pCi/L	249	226	1.10	A
			Cs-134	pCi/L	116	128	0.91	A
			Cs-137	pCi/L	106	114	0.93	A
			Co-58	pCi/L	95.4	97.5	0.98	A
			Mn-54	pCi/L	147	151	0.97	A
			Fe-59	pCi/L	53.1	54.8	0.97	A
			Zn-65	pCi/L	175	180	0.97	A
			Co-60	pCi/L	150	157	0.96	A
	E8073-396	AP	Ce-141	pCi	66.6	67.5	0.99	A
			Cr-51	pCi	263	229	1.15	A
			Cs-134	pCi	139	130	1.07	A
			Cs-137	pCi	110	115	0.96	A
			Co-58	pCi	108	98.6	1.10	A
			Mn-54	pCi	152	153	0.99	A
			Fe-59	pCi	57.5	55.5	1.04	A
			Zn-65	pCi	190	183	1.04	A
			Co-60	pCi	156	159	0.98	A
	E8072-396	Charcoal	I-131	pCi	77.6	80.6	0.96	A

TABLE F-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December, 2011	E8230-396	Milk	Sr-89	pCi/L	93.3	93.1	1.00	A
			Sr-90	pCi/L	12.7	15.4	0.82	A
		Milk	I-131	pCi/L	82.5	90.2	0.91	A
			Ce-141	pCi/L	not provided by Analytics for this study			
			Cr-51	pCi/L	465	566	0.82	A
			Cs-134	pCi/L	142	171	0.83	A
			Cs-137	pCi/L	185	210	0.88	A
			Co-58	pCi/L	177	221	0.80	A
			Mn-54	pCi/L	208	241	0.86	A
			Fe-59	pCi/L	164	183	0.90	A
			Zn-65	pCi/L	259	291	0.89	A
			Co-60	pCi/L	224	270	0.83	A
	E8233-396	AP	Ce-141	pCi	not provided by Analytics for this study			
			Cr-51	pCi	344	368	0.93	A
			Cs-134	pCi	105	111	0.95	A
			Cs-137	pCi	129	137	0.94	A
			Co-58	pCi	145	144	1.01	A
			Mn-54	pCi	137	157	0.87	A
			Fe-59	pCi	119	119	1.00	A
			Zn-65	pCi	145	190	0.76	W
			Co-60	pCi	168	176	0.95	A
December 2011	E8232-396	Charcoal	I-131	pCi	100	89.5	1.12	A

(1) Sample appears to be biased high. Corrective Action evaluated after the 2nd Quarter Analytics PE sample; no action required. NCR 11-13

(a) Teledyne Brown Engineering reported result.

(b) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) Ratio of Teledyne Brown Engineering to Analytics results.

(d) Analytics evaluation based on TBE internal QC limits: A= Acceptable. Reported result falls within ratio limits of 0.80-1.20. W-Acceptable with warning. Reported result falls within 0.70-0.80 or 1.20-1.30. N = Not Acceptable. Reported result falls outside the ratio limits of < 0.70 and > 1.30.

TABLE F-2 **ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM**
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Control Limits	Evaluation (c)
May 2011	RAD-85	Water	Sr-89	pCi/L	59.8	63.2	51.1 - 71.2	A
			Sr-90	pCi/L	42.5	42.5	31.3 - 48.8	A
			Ba-133	pCi/L	73.3	75.3	63.0 - 82.8	A
			Cs-134	pCi/L	64.9	72.9	59.5 - 80.2	A
			Cs-137	pCi/L	74.6	77.0	69.3 - 87.4	A
			Co-60	pCi/L	87.8	88.8	79.9 - 100	A
			Zn-65	pCi/L	103	98.9	89.0 - 118	A
			Gr-A	pCi/L	64.1	50.1	26.1 - 62.9	N (1)
			Gr-B	pCi/L	51.8	49.8	33.8 - 56.9	A
			I-131	pCi/L	27.4	27.5	22.9 - 32.3	A
			U-Nat	pCi/L	38.5	39.8	32.2 - 44.4	A
			H-3	pCi/L	10057	10200	8870 - 11200	A
	MRAD-14	Filter	Gr-A	pCi/filter	79.7	74.3	38.5 - 112	A
November 2011	RAD-87	Water	Sr-89	pCi/L	81.0	69.7	56.9 - 77.9	N (2)
			Sr-90	pCi/L	35.5	41.4	30.2 - 47.2	A
			Ba-133	pCi/L	90.7	96.9	81.8 - 106	A
			Cs-134	pCi/L	36.6	33.4	26.3 - 36.7	A
			Cs-137	pCi/L	44.7	44.3	39.4 - 51.7	A
			Co-60	pCi/L	118.7	119	107 - 133	A
			Zn-65	pCi/L	80.2	76.8	68.9 - 92.5	A
			Gr-A	pCi/L	34.2	53.2	27.8 - 66.6	A
			Gr-B	pCi/L	39.3	45.9	30.9 - 53.1	A
			I-131	pCi/L	22.9	27.5	22.9 - 32.3	A
			U-Nat	pCi/L	46.8	48.6	39.4 - 54.0	A
			H-3	pCi/L	15733	17400	15200 - 19100	A
	MRAD-15	Filter	Gr-A	pCi/filter	44.6	58.4	30.3 - 87.8	A

(1) The solids on the planchet exceeded 100 mg, which was beyond the range of the efficiency curve. NCR 11-08

(2) Sr-89 TBE to known ratio of 1.16 fell within acceptable range of ± 20%. No action required. NCR 11-16

(a) Teledyne Brown Engineering reported result.

(b) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. NA=not acceptable. Reported result falls outside of the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.

TABLE F-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2011	11-MaW24	Water	Cs-134	Bq/L	19.1	21.5	15.1 - 28.0	A
			Cs-137	Bq/L	29.0	29.4	20.6 - 38.2	A
			Co-57	Bq/L	0.139		(1)	A
			Co-60	Bq/L	23.9	24.6	17.2 - 32.0	A
			H-3	Bq/L	265	243	170 - 316	A
			Mn-54	Bq/L	31.8	31.6	22.1 - 41.1	A
			K-40	Bq/L	94.8	91	64 - 118	A
			Sr-90	Bq/L	9.64	8.72	6.10 - 11.34	A
			Zn-65	Bq/L	-0.142		(1)	A
	11-GrW24	Water	Gr-A	Bq/L	0.767	1.136	0.341 - 1.931	A
			Gr-B	Bq/L	3.43	2.96	1.48 - 4.44	A
	11-MaS24	Soil	Cs-134	Bq/kg	612	680	476 - 884	A
			Cs-137	Bq/kg	772	758	531 - 985	A
			Co-57	Bq/kg	910	927	649 - 1205	A
			Co-60	Bq/kg	500	482	337 - 627	A
			Mn-54	Bq/kg	0.607		(1)	A
			K-40	Bq/kg	569	540	378 - 702	A
			Sr-90	Bq/kg	NR	160	112 - 208	N (2)
			Zn-65	Bq/kg	1497	1359	951 - 1767	A
	11-RdF24	AP	Cs-134	Bq/sample	3.26	3.49	2.44 - 4.54	A
			Cs-137	Bq/sample	2.36	2.28	1.60 - 2.96	A
			Co-57	Bq/sample	3.30	3.33	2.33 - 4.33	A
			Co-60	Bq/sample	0.0765		(1)	A
			Mn-54	Bq/sample	2.84	2.64	1.85 - 3.43	A
			Sr-90	Bq/sample	NR	1.36	0.95 - 1.77	N (2)
			Zn-65	Bq/sample	3.30	3.18	2.23 - 4.13	A
	11-GrF24	AP	Gr-A	Bq/sample	0.101	0.659	0.198 - 1.120	N (3)
			Gr-B	Bq/sample	1.23	1.323	0.662 - 1.985	A
	11-RdV24	Vegetation	Cs-134	Bq/sample	4.97	5.50	3.85 - 7.15	A
			Cs-137	Bq/sample	0.0356		(1)	A
			Co-57	Bq/sample	10.8	9.94	6.96 - 12.92	A
			Co-60	Bq/sample	4.89	4.91	3.44 - 6.38	A
			Mn-54	Bq/sample	6.42	6.40	4.48 - 8.32	A
			Sr-90	Bq/sample	NR	2.46	1.72 - 3.20	N (2)
			Zn-65	Bq/sample	3.07	2.99	2.09 - 3.89	A

TABLE F-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2011

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2011	11-MaW25	Water	Cs-134	Bq/L	16.0	19.1	13.4 - 24.8	A
			Cs-137	Bq/L	0.0043		(1)	A
			Co-57	Bq/L	33.1	36.6	25.6 - 47.6	A
			Co-60	Bq/L	26.9	29.3	20.5 - 38.1	A
			H-3	Bq/L	1011	1014	710 - 1318	A
			Mn-54	Bq/L	23.2	25.0	17.5 - 32.5	A
			K-40	Bq/L	147	156	109 - 203	A
			Sr-90	Bq/L	15.8	14.2	9.9 - 18.5	A
			Zn-65	Bq/L	27.3	28.5	20.0 - 37.1	A
September 2011	11-GrW25	Water	Gr-A	Bq/L	0.894	0.866	0.260 - 1.472	A
			Gr-B	Bq/L	5.87	4.81	2.41 - 7.22	A
	11-MaS25	Soil	Cs-134	Bq/kg	-0.213		(1)	A
			Cs-137	Bq/kg	1110	979	685 - 1273	A
			Co-57	Bq/kg	1290	1180	826 - 1534	A
			Co-60	Bq/kg	731	644	451 - 837	A
			Mn-54	Bq/kg	987	848	594 - 1102	A
			K-40	Bq/kg	753	625	438 - 813	W
			Sr-90	Bq/kg	276	320	224 - 416	A
			Zn-65	Bq/kg	1870	1560	1092 - 2028	A
September 2011	11-RdF25	AP	Cs-134	Bq/sample	-0.043		(1)	A
			Cs-137	Bq/sample	3.09	2.60	1.82 - 3.38	A
			Co-57	Bq/sample	5.36	5.09	3.56 - 6.62	A
			Co-60	Bq/sample	3.41	3.20	2.24 - 4.16	A
			Mn-54	Bq/sample	0.067		(1)	A
			Sr-90	Bq/sample	1.84	1.67	1.17 - 2.17	A
			Zn-65	Bq/sample	5.17	4.11	2.88 - 5.34	W
	11-GrF25	AP	Gr-A	Bq/sample	0.0058		(1)	A
			Gr-B	Bq/sample	-0.01		(1)	A
	11-RdV25	Vegetation	Cs-134	Bq/sample	0.0081		(1)	A
			Cs-137	Bq/sample	4.94	4.71	3.30 - 6.12	A
			Co-57	Bq/sample	0.0639		(1)	A
			Co-60	Bq/sample	3.36	3.38	2.37 - 4.39	A
			Mn-54	Bq/sample	5.89	5.71	4.00 - 7.42	A
			Sr-90	Bq/sample	1.31	1.26	0.88 - 1.64	A
			Zn-65	Bq/sample	6.54	6.39	4.47 - 8.31	A

Footnotes on next page

(1) False positive test.

(2) Evaluated as failed due to not reporting a previously reported analyte. NCR 11-11

(3) The filter for Gross Alpha was counted on the wrong side. Recounted on the correct side resulted in acceptable results. NCR 11-11

(a) Teledyne Brown Engineering reported result.

(b) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) DOE/MAPEP evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.