VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 27, 2017

United States Nuclear Regulatory Commission
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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 5.5.2, enclosed is the 2016 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 Mr. Donald R. Taylor at (540) 894-2100.

Very truly yours,

N. Larry Lane
Site Vice President

Enclosure

Commitments made in this letter: None

IE25
NMSS26
NRR
NMSS

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Director, Division of Spent Fuel Management
Office of Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

NRC Senior Resident Inspector
North Anna Power Station

Dominion

North Anna Power Station

Radiological Environmental Monitoring Program

January 1, 2016 to December 31, 2016

Prepared by

Dominion, North Anna Power Station

Annual Radiological Environmental Operating Report

North Anna Power Station

January 1, 2016 to December 31, 2016

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1. EXECUTIVE SUMMARY

This document is a detailed report of the 2016 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 5.5.2. Radioactivity levels from January 1 through December 31, 2016, 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 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 (NAPS) 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 (NAPS) 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 (NAPS), 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.

Mirion Technologies 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 2016 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 2016 was 4270 pCi/liter. No other plant related isotopes were reported in any 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 3930 pCi/liter. No plant related isotopes were detected in quarterly precipitation samples. 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 the indicator or control locations in shoreline soil. No plant related isotope was 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 collected in 2016. Cs-137 was identified in 6 of 11 indicator samples. For the indicator stations the average was 362 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 current levels are also varied significantly by location and date. 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. No other plant related isotope was identified in soil samples during 2016.

The terrestrial exposure pathway includes milk and food/vegetation products. No plant related radioisotope was 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 isotope was detected in any vegetation sample. 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 2016, 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 2016 was 0.77 millirem. For reference, this dose may be compared to the 620 millirem average annual exposure to every person in the United States from natural and man-made sources. Natural background sources in the environment provide approximately 50% of radiation exposure to man, while medical uses provide approximately 48%. By comparison, 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 2016 North Anna Power Station operational Radiological Environmental Monitoring Program (REMP).

The North Anna Power Station of Virginia Electric and Power Company (Dominion) 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 has a gross electrical output of 1029 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 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 the North Anna Power Station Offsite Dose Calculation Manual (ODCM).

North Anna Power Station is responsible for collecting the various indicator and control environmental samples. Mirion Technologies is utilized for processing the TLDs. Teledyne Brown Engineering Environmental Services (TBE) is utilized 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. The pre-operational data is compared with data collected during the operational phase to assist in evaluating any radiological impact of station operation.

Occasionally samples of environmental 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 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 2016 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 2016 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 2016.

TABLE 2-1

North Anna Power Station – 2016

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	
	NAPS Access Rd.	S-17/49	0.36	S	173°	Quarterly	

TABLE 2-1

North Anna Power Station – 2016

RADIOLOGICAL SAMPLING STATION

DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
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	
	Bumpass, VA	07	7.30	SSE	167°	Weekly	

TABLE 2-1

North Anna Power Station – 2016

RADIOLOGICAL SAMPLING STATION

DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
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	
	Mineral, VA	03	7.10	WSW	243°	Once/3 years	
	Wares Crossroads	04	5.10	WNW	287°	Once/3 years	

TABLE 2-1

North Anna Power Station – 2016

RADIOLOGICAL SAMPLING STATION

DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance	Direction	Degrees	Collection Frequency	Remarks
Soil	Route 752	05	4.20	NNE	20°	Once/3 years	
	Sturgeon's Creek Marina	05A	2.04	N	11°	Once/3 years	
	Levy, VA	06	4.70	ESE	115°	Once/3 years	
	Bumpass, VA	07	7.30	SSE	167°	Once/3 years	
	End of Route 685	21	1.00	WNW	301°	Once/3 years	
	Route 700 (Exclusion Boundary)	22	1.00	WSW	242°	Once/3 years	
	"Aspen Hills"	23	0.93	SSE	158°	Once/3 years	
	Orange, VA	24	22.00	NW	325°	Once/3 years	Control
Milk	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 (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	

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 Composite	Sr-89	(b)	pCi/m^3
		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 Composite	Sr-89	(b)	pCi/L
		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	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	7/8	C-7/8
1A	01A,SE-13/45	1/33	N-1/33
2 (a)	02,SSW-20/52	31/63	NNW-31/63
3 (a)	03,C-5/6	29/61	NW-29/61
4 (a)	04	3/35	NNE-3/35
5 (a)	05	7/39	ENE-7/39
5A (a)	05A,N-2/34	9/41	E-9/41
6 (a)	06,ESE-12/44	11/43	ESE-11/43
7 (a)	07, C-1/2	17/49	S-17/49
8	08-Water, Fish, Sediment,	19/51	SSW-19/51
	Shoreline Soil	21/53	SW-21/53
9A	09A-Water sample, Sediment	23/55	WSW-23/55
11	11-River Water, Sediment		
12A	12A-Milk	25/57	W-25/57
14B	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,Vegetation	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

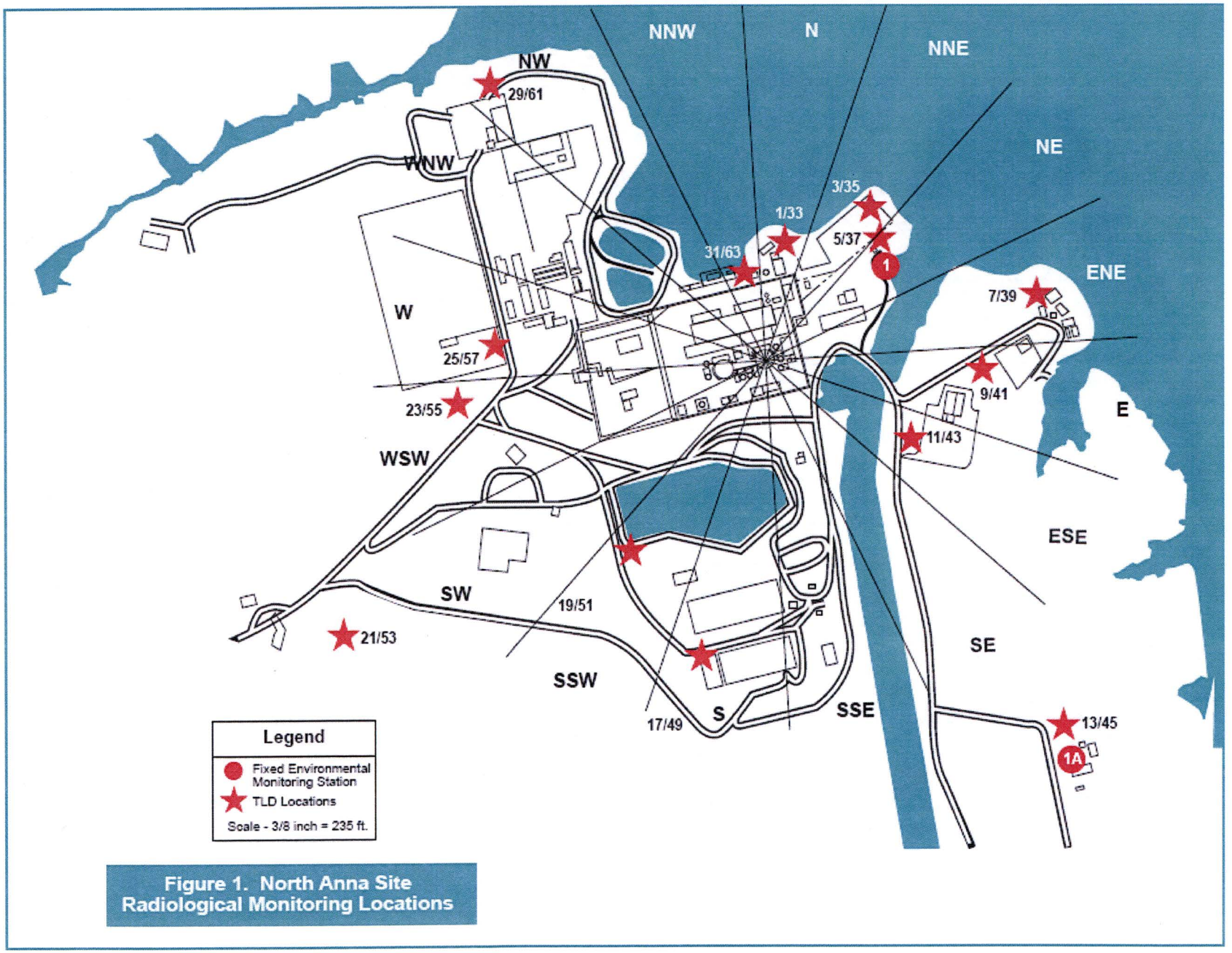
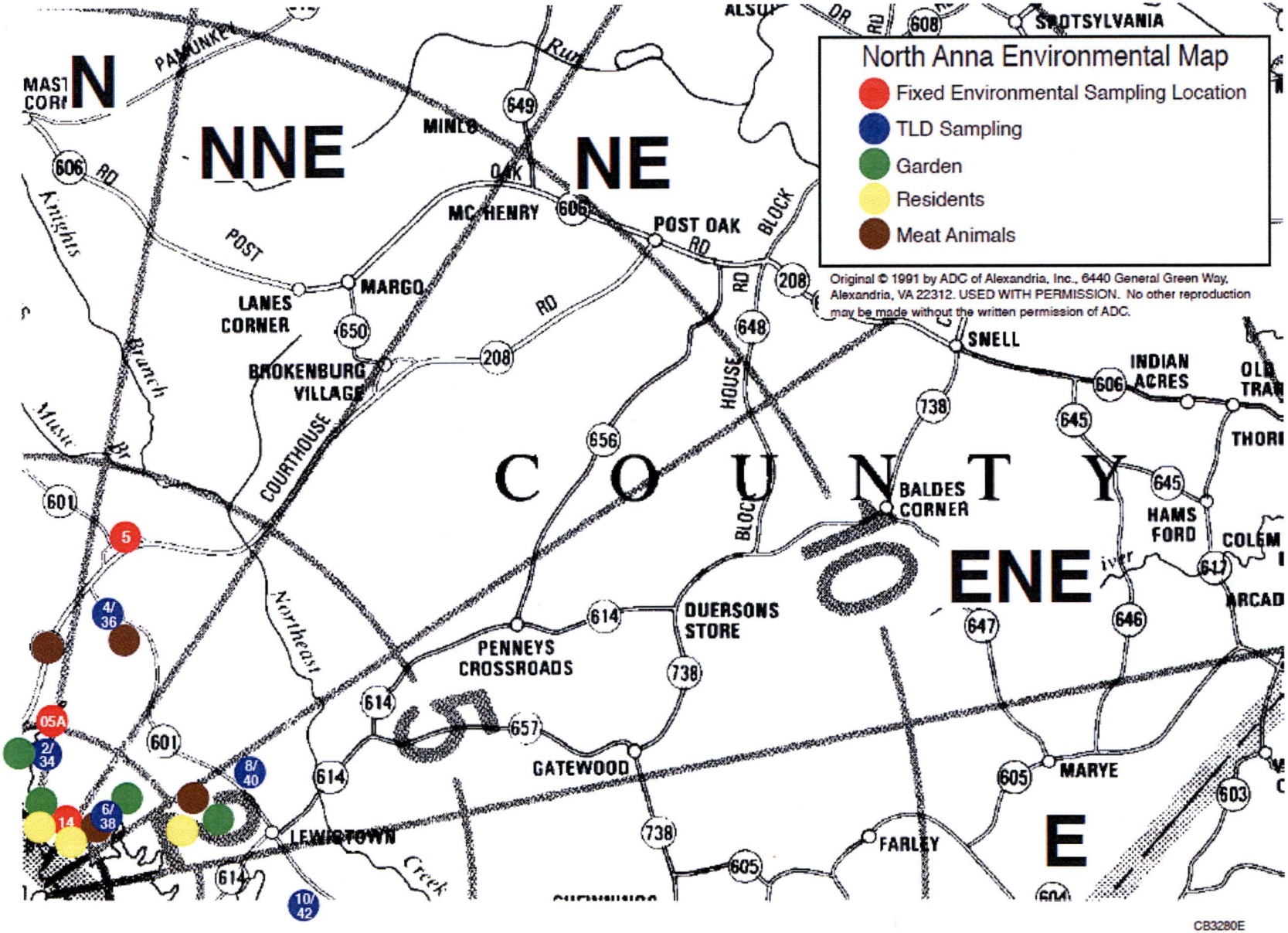
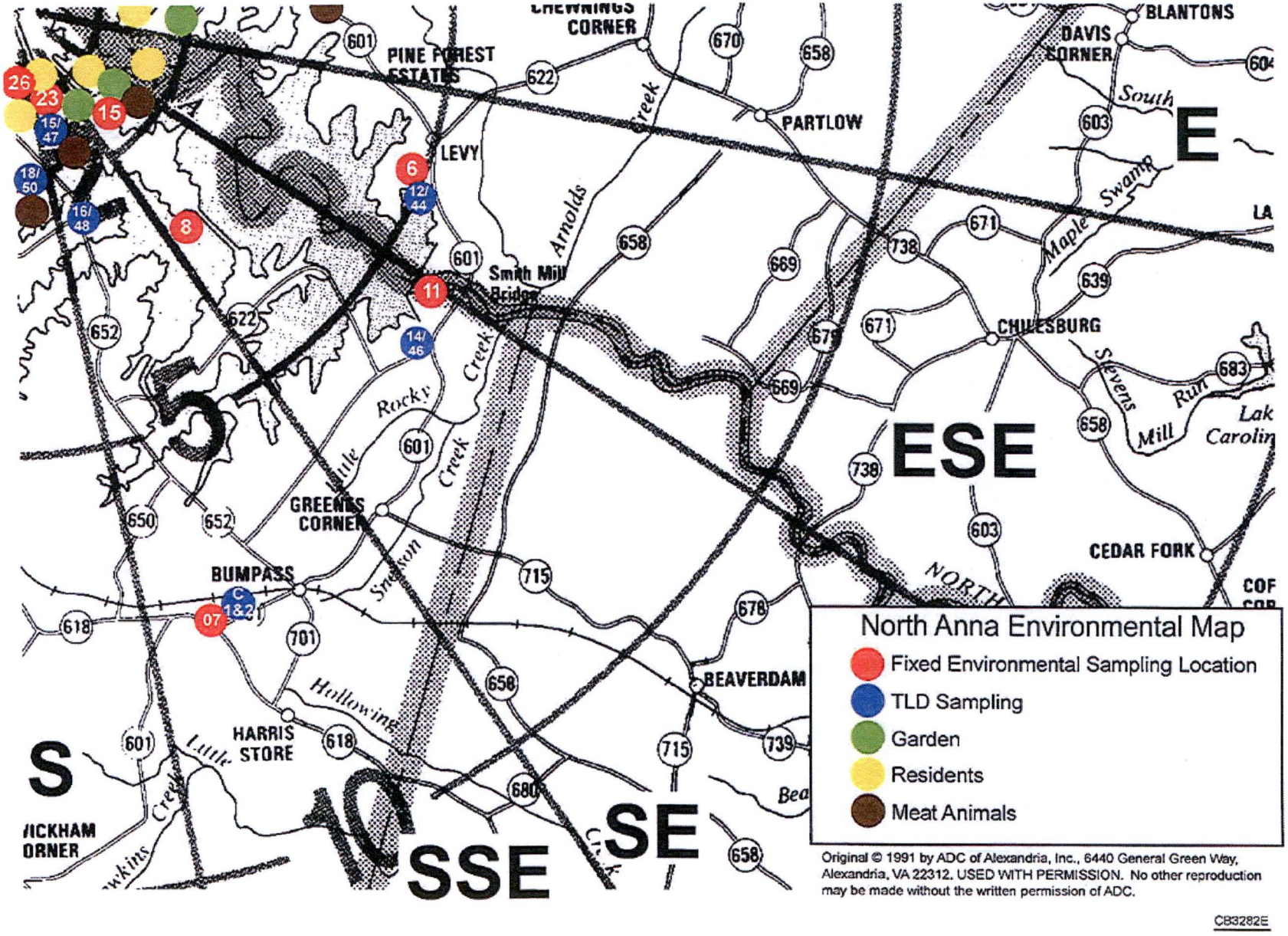
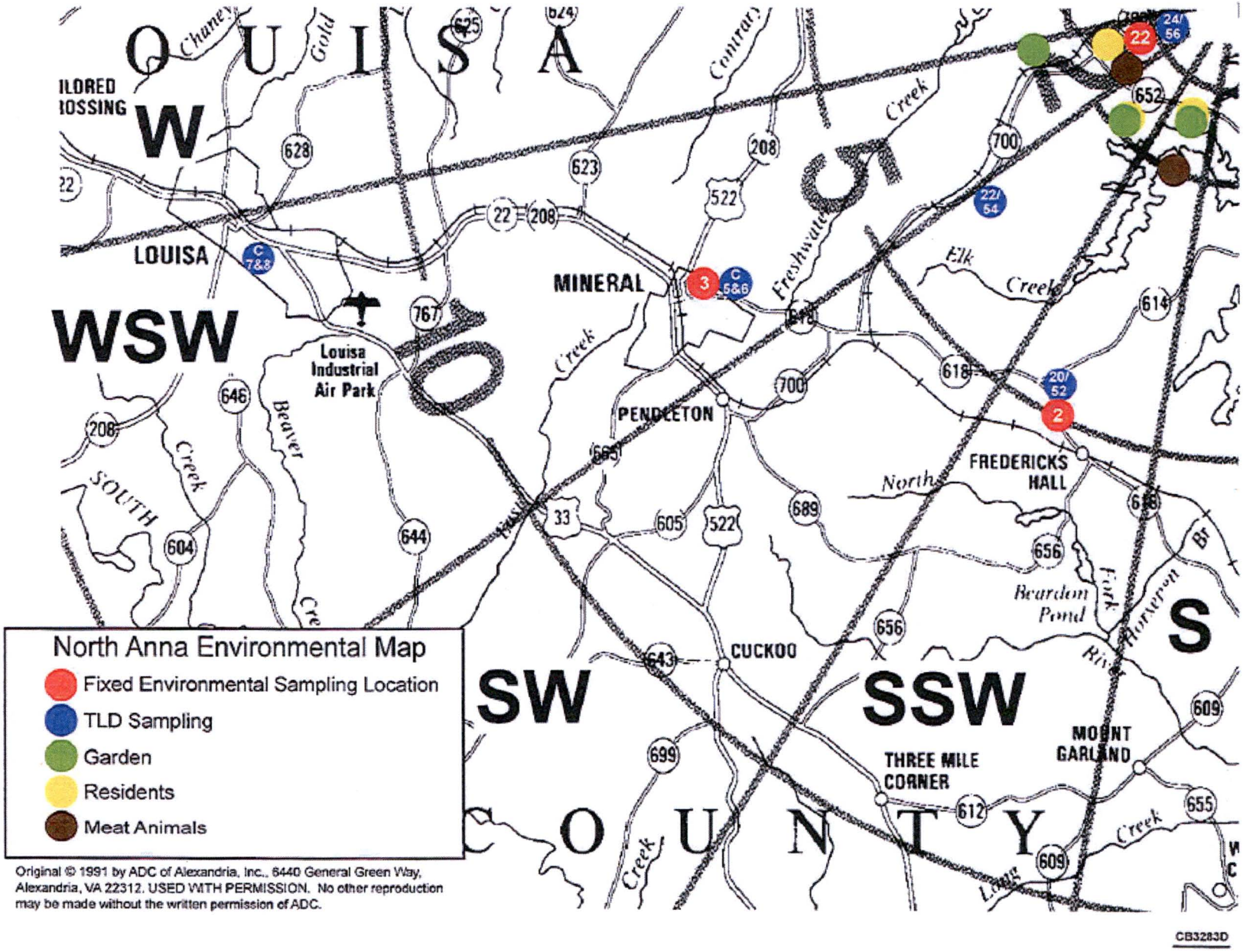


Figure 1. North Anna Site Radiological Monitoring Locations


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
OAK
MC HENRY
POST OAK
BLOCK
POST
LANES CORNER
MARGO
BROKENBURG VILLAGE
COURTHOUSE
HOUSE
SNELL
INDIAN ACRES
BALDES CORNER
HAMS FORD
PENNEYS CROSSROADS
DUERSONS STORE
GATEWOOD
MARYE
FARLEY
LEWISTOWN
Northeast
Creek
CB3280E


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.
CB3282E
PINE FOREST ESTATES
LEVY
PARTLOW
DAVIS CORNER
BLANTONS
CHILESBURG
GREENES CORNER
BUMPASS
HARRIS STORE
BEAVERDAM
CEDAR FORK
Smith Mill Bridge
Arnolds Creek
Rocky Creek
Little Creek
Sneadon
Hollowing
Maple Swamp
Stevens Mill Run
South
ESE
SE
SSE
S
E


LOUISA
MINERAL
PENDLETON
FREDERICKS HALL
CUCKOO
THREE MILE CORNER
MOUNT GARLAND
Louisa Industrial Air Park
WSW
SW
SSW
S
North Anna Environmental Map
Fixed Environmental Sampling Location
TLD Sampling
Garden
Residents
Meat Animals
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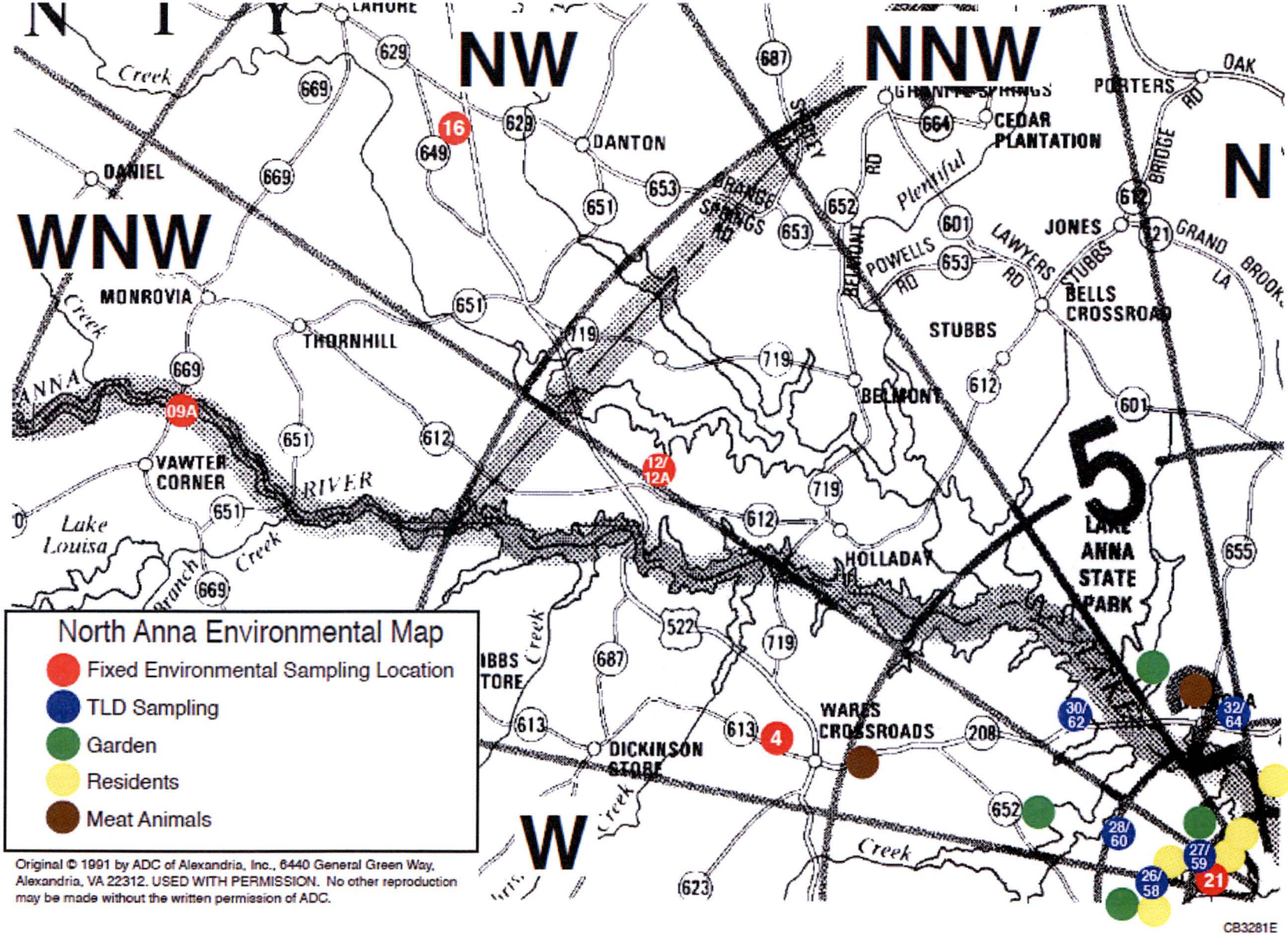
CB3283D



CB3281E

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 – 2016

Docket No. 50-338/339 Page 1 of 9

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	4.1 (256/256) (1.0-8.1)	29/61	0.52 mi. NW	7.0 (8/8) (6.0-8.1)	3.2 (16/16)* (1.9-4.3)	0
Direct Radiation (mR/std. Month) (Pre-operational TLDs)	Gamma Dose	32	2	2.4 (16/16) (1.1-4.6)	C-1/2	7.30 mi. SSE	2.9 (8/8) (2.1-4.6)	3.2 (16/16)* (1.9-4.3)	0
Direct Radiation (mR/std. Month) (Emergency Sector TLDs)	Gamma Dose	40	2	5.2 (40/40) (2.7-9.1)	EPSP-09/10	0.37 mi. ENE	7.7 (8/8) (6.6-9.1)	3.2 (16/16)* (1.9-4.3)	0
Direct Radiation (mR/std. month) (Environmental TLDs)	Gamma Dose	48	2	3.2 (44/44) (0.8-6.0)	23	0.93 mi. SSE	4.8 (4/4) (4.3-6.0)	3.2 (4/4) (1.9-4.3)	0
Direct Radiation (mR/std. Month) (Annual TLDs)	Gamma Dose	12	2	2.8 (11/11) (1.7-4.7)	01	0.20 mi. NE	4.7 (1/1) (4.7)	2.5 (1/1) (2.5)	0
Airborne Particulates (1E-03 pCi/m^3)	Gross Beta	676	0.01	13.3 (624/624) (4.09-33.9)	04	5.10 mi. WNW	14.3 (52/52) (7.27-33.9)	15.3 (52/52) (8.74-29.6)	0
Air Iodine (pCi/m^3)	I-131	676	0.07	(0/624)	N/A	N/A.	N/A	(0/52)	0
Airborne Particulates (1E-03 pCi/m^3)	Gamma	52							
	Be-7	52	-	128 (48/48) (113-152)	05	4.20 mi. NNE	144 (4/4) (125-168)	152 (4/4) (114-206)	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 – 2016

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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	12							
	K-40	12	-	12970 (11/11) (4600-32400)	23	0.93mi SSE	32400 (1/1) (32400)	30600 (1/1) (30600)	0
	Cs-134	12	150	(0/11)	N/A	N/A	N/A	(0/1)	0
	Cs-137	12	180	362 (6/11) (177-646)	06	4.70mi ESE	646 (1/1) (646)	(0/1)	0
	Ra-226	12	-	3809 (7/11) (2400-5510)	22	1.00mi WSW	5510 (1/1) (5510)	(0/1)	0
	Th-228	12	-	1644 (11/11) (487-3650)	22	1.00mi WSW	3650 (1/1) (3650)	209 (1/1) (209)	0
	Th-232	12	-	1773 (9/11) (515-3460)	05A	2.04mi N	3460 (1/1) (3460)	(0/1)	0
	Sr-89	12	-	(0/11)	N/A	N/A	N/A	(0/1)	0
	Sr-90	12	-	(0/11)	N/A	N/A	N/A	(0/1)	0
Precipitation	Monthly								
(pCi/liter)	Gross Beta	12	4	3.54 (10/12) (1.93-6.83)	01A	0.64 mi. SE	3.54 (10/12) (1.93-6.83)	N/A	0
	H-3	4	2000	(0/4)	N/A	N/A	N/A	N/A	0
	Semiannual Gamma	2							
	Be-7	2	-	51 (1/2) (51)	01A	0.64 mi SE	51 (1/2) (51)	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. Samples were obtained in 2016.

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2016

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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
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	10	(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	-	5.30 (1/2) (5.30)	01A	0.64mi SE	5.30 (1/2) (5.30)	N/A	0

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2016

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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
Milk (pCi/liter)	Gamma	12							
	K-40	12	-	1370 (12/12) (1220-1460)	12A	7.50 mi. NW	1370 (12/12) (1220-1460)	N/A	0
	I-131	12	1	(0/12)	N/A	N/A.	N/A	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
	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

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2016

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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
Food Vegetation	Gamma	40							
(pCi/kg) (wet)	Be-7	40	-	1650 (32/32) (473-4480)	15	1.37mi SE	2110 (8/8) (866-3160)	1490 (8/8) (1060-2380)	0
	K-40	40	-	5380 (32/32) (3050-7410)	14B	1.22mi NNE	5560 (8/8) (4360-7410)	4820 (8/8) (3460-8360)	0
	I-131	40	60	(0/32)	N/A	N/A	N/A	(0/8)	0
	Cs-134	40	60	(0/32)	N/A	N/A	N/A	(0/8)	0
	Cs-137	40	80	(0/32)	N/A	N/A	N/A	(0/8)	0
Ground Well Water	Tritium	4	2000	(0/4)	N/A	N/A	N/A	N/A	0
(pCi/liter)	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	(0/4)	N/A	N/A	N/A	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 – 2016

Docket No. 50-338/339

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
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	3930 (4/4) (3340-4230)	11	5.80 mi. SE	3930 (4/4) (3340-4230)	(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	(0/12)	N/A	N/A	N/A	(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

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2016

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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
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	-	(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
Surface Water (pCi/L)	Tritium	8	2000	4270 (4/4) (3580-5810)	08	3.37 mi. SSE	4270 (4/4) (3580-5810)	(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

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

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2016

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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	-	9700 (4/4) (1280-21800)	11	5.80 mi. SE	17900 (2/2) (14000-21800)	23100(2/2) (22500-23600)	0
	Cs-134	6	150	(0/4)	N/A	N/A	N/A	(0/2)	0
	Cs-137	6	180	(0/4)	N/A	N/A.	N/A	(0/2)	0
	Ra-226	6	-	1220 (4/4) (764-2130)	11	5.80 mi. SE	2130 (1/2) (2130)	2520 (2/2) (2270-2760)	0
	Th-228	6	-	350 (4/4) (81.7-779)	11	5.80 mi. SE	602.5 (2/2) (426-779)	861 (2/2) (769-953)	0
	Th-232	6	-	512.5 (2/4) (500-525)	11	5.80 mi. SE	512.5 (2/2) (500-525)	718 (2/2) (591-845)	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	-	806 (2/2) (532-1080)	08	3.37 mi. SSE	806 (2/2) (532-1080)	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	-	(0/2)	N/A	N/A	(0/2)	N/A	0

Table 3-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

North Anna Nuclear Power Station, Louisa County, Virginia – 2016

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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)									
	Th-228	2	-	(0/2)	08	N/A	N/A	N/A	0
	Th-232	2	-	(0/2)	N/A	N/A	N/A	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
	Gamma	8							
Fish (pCi/kg) (wet)									
	K-40	8	-	1750 (4/4) (1520-2000)	8	3.37 mi. SSE	1750 (4/4) (1520-2000)	1620 (4/4) (1400-2140)	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 2016 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

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[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 12/29/2015 3/29/2016	Second Quarter 3/29/2016 6/28/2016	Third Quarter 6/28/2016 9/28/2016	Fourth Quarter 9/28/2016 12/27/2016	Quarterly* Average +/- 2 s.d.
N-1	5.2	4.4	4.4	4.8	4.6 +/- 0.9
N-33	4.8	4.1	4.1	5.2	
N-2	2.6	1.8	2.6	3.0	2.6 +/- 1.1
N-34	2.6	1.9	2.7	3.4	
NNE-3	6.6	5.7	5.8	7.5	6.5 +/- 1.5
NNE-35	7.6	6.0	6.1	6.7	
NNE-4	4.1	3.3	3.6	3.7	3.8 +/- 1.1
NNE 36	3.8	3.0	3.7	4.9	
NE-5	3.9	3.7	4.2	4.3	3.9 +/- 1.5
NE-37	3.9	3.2	2.9	5.3	
NE-6	2.6	2.7	2.9	4.6	3.2 +/- 1.7
NE-38	3.2	2.6	2.7	4.5	
ENE-7	4.5	4.3	5.2	6.1	5.4 +/- 1.5
ENE-39	5.8	6.1	4.9	5.9	
ENE-8	2.8	2.5	2.6	2.5	2.8 +/- 0.8
ENE-40	3.2	2.9	2.4	3.5	
E-9	5.0	4.7	4.2	5.6	5.0 +/- 0.9
E-41	5.4	5.1	4.6	5.2	
E-10	4.8	3.0	3.0	3.9	3.6 +/- 1.4
E-42	3.6	2.9	3.3	4.3	
ESE-11	3.7	4.5	3.5	5.0	3.9 +/- 1.2
ESE-43	3.6	3.3	3.5	4.1	
ESE-12	4.9	4.5	3.4	5.0	4.4 +/- 1.2
ESE-44	4.2	4.5	3.8	5.1	
SE-13	5.1	3.7	3.8	3.7	4.0 +/- 1.9
SE-45	4.5	3.1	2.7	5.4	
SE-14	6.8	7.1	5.9	7.1	6.9 +/- 1.2
SE-46	7.1	7.2	6.2	7.9	
SSE-15	4.4	3.9	4.6	4.9	4.5 +/- 0.9
SSE-47	5.4	4.2	4.2	4.6	
SSE-16	2.4	3.2	1.7	3.0	2.5 +/- 1.0
SSE-48	2.3	2.3	2.1	2.7	

*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 12/29/2015 3/29/2016	Second Quarter 3/29/2016 6/28/2016	Third Quarter 6/28/2016 9/28/2016	Fourth Quarter 9/28/2016 12/27/2016	Quarterly* Average +/- 2 s.d.
S-17	5.4	3.4	3.1	4.7	4.3 +/- 2.1
S-49	5.6	2.9	4.4	4.7	
S-18	1.7	2.0	1.3	1.8	1.7 +/- 0.6
S-50	1.9	1.8	1.1	1.7	
SSW-19	6.4	6.8	6.3	5.9	6.1 +/- 0.9
SSW-51	5.3	5.8	6.0	5.9	
SSW-20	2.1	2.4	2.1	3.1	2.2 +/- 0.8
SSW-52	1.9	2.0	2.0	2.2	
SW-21	4.8	4.5	3.7	5.1	4.6 +/- 0.9
SW-53	4.6	4.7	4.2	5.0	
SW-22	4.6	4.4	3.6	5.1	4.1 +/- 1.2
SW-54	3.7	3.8	3.4	4.2	
WSW-23	4.9	3.5	3.2	5.2	4.3 +/- 1.9
WSW-55	3.6	4.8	3.7	5.8	
WSW-24	4.7	3.4	3.9	5.0	4.2 +/- 1.1
WSW-56	4.5	4.5	3.8	3.8	
W-25	6.8	7.6	5.7	6.8	6.8 +/- 1.4
W-57	7.1	7.0	5.8	7.6	
W-26	2.6	2.5	2.6	3.3	2.7 +/- 0.5
W-58	2.5	2.8	2.7	2.9	
WNW-27	2.4	2.8	2.8	3.8	3.2 +/- 1.3
WNW-59	3.7	2.8	2.8	4.2	
WNW-28	3.0	2.2	4.7	3.9	3.4 +/- 2.0
WNW-60	3.4	1.9	4.5	3.4	
NW-29	6.7	6.6	6.0	7.1	7.0 +/- 1.4
NW-61	7.8	7.3	6.5	8.1	
NW-30	1.6	1.8	1.0	1.9	1.7 +/- 0.9
NW-62	1.8	1.3	1.4	2.4	
NNW-31	3.2	2.8	3.1	3.3	3.1 +/- 0.7
NNW-63	3.2	2.4	3.3	3.5	
NNW-32	2.8	2.6	3.2	3.7	3.3 +/- 1.1
NNW-64	3.3	3.1	2.9	4.4	
Mean					4.1 +/- 1.5

*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 12/29/2015 3/29/2016	Second Quarter 3/29/2016 6/28/2016	Third Quarter 6/28/2016 9/28/2016	Fourth Quarter 9/28/2016 12/27/2016	Quarterly* Average +/- 2 s.d.
C-1	2.6	2.3	3.1	3.4	2.9 +/- 1.6
C-2	2.4	2.1	2.7	4.6	
C-3**	2.8	1.9	3.1	3.5	2.9 +/- 1.2
C-4**	3.0	2.0	2.9	3.6	
C-5	1.7	1.1	1.7	3.0	1.9 +/- 1.2
C-6	2.0	1.5	2.0	2.5	
C-7**	3.6	2.3	3.4	3.8	3.5 +/- 1.2
C-8**	3.8	3.1	3.4	4.3	
					2.4 +/- 1.7
					3.2 +/- 1.3
EPSA-01***	4.5	4.0	5.4	5.3	4.6 +/- 1.1
EPSA-02***	4.6	4.0	4.3	4.8	
EPSF-03***	5.0	3.4	3.7	3.8	4.0 +/- 1.6
EPSF-04***	3.4	4.6	3.0	5.2	
EPSR-05***	5.3	5.0	5.6	7.2	5.9 +/- 1.7
EPSR-06***	6.9	6.4	4.9	5.5	
EPSJ-07***	4.1	3.6	2.7	4.7	3.9 +/- 1.3
EPSJ-08***	4.1	4.0	3.6	4.6	
EPSP-09***	7.5	8.1	6.6	8.4	7.7 +/- 1.7
EPSP-10***	8.2	7.2	6.7	9.1	
Mean					5.2 +/- 3.2

*Average of collocated TLDs.

** Control Station

*** Emergency Plan TLDs.

TABLE 3-2

DIRECT RADIATION MEASURMENTS- SECTOR QUARTERLY TLD RESULTS

mR/Std. Month (30.4 days) ± 2 Sigma

Station	First Quarter 12/29/2015 3/29/2016	Second Quarter 3/29/2016 6/28/2016	Third Quarter 6/28/2016 9/28/2016	Fourth Quarter 9/28/2016 12/27/2016	Quarterly Average +/- 2 s.d.	Annual TLD
STA-01	3.5	3.2	3.1	5.3	3.8 +/- 2.1	4.7
STA-02	1.7	2.7	2.1	2.3	2.2 +/- 0.8	1.9
STA-03	2.1	1.7	2.1	2.4	2.1 +/- 0.6	1.7
STA-04	2.5	2.1	2.6	2.7	2.5 +/- 0.5	1.7
STA-05	2.4	2.4	2.1	2.6	2.4 +/- 0.4	2.6
STA-05A	2.5	2.5	3.8	2.5	2.8 +/- 1.3	2.2
STA-06	4.8	4.6	3.9	5.2	4.6 +/- 1.1	4.1
STA-07	3.3	0.8	2.5	3.2	2.5 +/- 2.3	2.4
STA-21	2.5	2.9	2.7	3.6	2.9 +/- 1.0	2.2
STA-22	4.5	4.6	4.0	4.9	4.5 +/- 0.7	3.4
STA-23	4.7	4.3	4.3	6.1	4.9 +/- 1.7	4.1
STA-24*	2.9	1.9	3.2	2.9	2.7 +/- 0.6	2.5
			Mean - Indicator Locations		3.2 +/- 1.2	2.8 +/- 2.1

*Control

Table 3-3
Air Particulate
Gross Beta Radioactivity
[10^{-2} pCi/m^3]

Period Ending	Station 01			Station 02			Station 03			Station 04			Station 05			Station 06			Station 07		
01/05/16	1.04E+01	+/-	2.36E+00	1.20E+01	+/-	2.44E+00	1.17E+01	+/-	2.42E+00	8.17E+00	+/-	2.19E+00	1.12E+01	+/-	2.38E+00	8.85E+00	+/-	2.24E+00	1.10E+01	+/-	2.38E+00
01/12/16	7.83E+00	+/-	2.49E+00	1.08E+01	+/-	2.67E+00	6.92E+00	+/-	2.53E+00	6.91E+00	+/-	2.43E+00	1.37E+01	+/-	2.83E+00	4.19E+00	+/-	2.25E+00	6.68E+00	+/-	2.42E+00
01/19/16	1.95E+01	+/-	2.95E+00	1.34E+01	+/-	2.67E+00	1.53E+01	+/-	2.74E+00	2.19E+01	+/-	3.13E+00	1.51E+01	+/-	2.75E+00	2.06E+01	+/-	3.03E+00	1.58E+01	+/-	2.79E+00
01/29/16	9.37E+00	+/-	2.28E+00	1.21E+01	+/-	2.42E+00	1.08E+01	+/-	2.38E+00	1.09E+01	+/-	2.34E+00	1.07E+01	+/-	2.36E+00	1.03E+01	+/-	2.33E+00	9.47E+00	+/-	2.28E+00
02/02/16	1.45E+01	+/-	2.96E+00	1.34E+01	+/-	2.90E+00	1.22E+01	+/-	2.82E+00	1.35E+01	+/-	2.90E+00	1.41E+01	+/-	2.94E+00	1.34E+01	+/-	2.90E+00	1.02E+01	+/-	2.70E+00
02/10/16	1.32E+01	+/-	2.27E+00	8.86E+00	+/-	1.95E+00	1.31E+01	+/-	2.19E+00	1.30E+01	+/-	2.21E+00	1.29E+01	+/-	2.23E+00	8.68E+00	+/-	1.97E+00	1.06E+01	+/-	2.10E+00
02/17/16	9.82E+00	+/-	2.38E+00	8.40E+00	+/-	2.32E+00	8.50E+00	+/-	2.39E+00	9.29E+00	+/-	2.42E+00	9.75E+00	+/-	2.42E+00	7.21E+00	+/-	2.25E+00	7.41E+00	+/-	2.26E+00
02/23/16	9.93E+00	+/-	2.94E+00	1.13E+01	+/-	3.03E+00	1.12E+01	+/-	3.03E+00	1.24E+01	+/-	3.09E+00	1.16E+01	+/-	3.04E+00	1.11E+01	+/-	3.02E+00	1.07E+01	+/-	2.99E+00
03/02/16	1.01E+01	+/-	2.21E+00	9.87E+00	+/-	2.20E+00	9.34E+00	+/-	2.17E+00	1.03E+01	+/-	2.22E+00	1.03E+01	+/-	2.22E+00	1.06E+01	+/-	2.24E+00	1.03E+01	+/-	2.22E+00
03/08/16	1.28E+01	+/-	3.10E+00	9.74E+00	+/-	2.87E+00	9.27E+00	+/-	2.97E+00	1.31E+01	+/-	3.07E+00	1.14E+01	+/-	2.95E+00	9.96E+00	+/-	2.87E+00	1.20E+01	+/-	3.01E+00
03/15/16	1.40E+01	+/-	2.80E+00	1.26E+01	+/-	2.71E+00	9.57E+00	+/-	2.53E+00	1.28E+01	+/-	2.73E+00	1.22E+01	+/-	2.69E+00	1.34E+01	+/-	2.76E+00	1.29E+01	+/-	2.74E+00
03/23/16	1.15E+01	+/-	2.80E+00	7.51E+00	+/-	2.17E+00	1.17E+01	+/-	2.42E+00	9.90E+00	+/-	2.31E+00	1.32E+01	+/-	2.50E+00	8.88E+00	+/-	2.25E+00	1.20E+01	+/-	2.43E+00
03/29/16	1.13E+01	+/-	2.69E+00	9.05E+00	+/-	2.53E+00	8.99E+00	+/-	2.49E+00	1.05E+01	+/-	2.60E+00	9.71E+00	+/-	2.57E+00	6.94E+00	+/-	2.38E+00	1.09E+01	+/-	2.65E+00
04/05/16	1.05E+01	+/-	2.61E+00	8.79E+00	+/-	2.52E+00	5.55E+00	+/-	2.36E+00	1.14E+01	+/-	2.75E+00	1.28E+01	+/-	2.77E+00	1.21E+01	+/-	2.72E+00	1.29E+01	+/-	2.76E+00
04/13/16	1.29E+01	+/-	2.42E+00	1.03E+01	+/-	2.30E+00	1.29E+01	+/-	2.48E+00	1.24E+01	+/-	2.43E+00	1.17E+01	+/-	2.40E+00	1.11E+01	+/-	2.36E+00	1.24E+01	+/-	2.43E+00
04/20/16	1.70E+01	+/-	2.86E+00	1.33E+01	+/-	2.57E+00	1.60E+01	+/-	2.73E+00	1.31E+01	+/-	2.58E+00	1.71E+01	+/-	2.79E+00	1.60E+01	+/-	2.73E+00	1.39E+01	+/-	2.61E+00
04/26/16	1.63E+01	+/-	2.89E+00	1.53E+01	+/-	2.92E+00	1.67E+01	+/-	2.99E+00	1.29E+01	+/-	2.74E+00	1.57E+01	+/-	2.94E+00	1.28E+01	+/-	2.76E+00	1.39E+01	+/-	2.83E+00
05/03/16	8.23E+00	+/-	2.40E+00	6.28E+00	+/-	2.28E+00	6.59E+00	+/-	2.30E+00	7.72E+00	+/-	2.37E+00	7.19E+00	+/-	2.34E+00	6.66E+00	+/-	2.30E+00	8.55E+00	+/-	2.43E+00
05/10/16	1.68E+01	+/-	2.86E+01	7.31E+00	+/-	2.15E+00	7.39E+00	+/-	2.15E+00	6.65E+00	+/-	2.10E+00	5.54E+00	+/-	2.02E+00	4.51E+00	+/-	1.94E+00	6.43E+00	+/-	2.08E+00
05/17/16	1.02E+01	+/-	2.34E+00	9.47E+00	+/-	2.29E+00	8.80E+00	+/-	2.25E+00	9.01E+00	+/-	2.26E+00	1.11E+01	+/-	2.39E+00	1.07E+01	+/-	2.37E+00	7.10E+00	+/-	2.13E+00
05/24/16	1.08E+01	+/-	2.61E+00	1.14E+01	+/-	2.64E+00	1.29E+01	+/-	2.72E+00	1.03E+01	+/-	2.58E+00	1.01E+01	+/-	2.57E+00	1.07E+01	+/-	2.60E+00	1.15E+01	+/-	2.65E+00
05/31/16	1.79E+01	+/-	2.95E+00	1.47E+01	+/-	2.77E+00	2.24E+01	+/-	3.17E+00	1.43E+01	+/-	2.75E+00	1.62E+01	+/-	2.85E+00	1.92E+01	+/-	3.01E+00	1.74E+01	+/-	2.92E+00
06/07/16	9.58E+00	+/-	2.48E+00	8.97E+00	+/-	2.38E+00	1.03E+01	+/-	2.47E+00	1.11E+01	+/-	2.53E+00	1.07E+01	+/-	2.49E+00	6.72E+00	+/-	2.23E+00	1.28E+01	+/-	2.62E+00
06/14/16	1.09E+01	+/-	2.47E+00	1.65E+01	+/-	2.86E+00	1.39E+01	+/-	2.72E+00	1.58E+01	+/-	2.80E+00	1.34E+01	+/-	2.68E+00	1.39E+01	+/-	2.71E+00	1.54E+01	+/-	2.80E+00
06/21/16	1.21E+01	+/-	2.55E+00	9.20E+00	+/-	2.37E+00	1.04E+01	+/-	2.45E+00	1.44E+01	+/-	2.68E+00	1.23E+01	+/-	2.56E+00	1.20E+01	+/-	2.54E+00	1.38E+01	+/-	2.64E+00
06/28/16	1.39E+01	+/-	2.64E+00	1.53E+01	+/-	2.68E+00	1.61E+01	+/-	2.64E+00	1.46E+01	+/-	2.61E+00	1.41E+01	+/-	2.59E+00	1.21E+01	+/-	2.48E+00	1.19E+01	+/-	2.48E+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		
01/05/16	9.51E+00	+/-	2.28E+00	9.81E+00	+/-	2.30E+00	9.71E+00	+/-	2.30E+00	9.68E+00	+/-	2.29E+00	1.46E+01	+/-	2.61E+00	1.01E+01	+/-	2.31E+00
01/12/16	8.52E+00	+/-	2.55E+00	8.31E+00	+/-	2.52E+00	6.56E+00	+/-	2.42E+00	8.23E+00	+/-	2.51E+00	8.53E+00	+/-	2.53E+00	1.02E+01	+/-	2.63E+00
01/19/16	1.55E+01	+/-	2.78E+00	1.64E+01	+/-	2.83E+00	1.99E+01	+/-	3.01E+00	1.66E+01	+/-	2.83E+00	2.15E+01	+/-	3.09E+00	1.84E+01	+/-	2.92E+00
01/29/16	1.05E+01	+/-	2.34E+00	9.69E+00	+/-	2.29E+00	9.24E+00	+/-	2.27E+00	1.03E+01	+/-	2.33E+00	1.33E+01	+/-	2.49E+00	1.09E+01	+/-	2.37E+00
02/02/16	6.29E+00	+/-	2.82E+00	1.12E+01	+/-	2.76E+00	8.81E+00	+/-	2.61E+00	1.63E+01	+/-	3.06E+00	1.24E+01	+/-	2.84E+00	1.47E+01	+/-	2.97E+00
02/10/16	1.12E+01	+/-	2.11E+00	1.02E+01	+/-	2.06E+00	1.15E+01	+/-	2.13E+00	1.60E+01	+/-	2.37E+00	1.15E+01	+/-	2.16E+00	1.30E+01	+/-	2.22E+00
02/17/16	6.76E+00	+/-	2.24E+00	8.02E+00	+/-	2.32E+00	9.27E+00	+/-	2.41E+00	1.20E+01	+/-	2.59E+00	1.13E+01	+/-	2.47E+00	1.05E+01	+/-	2.47E+00
02/23/16	9.51E+00	+/-	2.93E+00	8.60E+00	+/-	2.87E+00	1.04E+01	+/-	2.97E+00	1.27E+01	+/-	3.12E+00	1.54E+01	+/-	3.26E+00	1.48E+01	+/-	3.23E+00
03/02/16	9.21E+00	+/-	2.16E+00	1.03E+01	+/-	2.22E+00	1.11E+01	+/-	2.27E+00	8.81E+00	+/-	2.13E+00	1.34E+01	+/-	2.40E+00	9.28E+00	+/-	2.16E+00
03/08/16	1.40E+01	+/-	3.08E+00	1.06E+01	+/-	2.88E+00	1.30E+01	+/-	3.10E+00	1.27E+01	+/-	2.99E+00	1.26E+01	+/-	3.08E+00	1.52E+01	+/-	3.17E+00
03/15/16	1.32E+01	+/-	2.75E+00	9.67E+00	+/-	2.54E+00	8.89E+00	+/-	2.50E+00	1.08E+01	+/-	2.61E+00	1.36E+01	+/-	2.77E+00	1.22E+01	+/-	2.69E+00
03/23/16	9.27E+00	+/-	2.27E+00	1.06E+01	+/-	2.35E+00	8.79E+00	+/-	2.24E+00	1.17E+01	+/-	2.41E+00	1.06E+01	+/-	2.35E+00	1.03E+01	+/-	2.34E+00
03/29/16	8.46E+00	+/-	2.49E+00	1.04E+01	+/-	2.62E+00	1.26E+01	+/-	2.75E+00	1.07E+01	+/-	2.62E+00	1.27E+01	+/-	2.78E+00	1.28E+01	+/-	2.76E+00
04/05/16	1.28E+01	+/-	2.76E+00	1.07E+01	+/-	2.64E+00	1.42E+01	+/-	2.84E+00	1.15E+01	+/-	2.70E+00	1.30E+01	+/-	2.76E+00	1.23E+01	+/-	2.73E+00
04/13/16	1.07E+01	+/-	2.35E+00	1.16E+01	+/-	2.40E+00	1.29E+01	+/-	2.43E+00	4.65E+00	+/-	1.98E+00	1.32E+01	+/-	2.44E+00	1.13E+01	+/-	2.38E+00
04/20/16	1.63E+01	+/-	2.75E+00	1.82E+01	+/-	2.85E+00	1.75E+01	+/-	2.81E+00	2.04E+01	+/-	3.13E+00	2.00E+01	+/-	3.02E+00	1.69E+01	+/-	2.78E+00
04/26/16	1.40E+01	+/-	2.82E+00	1.38E+01	+/-	2.81E+00	1.63E+01	+/-	2.97E+00	1.63E+01	+/-	2.97E+00	1.56E+01	+/-	2.86E+00	1.63E+01	+/-	2.96E+00
05/03/16	6.82E+00	+/-	2.32E+00	7.65E+00	+/-	2.37E+00	6.66E+00	+/-	2.30E+00	8.34E+00	+/-	2.42E+00	7.51E+00	+/-	2.42E+00	4.09E+00	+/-	2.13E+00
05/10/16	6.35E+00	+/-	2.08E+00	5.91E+00	+/-	2.05E+00	6.33E+00	+/-	2.07E+00	5.98E+00	+/-	2.05E+00	8.68E+00	+/-	2.23E+00	5.98E+00	+/-	2.05E+00
05/17/16	8.95E+00	+/-	2.26E+00	1.01E+01	+/-	2.33E+00	1.00E+01	+/-	2.33E+00	1.19E+01	+/-	2.44E+00	9.73E+00	+/-	2.31E+00	8.86E+00	+/-	2.25E+00
05/24/16	1.12E+01	+/-	2.62E+00	1.19E+01	+/-	2.67E+00	1.66E+01	+/-	2.94E+00	1.64E+01	+/-	2.92E+00	1.08E+01	+/-	2.61E+00	1.06E+01	+/-	2.59E+00
05/31/16	1.89E+01	+/-	2.99E+00	1.78E+01	+/-	2.94E+00	1.50E+01	+/-	2.79E+00	2.16E+01	+/-	3.13E+00	1.85E+01	+/-	2.98E+00	1.77E+01	+/-	2.93E+00
06/07/16	1.03E+01	+/-	2.47E+00	1.30E+01	+/-	2.63E+00	1.10E+01	+/-	2.51E+00	1.47E+01	+/-	2.73E+00	1.12E+01	+/-	2.58E+00	1.27E+01	+/-	2.61E+00
06/14/16	1.15E+01	+/-	2.58E+00	1.46E+01	+/-	2.76E+00	1.26E+01	+/-	2.63E+00	1.80E+01	+/-	2.95E+00	1.36E+01	+/-	2.64E+00	1.45E+01	+/-	2.75E+00
06/21/16	1.14E+01	+/-	2.51E+00	9.54E+00	+/-	2.39E+00	1.23E+01	+/-	2.56E+00	1.33E+01	+/-	2.62E+00	1.11E+01	+/-	2.49E+00	1.37E+01	+/-	2.63E+00
06/28/16	1.04E+01	+/-	2.35E+00	1.21E+01	+/-	2.45E+00	1.02E+01	+/-	2.38E+00	1.66E+01	+/-	2.69E+00	1.48E+01	+/-	2.68E+00	1.60E+01	+/-	2.69E+00

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		
07/05/16	1.33E+01	+/-	2.52E+00	1.18E+01	+/-	2.45E+00	1.28E+01	+/-	2.62E+00	1.02E+01	+/-	2.39E+00	1.20E+01	+/-	2.49E+00	1.30E+01	+/-	2.54E+00	1.26E+01	+/-	2.51E+00
07/12/16	8.26E+00	+/-	2.20E+00	7.11E+00	+/-	2.13E+00	1.21E+01	+/-	2.45E+00	1.16E+01	+/-	2.42E+00	1.28E+01	+/-	2.49E+00	7.85E+00	+/-	2.18E+00	1.09E+01	+/-	2.37E+00
07/19/16	1.33E+01	+/-	2.52E+00	1.63E+01	+/-	2.74E+00	1.46E+01	+/-	2.65E+00	1.25E+01	+/-	2.52E+00	1.71E+01	+/-	2.78E+00	1.45E+01	+/-	2.63E+00	1.62E+01	+/-	2.73E+00
07/26/16	1.62E+01	+/-	2.74E+00	2.12E+01	+/-	3.00E+00	2.15E+01	+/-	3.00E+00	1.93E+01	+/-	2.90E+00	2.13E+01	+/-	3.01E+00	1.68E+01	+/-	2.77E+00	1.89E+01	+/-	2.89E+00
08/02/16	1.40E+01	+/-	2.75E+00	1.36E+01	+/-	2.73E+00	1.47E+01	+/-	2.79E+00	1.57E+01	+/-	2.84E+00	1.23E+01	+/-	2.65E+00	1.25E+01	+/-	2.66E+00	1.43E+01	+/-	2.77E+00
08/09/16	1.32E+01	+/-	2.71E+00	1.15E+01	+/-	2.62E+00	1.41E+01	+/-	2.77E+00	1.64E+01	+/-	2.90E+00	1.46E+01	+/-	2.80E+00	1.19E+01	+/-	2.65E+00	1.37E+01	+/-	2.75E+00
08/17/16	9.72E+00	+/-	2.34E+00	9.29E+00	+/-	2.30E+00	5.35E+00	+/-	2.06E+00	1.02E+01	+/-	2.36E+00	9.95E+00	+/-	2.34E+00	9.42E+00	+/-	2.31E+00	1.02E+01	+/-	2.36E+00
08/24/16	1.17E+01	+/-	2.71E+00	1.43E+01	+/-	2.87E+00	1.22E+01	+/-	2.75E+00	8.59E+00	+/-	2.55E+00	1.40E+01	+/-	2.85E+00	1.32E+01	+/-	2.81E+00	1.31E+01	+/-	2.80E+00
08/30/16	1.85E+01	+/-	3.09E+00	1.72E+01	+/-	3.00E+00	2.10E+01	+/-	3.21E+00	2.13E+01	+/-	3.21E+00	1.66E+01	+/-	2.96E+00	1.51E+01	+/-	2.87E+00	2.05E+01	+/-	3.18E+00
09/06/16	1.75E+01	+/-	2.78E+00	2.01E+01	+/-	2.92E+00	1.86E+01	+/-	2.84E+00	2.04E+01	+/-	2.93E+00	1.56E+01	+/-	2.67E+00	1.76E+01	+/-	2.78E+00	1.88E+01	+/-	2.85E+00
09/14/16	2.20E+01	+/-	2.84E+00	2.48E+01	+/-	2.95E+00	2.31E+01	+/-	2.83E+00	2.52E+01	+/-	2.95E+00	1.94E+01	+/-	2.66E+00	1.82E+01	+/-	2.61E+00	2.39E+01	+/-	2.89E+00
09/20/16	1.33E+01	+/-	2.63E+00	1.26E+01	+/-	2.59E+00	1.36E+01	+/-	2.65E+00	1.23E+01	+/-	2.56E+00	8.48E+00	+/-	2.30E+00	9.87E+00	+/-	2.40E+00	1.17E+01	+/-	2.53E+00
09/28/16	1.75E+01	+/-	2.67E+00	1.89E+01	+/-	2.73E+00	1.80E+01	+/-	2.65E+00	2.29E+01	+/-	2.90E+00	1.99E+01	+/-	2.77E+00	1.75E+01	+/-	2.66E+00	1.75E+01	+/-	2.66E+00
10/04/16	5.50E+00	+/-	2.52E+00	7.26E+00	+/-	2.65E+00	7.30E+00	+/-	2.72E+00	7.27E+00	+/-	2.69E+00	6.54E+00	+/-	2.61E+00	5.88E+00	+/-	2.55E+00	6.35E+00	+/-	2.59E+00
10/11/16	1.19E+01	+/-	3.08E+00	1.05E+01	+/-	3.01E+00	1.06E+01	+/-	3.10E+00	1.37E+01	+/-	3.23E+00	1.23E+01	+/-	3.12E+00	1.25E+01	+/-	3.13E+00	1.26E+01	+/-	3.14E+00
10/19/16	1.40E+01	+/-	2.39E+00	1.48E+01	+/-	2.43E+00	1.57E+01	+/-	2.47E+00	1.67E+01	+/-	2.52E+00	1.64E+01	+/-	2.51E+00	1.31E+01	+/-	2.33E+00	1.13E+01	+/-	2.23E+00
10/25/16	9.92E+00	+/-	2.66E+00	1.46E+01	+/-	2.91E+00	8.99E+00	+/-	2.73E+00	1.46E+01	+/-	2.95E+00	1.29E+01	+/-	2.85E+00	8.17E+00	+/-	2.54E+00	1.52E+01	+/-	2.97E+00
11/02/16	1.79E+01	+/-	2.80E+00	1.93E+01	+/-	2.93E+00	1.56E+01	+/-	2.72E+00	1.78E+01	+/-	2.81E+00	1.80E+01	+/-	2.87E+00	1.62E+01	+/-	2.78E+00	1.40E+01	+/-	2.64E+00
11/15/16	1.38E+01	+/-	2.72E+00	1.22E+01	+/-	2.62E+00	1.57E+01	+/-	2.81E+00	1.26E+01	+/-	2.64E+00	1.31E+01	+/-	2.67E+00	1.22E+01	+/-	2.62E+00	1.36E+01	+/-	2.70E+00
11/22/16	2.90E+01	+/-	3.48E+00	2.96E+01	+/-	3.51E+00	2.51E+01	+/-	3.30E+00	3.39E+01	+/-	3.69E+00	2.26E+01	+/-	3.19E+00	2.74E+01	+/-	3.41E+00	2.72E+01	+/-	3.40E+00
11/29/16	2.34E+01	+/-	3.30E+00	2.50E+01	+/-	3.37E+00	2.17E+01	+/-	3.21E+00	2.74E+01	+/-	3.49E+00	2.10E+01	+/-	3.18E+00	1.71E+01	+/-	2.99E+00	1.90E+01	+/-	3.08E+00
12/07/16	1.31E+01	+/-	2.33E+00	1.33E+01	+/-	2.34E+00	1.17E+01	+/-	2.26E+00	1.09E+01	+/-	2.21E+00	9.77E+00	+/-	2.14E+00	1.01E+01	+/-	2.16E+00	1.11E+01	+/-	2.22E+00
12/14/16	1.75E+01	+/-	2.80E+00	1.38E+01	+/-	2.60E+00	1.58E+01	+/-	2.71E+00	1.77E+01	+/-	2.82E+00	1.72E+01	+/-	2.79E+00	1.74E+01	+/-	2.81E+00	1.31E+01	+/-	2.55E+00
12/20/16	1.61E+01	+/-	3.18E+00	1.37E+01	+/-	3.03E+00	1.61E+01	+/-	3.17E+00	1.65E+01	+/-	3.18E+00	6.58E+00	+/-	2.60E+00	1.32E+01	+/-	3.00E+00	1.62E+01	+/-	3.17E+00
12/27/16	2.34E+01	+/-	3.19E+00	2.35E+01	+/-	3.16E+00	1.66E+01	+/-	2.74E+00	2.53E+01	+/-	3.21E+00	1.87E+01	+/-	2.91E+00	1.93E+01	+/-	2.95E+00	1.78E+01	+/-	2.87E+00
MEAN	1.385E+01	+/-	3.21E+00	1.34E+01	+/-	2.65E+00	1.34E+01	+/-	2.66E+00	1.43E+01	+/-	2.70E+00	1.34E+01	+/-	2.66E+00	1.24E+01	+/-	2.59E+00	1.33E+01	+/-	2.65E+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		
07/05/16	9.88E+00	+/-	2.37E+00	1.09E+01	+/-	2.43E+00	1.31E+01	+/-	2.53E+00	1.37E+01	+/-	2.63E+00	1.11E+01	+/-	2.39E+00	1.48E+01	+/-	2.66E+00
07/12/16	1.20E+01	+/-	2.44E+00	9.77E+00	+/-	2.31E+00	9.79E+00	+/-	2.30E+00	1.30E+01	+/-	2.50E+00	1.10E+01	+/-	2.37E+00	1.22E+01	+/-	2.45E+00
07/19/16	1.54E+01	+/-	2.70E+00	1.61E+01	+/-	2.77E+00	1.37E+01	+/-	2.60E+00	1.68E+01	+/-	2.77E+00	1.56E+01	+/-	2.66E+00	1.59E+01	+/-	2.71E+00
07/26/16	1.94E+01	+/-	2.90E+00	1.54E+01	+/-	2.69E+00	2.27E+01	+/-	3.07E+00	2.35E+01	+/-	3.10E+00	1.55E+01	+/-	2.70E+00	1.76E+01	+/-	2.82E+00
08/02/16	7.97E+00	+/-	2.40E+00	9.64E+00	+/-	2.50E+00	1.56E+01	+/-	2.84E+00	1.88E+01	+/-	3.00E+00	1.49E+01	+/-	2.79E+00	1.32E+01	+/-	2.70E+00
08/09/16	1.07E+01	+/-	2.58E+00	1.20E+01	+/-	2.65E+00	1.42E+01	+/-	2.77E+00	1.89E+01	+/-	3.03E+00	1.43E+01	+/-	2.78E+00	1.46E+01	+/-	2.80E+00
08/17/16	5.15E+00	+/-	2.05E+00	9.69E+00	+/-	2.33E+00	1.05E+01	+/-	2.38E+00	8.74E+00	+/-	2.27E+00	9.72E+00	+/-	2.34E+00	7.71E+00	+/-	2.21E+00
08/24/16	1.26E+01	+/-	2.77E+00	1.31E+01	+/-	2.80E+00	1.18E+01	+/-	2.72E+00	1.40E+01	+/-	2.85E+00	1.50E+01	+/-	2.89E+00	1.50E+01	+/-	2.91E+00
08/30/16	1.67E+01	+/-	2.96E+00	1.73E+01	+/-	3.00E+00	2.02E+01	+/-	3.17E+00	1.96E+01	+/-	3.13E+00	2.00E+01	+/-	3.17E+00	1.67E+01	+/-	2.96E+00
09/06/16	1.86E+01	+/-	2.84E+00	1.94E+01	+/-	2.88E+00	1.83E+01	+/-	2.82E+00	2.64E+01	+/-	3.24E+00	1.79E+01	+/-	2.80E+00	1.69E+01	+/-	2.75E+00
09/14/16	1.98E+01	+/-	2.67E+00	2.28E+01	+/-	2.83E+00	2.56E+01	+/-	2.99E+00	2.96E+01	+/-	3.10E+00	2.69E+01	+/-	3.05E+00	2.51E+01	+/-	2.93E+00
09/20/16	1.34E+01	+/-	2.64E+00	1.15E+01	+/-	2.51E+00	1.58E+01	+/-	2.79E+00	1.56E+01	+/-	2.79E+00	1.43E+01	+/-	2.70E+00	1.18E+01	+/-	2.53E+00
09/28/16	1.69E+01	+/-	2.63E+00	1.83E+01	+/-	2.69E+00	1.48E+01	+/-	2.52E+00	2.78E+01	+/-	3.12E+00	1.90E+01	+/-	2.74E+00	1.54E+01	+/-	2.55E+00
10/04/16	7.06E+00	+/-	2.64E+00	5.82E+00	+/-	2.56E+00	6.28E+00	+/-	2.60E+00	9.16E+00	+/-	2.78E+00	6.14E+00	+/-	2.57E+00	6.63E+00	+/-	2.62E+00
10/11/16	1.57E+01	+/-	3.30E+00	1.16E+01	+/-	3.08E+00	1.58E+01	+/-	3.32E+00	1.34E+01	+/-	3.18E+00	1.21E+01	+/-	3.10E+00	1.23E+01	+/-	3.12E+00
10/19/16	8.18E+00	+/-	2.10E+00	1.16E+01	+/-	2.26E+00	2.33E+01	+/-	2.85E+00	1.16E+01	+/-	2.25E+00	1.63E+01	+/-	2.52E+00	1.63E+01	+/-	2.51E+00
10/25/16	9.72E+00	+/-	2.68E+00	9.80E+00	+/-	2.69E+00	1.27E+01	+/-	2.79E+00	1.14E+01	+/-	2.83E+00	1.23E+01	+/-	2.81E+00	1.43E+01	+/-	2.93E+00
11/02/16	1.34E+01	+/-	2.61E+00	1.34E+01	+/-	2.61E+00	1.60E+01	+/-	2.77E+00	1.47E+01	+/-	2.69E+00	1.46E+01	+/-	2.64E+00	1.62E+01	+/-	2.78E+00
11/15/16	8.92E+00	+/-	2.43E+00	1.18E+01	+/-	2.59E+00	1.37E+01	+/-	2.71E+00	1.72E+01	+/-	2.89E+00	1.27E+01	+/-	2.66E+00	1.14E+01	+/-	2.57E+00
11/22/16	2.57E+01	+/-	3.33E+00	2.43E+01	+/-	3.26E+00	2.29E+01	+/-	3.20E+00	2.88E+01	+/-	3.47E+00	2.63E+01	+/-	3.36E+00	2.02E+01	+/-	3.07E+00
11/29/16	2.60E+01	+/-	3.41E+00	1.88E+01	+/-	3.07E+00	2.22E+01	+/-	3.24E+00	2.11E+01	+/-	3.18E+00	1.48E+01	+/-	2.87E+00	2.26E+01	+/-	3.27E+00
12/07/16	1.11E+01	+/-	2.22E+00	9.47E+00	+/-	2.12E+00	1.29E+01	+/-	2.32E+00	1.35E+01	+/-	2.36E+00	1.31E+01	+/-	2.33E+00	1.19E+01	+/-	2.26E+00
12/14/16	1.68E+01	+/-	2.77E+00	1.18E+01	+/-	2.48E+00	2.02E+01	+/-	2.95E+00	1.72E+01	+/-	2.79E+00	1.48E+01	+/-	2.65E+00	1.53E+01	+/-	2.69E+00
12/20/16	1.08E+01	+/-	2.87E+00	8.91E+00	+/-	2.75E+00	1.17E+01	+/-	2.93E+00	1.76E+01	+/-	3.24E+00	1.18E+01	+/-	2.93E+00	1.36E+01	+/-	3.02E+00
12/27/16	1.67E+01	+/-	2.79E+00	1.49E+01	+/-	2.68E+00	2.03E+01	+/-	3.01E+00	2.22E+01	+/-	3.04E+00	1.69E+01	+/-	2.86E+00	2.45E+01	+/-	3.18E+00
MEAN	1.24E+01	+/-	2.60E+00	1.23E+01	+/-	2.60E+00	1.38E+01	+/-	2.68E+00	1.53E+01	+/-	2.76E+00	1.40E+01	+/-	2.70E+00	1.38E+01	+/-	2.68E+00
																Mean - All Indicator Locations	1.33E+01	+/-	2.70E+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
01/05/16	< 1.22E+01	< 2.86E+01	< 2.86E+01	< 2.85E+01	< 2.85E+01	< 2.42E+01	< 2.42E+01
01/12/16	< 1.02E+01	< 2.64E+01	< 2.77E+01	< 2.64E+01	< 2.64E+01	< 7.98E+00	< 2.06E+01
01/19/16	< 1.59E+01	< 4.08E+01	< 4.02E+01	< 4.14E+01	< 4.06E+01	< 3.20E+01	< 3.20E+01
01/29/16	< 3.46E+01	< 3.45E+01	< 3.50E+01	< 1.33E+01	< 3.47E+01	< 3.35E+01	< 3.33E+01
02/02/16	< 1.10E+01	< 2.83E+01	< 2.82E+01	< 2.83E+01	< 2.83E+01	< 3.82E+01	< 3.82E+01
02/10/16	< 1.93E+01	< 4.55E+01	< 4.39E+01	< 4.45E+01	< 4.52E+01	< 3.95E+01	< 3.96E+01
02/17/16	< 4.92E+00	< 1.12E+01	< 1.16E+01	< 1.15E+01	< 1.13E+01	< 1.10E+01	< 1.10E+01
02/23/16	< 4.67E+01	< 4.67E+01	< 4.69E+01	< 1.81E+01	< 4.67E+01	< 3.59E+01	< 3.59E+01
03/02/16	< 4.21E+01	< 4.21E+01	< 4.21E+01	< 4.21E+01	< 6.78E+01	< 6.78E+01	< 3.50E+01
03/08/16	< 1.36E+01	< 3.44E+01	< 3.37E+01	< 3.43E+01	< 3.40E+01	< 3.80E+01	< 3.81E+01
03/15/16	< 2.31E+01	< 1.19E+01	< 2.30E+01	< 2.30E+01	< 2.30E+01	< 2.17E+01	< 2.17E+01
03/23/16	< 1.61E+01	< 1.61E+01	< 1.61E+01	< 1.61E+01	< 1.96E+01	< 1.96E+01	< 1.96E+01
03/29/16	< 1.51E+01	< 3.84E+01	< 3.78E+01	< 3.78E+01	< 3.83E+01	< 4.48E+01	< 4.48E+01
04/05/16	< 1.53E+01	< 2.85E+01	< 2.92E+01	< 2.94E+01	< 2.86E+01	< 3.93E+01	< 3.92E+01
04/13/16	< 4.35E+01	< 4.42E+01	< 4.51E+01	< 4.45E+01	< 6.10E+01	< 6.08E+01	< 6.07E+01
04/20/16	< 1.40E+01	< 3.45E+01	< 3.45E+01	< 3.50E+01	< 3.45E+01	< 3.64E+01	< 3.64E+01
04/26/16	< 4.27E+01	< 4.44E+01	< 4.43E+01	< 4.37E+01	< 4.94E+01	< 4.95E+01	< 4.95E+01
05/03/16	< 4.01E+01	< 4.01E+01	< 4.02E+01	< 4.01E+01	< 5.00E+01	< 5.00E+01	< 5.00E+01
05/10/16	< 4.61E+01	< 4.63E+01	< 4.63E+01	< 1.94E+01	< 4.63E+01	< 1.49E+01	< 1.49E+01
05/17/16	< 1.81E+01	< 1.81E+01	< 1.81E+01	< 1.80E+01	< 7.01E+00	< 2.03E+01	< 2.03E+01
05/24/16	< 7.63E+00	< 1.96E+01	< 1.96E+01	< 1.96E+01	< 1.96E+01	< 2.31E+01	< 2.31E+01
05/31/16	< 3.58E+01	< 3.58E+01	< 1.39E+01	< 3.58E+01	< 3.58E+01	< 6.81E+01	< 6.81E+01
06/07/16	< 2.60E+01	< 6.47E+01	< 6.47E+01	< 6.53E+01	< 6.47E+01	< 6.76E+01	< 6.76E+01
06/14/16	< 2.35E+01	< 6.25E+01	< 6.27E+01	< 6.19E+01	< 6.25E+01	< 5.65E+01	< 5.65E+01
06/21/16	< 2.51E+01	< 6.44E+01	< 6.46E+01	< 6.44E+01	< 6.44E+01	< 5.97E+01	< 5.97E+01
06/28/16	< 5.64E+00	< 1.31E+01	< 1.26E+01	< 1.29E+01	< 1.30E+01	< 1.41E+01	< 1.42E+01

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

Period Ending	Station 21	Station 22	Station 28	Station 24**	Station 01A	Station 05A
01/05/16	< 2.42E+01	< 2.42E+01	< 2.50E+01	< 2.49E+01	< 2.52E+01	< 2.49E+01
01/12/16	< 2.07E+01	< 2.06E+01	< 2.07E+01	< 2.53E+01	< 2.52E+01	< 2.53E+01
01/19/16	< 3.20E+01	< 3.20E+01	< 3.51E+01	< 3.49E+01	< 3.51E+01	< 3.48E+01
01/29/16	< 3.34E+01	< 3.34E+01	< 3.79E+01	< 3.83E+01	< 3.82E+01	< 3.68E+01
02/02/16	< 4.55E+01	< 3.81E+01	< 3.37E+01	< 3.36E+01	< 3.37E+01	< 3.37E+01
02/10/16	< 3.91E+01	< 3.91E+01	< 2.71E+01	< 2.69E+01	< 2.78E+01	< 2.73E+01
02/17/16	< 1.11E+01	< 1.11E+01	< 1.21E+01	< 1.21E+01	< 1.17E+01	< 1.19E+01
02/23/16	< 3.61E+01	< 3.61E+01	< 2.73E+01	< 2.74E+01	< 2.73E+01	< 2.73E+01
03/02/16	< 6.78E+01	< 6.78E+01	< 4.19E+01	< 4.19E+01	< 4.19E+01	< 4.19E+01
03/08/16	< 3.74E+01	< 3.75E+01	< 3.06E+01	< 2.95E+01	< 3.08E+01	< 2.99E+01
03/15/16	< 2.17E+01	< 2.17E+01	< 2.41E+01	< 2.41E+01	< 2.41E+01	< 2.41E+01
03/23/16	< 1.96E+01	< 9.04E+00	< 1.67E+01	< 1.67E+01	< 1.67E+01	< 1.67E+01
03/29/16	< 4.48E+01	< 4.48E+01	< 4.10E+01	< 4.09E+01	< 4.15E+01	< 4.10E+01
04/05/16	< 3.93E+01	< 3.93E+01	< 3.25E+01	< 3.26E+01	< 3.22E+01	< 3.25E+01
04/13/16	< 6.15E+01	< 6.86E+01	< 6.70E+01	< 6.91E+01	< 2.80E+01	< 6.83E+01
04/20/16	< 3.65E+01	< 3.65E+01	< 3.92E+01	< 4.25E+01	< 4.06E+01	< 3.92E+01
04/26/16	< 4.93E+01	< 2.25E+01	< 4.18E+01	< 4.16E+01	< 4.02E+01	< 4.15E+01
05/03/16	< 5.01E+01	< 1.87E+01	< 4.81E+01	< 4.82E+01	< 4.98E+01	< 4.81E+01
05/10/16	< 1.49E+01	< 1.49E+01	< 2.00E+01	< 2.01E+01	< 2.00E+01	< 2.01E+01
05/17/16	< 2.03E+01	< 2.03E+01	< 1.94E+01	< 1.94E+01	< 1.94E+01	< 1.93E+01
05/24/16	< 2.30E+01	< 2.30E+01	< 3.74E+01	< 3.73E+01	< 3.74E+01	< 3.74E+01
05/31/16	< 6.80E+01	< 6.80E+01	< 5.38E+01	< 5.37E+01	< 5.38E+01	< 5.38E+01
06/07/16	< 6.76E+01	< 6.76E+01	< 6.02E+01	< 6.01E+01	< 6.19E+01	< 6.02E+01
06/14/16	< 5.67E+01	< 5.67E+01	< 5.26E+01	< 5.29E+01	< 5.10E+01	< 5.27E+01
06/21/16	< 5.99E+01	< 5.99E+01	< 2.83E+01	< 2.83E+01	< 2.83E+01	< 2.82E+01
06/28/16	< 1.39E+01	< 1.39E+01	< 2.99E+01	< 2.88E+01	< 3.02E+01	< 2.94E+01

** 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
07/05/16	< 5.70E+01	< 5.80E+01	< 6.13E+01	< 5.92E+01	< 4.27E+01	< 4.26E+01	< 4.24E+01
07/12/16	< 5.32E+01	< 5.34E+01	< 5.34E+01	< 5.34E+01	< 5.17E+01	< 5.17E+01	< 5.17E+01
07/19/16	< 2.18E+01	< 5.04E+01	< 5.07E+01	< 5.04E+01	< 5.04E+01	< 5.81E+01	< 5.81E+01
07/26/16	< 1.63E+01	< 3.85E+01	< 3.83E+01	< 3.85E+01	< 3.85E+01	< 5.10E+01	< 5.10E+01
08/02/16	< 4.23E+01	< 1.64E+01	< 4.23E+01	< 4.23E+01	< 4.23E+01	< 4.82E+01	< 4.82E+01
08/09/16	< 7.07E+00	< 1.83E+01	< 1.83E+01	< 1.83E+01	< 1.83E+01	< 2.45E+01	< 2.45E+01
08/17/16	< 1.24E+01	< 3.17E+01	< 3.17E+01	< 3.17E+01	< 3.17E+01	< 3.00E+01	< 3.00E+01
08/24/16	< 2.15E+01	< 5.16E+01	< 5.15E+01	< 5.18E+01	< 5.16E+01	< 4.93E+01	< 4.93E+01
08/30/16	< 3.26E+01	< 6.26E+01	< 6.25E+01	< 6.24E+01	< 6.26E+01	< 5.78E+01	< 5.78E+01
09/06/16	< 4.91E+01	< 4.91E+01	< 4.91E+01	< 4.91E+01	< 4.67E+01	< 4.67E+01	< 4.67E+01
09/14/16	< 9.39E+00	< 2.39E+01	< 2.35E+01	< 2.37E+01	< 2.36E+01	< 3.33E+01	< 3.33E+01
09/20/16	< 1.71E+01	< 4.08E+01	< 4.07E+01	< 4.07E+01	< 4.08E+01	< 5.10E+01	< 5.10E+01
09/28/16	< 1.90E+01	< 4.52E+01	< 4.43E+01	< 4.48E+01	< 4.52E+01	< 4.23E+01	< 4.23E+01
10/04/16	< 3.96E+01	< 3.99E+01	< 4.11E+01	< 4.05E+01	< 4.13E+01	< 4.11E+01	< 4.12E+01
10/11/16	< 4.79E+01	< 4.82E+01	< 2.09E+01	< 4.89E+01	< 4.83E+01	< 4.13E+01	< 4.14E+01
10/19/16	< 1.21E+01	< 2.85E+01	< 2.83E+01	< 2.83E+01	< 2.85E+01	< 2.42E+01	< 2.42E+01
10/25/16	< 5.52E+01	< 5.42E+01	< 5.85E+01	< 5.53E+01	< 4.56E+01	< 4.54E+01	< 4.53E+01
11/02/16	< 1.45E+01	< 3.37E+01	< 3.32E+01	< 3.29E+01	< 3.37E+01	< 3.84E+01	< 3.84E+01
11/15/16	< 2.33E+01	< 3.56E+01	< 3.55E+01	< 3.55E+01	< 1.58E+01	< 2.88E+01	< 2.88E+01
11/22/16	< 1.57E+01	< 3.72E+01	< 3.71E+01	< 3.72E+01	< 3.72E+01	< 3.31E+01	< 3.31E+01
11/29/16	< 4.23E+01	< 4.23E+01	< 4.22E+01	< 4.24E+01	< 4.43E+01	< 4.43E+01	< 4.43E+01
12/07/16	< 1.12E+01	< 2.66E+01	< 2.67E+01	< 2.66E+01	< 2.66E+01	< 2.52E+01	< 2.52E+01
12/14/16	< 9.86E+00	< 2.36E+01	< 2.36E+01	< 2.36E+01	< 2.36E+01	< 2.24E+01	< 2.24E+01
12/20/16	< 3.96E+01	< 3.94E+01	< 3.94E+01	< 1.66E+01	< 3.94E+01	< 3.11E+01	< 3.11E+01
12/27/16	< 1.87E+01	< 3.34E+01	< 3.22E+01	< 3.30E+01	< 3.31E+01	3.46E+01	< 3.44E+01
Mean	+/- 1.52E+01	+/- 3.35E+01	+/- 3.35E+01	+/- 3.36E+01	+/- 3.35E+01	+/- 4.21E+01	+/- 4.20E+01

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
07/05/16	< 4.30E+01	< 6.11E+01	< 5.97E+01	< 6.18E+01	< 2.48E+01	< 6.08E+01
07/12/16	< 5.17E+01	< 2.00E+01	< 4.47E+01	< 4.48E+01	< 4.47E+01	< 4.49E+01
07/19/16	< 5.84E+01	< 5.94E+01	< 5.62E+01	< 5.62E+01	< 5.45E+01	< 5.59E+01
07/26/16	< 5.07E+01	< 5.07E+01	< 4.93E+01	< 4.90E+01	< 4.93E+01	< 4.93E+01
08/02/16	< 4.82E+01	< 4.82E+01	< 4.17E+01	< 4.18E+01	< 4.17E+01	< 4.17E+01
08/09/16	< 2.46E+01	< 2.46E+01	< 2.98E+01	< 3.01E+01	< 2.98E+01	< 3.01E+01
08/17/16	< 3.00E+01	< 3.00E+01	< 2.80E+01	< 2.79E+01	< 2.80E+01	< 2.79E+01
08/24/16	< 4.93E+01	< 4.93E+01	< 3.47E+01	< 3.48E+01	< 3.45E+01	< 3.48E+01
08/30/16	< 5.77E+01	< 5.77E+01	< 4.91E+01	< 4.88E+01	< 4.93E+01	< 4.88E+01
09/06/16	< 4.67E+01	< 1.23E+01	< 3.17E+01	< 3.17E+01	< 3.17E+01	< 3.17E+01
09/14/16	< 3.30E+01	< 3.31E+01	< 3.90E+01	< 3.78E+01	< 3.92E+01	< 3.83E+01
09/20/16	< 5.10E+01	< 5.09E+01	< 5.51E+01	< 5.53E+01	< 5.51E+01	< 5.52E+01
09/28/16	< 4.23E+01	< 4.22E+01	< 4.61E+01	< 4.62E+01	< 4.64E+01	< 4.62E+01
10/04/16	< 4.11E+01	< 3.54E+01	< 3.55E+01	< 3.53E+01	< 1.37E+01	< 3.54E+01
10/11/16	< 4.13E+01	< 4.15E+01	< 3.89E+01	< 3.88E+01	< 3.86E+01	< 3.89E+01
10/19/16	< 2.50E+01	< 2.43E+01	< 3.20E+01	< 3.18E+01	< 3.22E+01	< 3.20E+01
10/25/16	< 4.64E+01	< 5.85E+01	< 2.36E+01	< 5.96E+01	< 5.75E+01	< 5.76E+01
11/02/16	< 3.79E+01	< 3.79E+01	< 2.68E+01	< 2.67E+01	< 2.61E+01	< 2.68E+01
11/15/16	< 2.87E+01	< 2.87E+01	< 3.03E+01	< 3.02E+01	< 3.04E+01	< 3.02E+01
11/22/16	< 3.31E+01	< 3.31E+01	< 3.35E+01	< 3.35E+01	< 3.35E+01	< 3.35E+01
11/29/16	< 4.42E+01	< 1.93E+01	< 4.61E+01	< 4.59E+01	< 4.61E+01	< 4.61E+01
12/07/16	< 2.52E+01	< 2.52E+01	< 2.31E+01	< 2.31E+01	< 2.31E+01	< 2.31E+01
12/14/16	< 2.24E+01	< 2.24E+01	< 2.91E+01	< 2.92E+01	< 2.91E+01	< 2.92E+01
12/20/16	< 3.11E+01	< 3.11E+01	< 4.17E+01	< 4.15E+01	< 4.17E+01	< 4.14E+01
12/27/16	< 3.40E+01	< 3.38E+01	< 3.63E+01	< 3.53E+01	< 3.67E+01	< 3.58E+01
MEAN	+/- 4.21E+01	+/- 4.21E+01	+/- 3.68E+01	+/- 3.68E+01	+/- 3.39E+01	+/- 3.68E+01
				Indicator Locations Mean		+/- 3.53E+01

** Control Station

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

Quarter 1

Sampling Location	Be-7			Cs-134*	Cs-137*		
01	1.39E+02	+/-	2.50E+01	< 1.16E+00	< 8.46E-01		
01A	1.18E+02	+/-	2.78E+01	< 1.10E+00	< 1.04E+00		
02	1.08E+02	+/-	2.48E+01	+/- 8.13E-01	< 8.15E-01		
03	1.13E+02	+/-	2.55E+01	< 1.32E+00	< 1.57E+00		
04	1.19E+02	+/-	2.78E+01	< 1.66E+00	< 1.22E+00		
05	1.31E+02	+/-	4.02E+01	< 1.97E+00	< 1.56E+00		
05A	1.10E+02	+/-	2.48E+01	+/- 9.17E-01	< 1.17E+00		
06	1.22E+02	+/-	3.58E+01	< 1.42E+00	< 1.03E+00		
07	8.89E+01	+/-	3.12E+01	+/- 9.32E-01	< 1.26E+00		
21	1.02E+02	+/-	3.55E+01	< 2.26E+00	< 1.49E+00		
22	9.61E+01	+/-	2.57E+01	< 1.23E+00	< 1.05E+00		
23	8.46E+01	+/-	1.97E+01	< 1.16E+00	< 1.06E+00		
24**	1.14E+02	+/-	2.40E+01	< 1.40E+00	< 9.60E-01		

Quarter 2

Sampling Location	Be-7			Cs-134*	Cs-137*	Sr-89	Sr-90
01	1.42E+02	+/-	2.58E+01	< 1.23E+00	< 8.75E-01	< 5.68E+00	< 1.93E+00
01A	1.52E+02	+/-	2.70E+01	< 1.19E+00	< 1.20E+00	< 8.93E+00	< 5.11E+00
02	1.71E+02	+/-	2.91E+01	< 1.26E+00	< 1.30E+00	< 5.71E+00	< 2.80E+00
03	1.72E+02	+/-	3.01E+01	< 1.26E+00	< 1.11E+00	< 5.29E+00	< 2.49E+00
04	1.42E+02	+/-	2.66E+01	< 8.49E-01	< 1.12E+00	< 4.28E+00	< 2.03E+00
05	1.50E+02	+/-	2.39E+01	< 1.11E+00	< 7.83E-01	< 4.83E+00	< 2.45E+00
05A	1.49E+02	+/-	2.66E+01	< 1.06E+00	< 9.32E-01	< 8.34E+00	< 3.19E+00
06	1.65E+02	+/-	2.76E+01	< 1.29E+00	< 1.30E+00	< 6.74E+00	< 2.88E+00
07	1.78E+02	+/-	3.08E+01	< 1.50E+00	< 1.18E+00	< 4.65E+00	< 2.55E+00
21	1.50E+02	+/-	2.48E+01	< 1.19E+00	< 1.09E+00	< 4.73E+00	< 1.92E+00
22	1.42E+02	+/-	2.21E+01	< 1.04E+00	< 1.02E+00	< 4.74E+00	< 1.82E+00
23	1.47E+02	+/-	2.77E+01	< 1.13E+00	< 1.18E+00	< 5.49E+00	< 2.60E+00
24**	2.06E+02	+/-	3.06E+01	< 1.33E+00	< 1.19E+00	< 4.81E+00	< 2.66E+00

* LLD identified in the ODCM

** Control Station

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

Quarter 3

Sampling Location	Be-7			Cs-134*		Cs-137*	
01	1.22E+02	+/-	2.32E+01	<	1.38E+00	<	1.26E+00
01A	1.17E+02	+/-	2.71E+01	<	1.19E+00	<	9.68E-01
02	1.13E+02	+/-	2.60E+01	<	9.59E-01	<	1.16E+00
03	1.54E+02	+/-	3.17E+01	<	1.38E+00	<	1.42E+00
04	1.27E+02	+/-	2.45E+01	<	1.36E+00	<	9.06E-01
05	1.68E+02	+/-	2.87E+01	<	1.36E+00	<	1.38E+00
05A	1.55E+02	+/-	3.42E+01	<	2.13E+00	<	1.57E+00
06	1.14E+02	+/-	2.40E+01	<	1.53E+00	<	1.25E+00
07	1.33E+02	+/-	2.44E+01	<	1.23E+00	<	1.26E+00
21	1.08E+02	+/-	2.57E+01	<	9.88E-01	<	1.00E+00
22	1.20E+02	+/-	3.34E+01	<	1.44E+00	<	1.23E+00
23	1.37E+02	+/-	2.46E+01	<	1.58E+00	<	1.25E+00
24**	1.63E+02	+/-	3.37E+01	<	1.15E+00	<	1.36E+00
MEAN							

Quarter 4

Sampling Location	Be-7			Cs-134*		Cs-137*		MEAN Be-7		
01	1.25E+02	+/-	2.00E+01	<	8.95E-01	<	9.98E-01	1.32E+02	+/-	2.35E+01
01A	1.06E+02	+/-	2.95E+01	<	1.63E+00	<	1.19E+00	1.23E+02	+/-	2.79E+01
02	1.12E+02	+/-	2.98E+01	<	1.73E+00	<	1.71E+00	1.26E+02	+/-	2.74E+01
03	1.39E+02	+/-	3.16E+01	<	2.00E+00	<	1.65E+00	1.45E+02	+/-	2.97E+01
04	1.08E+02	+/-	2.21E+01	<	1.18E+00	<	1.24E+00	1.24E+02	+/-	2.53E+01
05	1.25E+02	+/-	2.49E+01	<	1.58E+00	<	1.36E+00	1.44E+02	+/-	2.94E+01
05A	1.22E+02	+/-	2.19E+01	<	1.21E+00	<	1.40E+00	1.34E+02	+/-	2.69E+01
06	1.04E+02	+/-	2.25E+01	<	1.47E+00	<	1.44E+00	1.26E+02	+/-	2.75E+01
07	1.04E+02	+/-	1.97E+01	<	1.26E+00	<	7.71E-01	1.26E+02	+/-	2.65E+01
21	1.05E+02	+/-	2.18E+01	<	1.34E+00	<	1.20E+00	1.16E+02	+/-	2.70E+01
22	9.50E+01	+/-	3.05E+01	<	1.95E+00	<	1.74E+00	1.13E+02	+/-	2.79E+01
23	1.29E+02	+/-	3.21E+01	<	1.99E+00	<	1.71E+00	1.24E+02	+/-	2.60E+01
24**	1.25E+02	+/-	2.28E+01	<	1.23E+00	<	1.09E+00	1.52E+02	+/-	2.78E+01
						Mean of All Indicator Location:		1.28E+02	+/-	2.71E+01

* LLD Identified in ODCM

** Control Station

Table 3-6
Soil
[pCi/kg]

Sample Date	Station	Sr-89			Sr-90			K-40			Cs-134		
		Acivity Conc	2 Sigma	MDC	Acivity Conc	2 Sigma	MDC	Acivity Conc	2 Sigma	MDC	Acivity Conc	2 Sigma	MDC
7/12/16	01		<	6.74E+02		<	3.36E+01	1.60E+04	+/-	2.17E+03		<	6.91E+01
7/12/16	02		<	5.38E+02		<	2.95E+01	8.73E+03	+/-	2.21E+03		<	8.91E+01
7/12/16	03		<	7.20E+02		<	4.06E+01	6.04E+03	+/-	1.24E+03		<	7.94E+01
7/12/16	04		<	6.55E+02		<	2.44E+01	4.60E+03	+/-	1.29E+03		<	8.88E+01
7/12/16	05		<	6.80E+02		<	2.92E+01	1.10E+04	+/-	1.93E+03		<	7.45E+01
7/12/16	05A		<	5.48E+02		<	2.70E+01	1.41E+04	+/-	1.88E+03		<	8.75E+01
7/12/16	06		<	5.34E+02		<	2.48E+01	1.08E+04	+/-	1.56E+03		<	1.42E+02
7/12/16	07		<	4.92E+02		<	2.22E+01	1.22E+04	+/-	1.63E+03		<	9.35E+01
7/12/16	21		<	7.62E+02		<	3.46E+01	1.08E+04	+/-	2.20E+03		<	1.03E+02
7/12/16	22		<	6.42E+02		<	3.02E+01	1.60E+04	+/-	2.32E+03		<	9.23E+01
7/12/16	23		<	6.24E+02		<	4.10E+01	3.24E+04	+/-	2.62E+03		<	9.18E+01
7/12/16	24*		<	3.96E+02		<	2.25E+01	3.06E+04	+/-	2.43E+03		<	7.61E+01

Sample Date	Station	Cs-137			Ra-226			Th-228			Th-232		
		Acivity Conc	2 Sigma	MDC	Acivity Conc	2 Sigma	MDC	Acivity Conc	2 Sigma	MDC	Acivity Conc	2 Sigma	MDC
7/12/16	01		<	8.83E+01	3.89E+03	+/-	3.77E+03	9.24E+02	+/-	1.55E+02	8.82E+02	+/-	2.88E+02
7/12/16	02	4.59E+02	+/-	1.52E+02		<	3.21E+03	5.03E+02	+/-	2.05E+02		<	7.99E+02
7/12/16	03	1.78E+02	+/-	1.08E+02		<	1.71E+03	6.30E+02	+/-	1.24E+02	5.15E+02	+/-	3.00E+02
7/12/16	04	1.77E+02	+/-	9.70E+01	2.50E+03	+/-	2.43E+03	6.46E+02	+/-	2.80E+02		<	5.31E+02
7/12/16	05	4.45E+02	+/-	1.24E+02		<	2.10E+03	4.87E+02	+/-	1.44E+02	7.31E+02	+/-	3.10E+02
7/12/16	05A		<	9.94E+01	5.09E+03	+/-	2.24E+03	3.36E+03	+/-	2.05E+02	3.46E+03	+/-	3.55E+02
7/12/16	06	6.46E+02	+/-	1.40E+02		<	2.51E+03	7.91E+02	+/-	2.10E+02	9.00E+02	+/-	1.99E+02
7/12/16	07		<	1.31E+02	3.45E+03	+/-	2.81E+03	2.57E+03	+/-	2.08E+02	2.46E+03	+/-	2.77E+02
7/12/16	21		<	1.52E+02	3.82E+03	+/-	2.27E+03	2.90E+03	+/-	3.03E+02	2.49E+03	+/-	4.41E+02
7/12/16	22		<	1.13E+02	5.51E+03	+/-	2.55E+03	3.65E+03	+/-	2.46E+02	3.11E+03	+/-	4.04E+02
7/12/16	23	2.69E+02	+/-	7.41E+01	2.40E+03	+/-	1.57E+03	1.62E+03	+/-	1.54E+02	1.41E+03	+/-	2.66E+02
7/12/16	24*		<	8.29E+01		<	1.82E+03	2.09E+02	+/-	1.23E+02		<	4.04E+02

*Control Station

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

Sampling Date	Gross Beta			H-3			Rainfall (inches)
01/27/16		<	1.58E+00	<	9.64E+02		1.92
02/23/16	3.14E+00	+/-	1.10E+00	<	8.85E+02		3.46
03/29/16	2.69E+00	+/-	1.09E+00	<	9.47E+02		2.89
04/26/16	6.21E+00	+/-	1.22E+00	<	9.47E+02		1.26
05/31/16	1.97E+00	+/-	1.04E+00	<	9.25E+02		8.42
06/28/16		+/-	1.37E+00	<	8.34E+02		5.51
07/26/16	4.30E+00	<	0.00E+00	<	0.00E+00		4.60
08/30/16	4.98E+00	<	0.00E+00	<	0.00E+00		5.35
09/28/16	1.93E+00	<	0.00E+00	<	0.00E+00		4.74
10/25/16	1.90E+00	<	0.00E+00	<	0.00E+00		4.69
11/29/16	6.83E+00	<	0.00E+00	<	0.00E+00		1.75
12/27/16	6.17E+00	<	0.00E+00	<	0.00E+00		2.92
Mean	4.01E+00	+/-	4.47E-01	<	4.59E+02	Total	47.51

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

Sampling Location	Be-7			Mn-54			Fe-59			Co-58			Co-60		
01A															
06/28/16	5.10E+01	+/-	3.54E+01	<	1.67E+00	<	1.44E+01	<	3.95E+00				<	1.40E+00	
12/27/16		<	2.44E+01	<	7.74E-01	<	6.13E+00	<	1.78E+00				<	7.81E-01	

Sampling Location	Zn-65			Zr-95			Nb-95			Cs-134			Cs-137		
01A															
06/28/16		<	3.52E+00	<	7.54E+00	<	4.54E+00	<	1.41E+00				<	1.31E+00	
12/27/16		<	1.73E+00	<	3.41E+00	<	2.04E+00	<	6.71E-01				<	7.08E-01	

Sampling Location	Ba-140			La-140			I-131			Th-228					
01A															
06/28/16		<	2.16E+03	<	7.15E+02	<	2.51E+04			5.30E+00	+/-	3.61E+00			
12/27/16		<	9.75E+02	<	2.94E+02	<	1.01E+04	<	1.31E+00						

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				5.30E+00	+/- 3.61E+00

* No mean values. All results were <MDA

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

Station 12A

Sampling Date	K-40			Sr-89		Sr-90		I-131*		Cs-134*		Cs-137*		Ba-140*		La-140*	
01/19/16	1.40E+03	+/-	6.73E+01	[a]		[a]		<	8.14E+01	<	2.34E+00	<	2.71E+00	<	1.23E+01	<	3.61E+00
02/17/16	1.33E+03	+/-	1.49E+02	[a]		[a]		<	7.72E-01	<	5.62E+00	<	7.69E+00	<	3.07E+01	<	8.75E+00
03/15/16	1.27E+03	+/-	1.69E+02	<	0.00E+00	<	0.00E+00	<	4.53E-01	<	8.13E+00	<	8.96E+00	<	3.20E+01	<	1.49E+01
04/20/16	1.22E+03	+/-	2.07E+02	[a]		[a]		<	4.16E-01	<	7.79E+00	<	1.07E+01	<	4.81E+01	<	8.68E+00
05/17/16	1.40E+03	+/-	1.33E+02	[a]		[a]		<	4.80E-01	<	5.76E+00	<	6.20E+00	<	2.73E+01	<	9.29E+00
06/21/16	1.46E+03	+/-	2.39E+02	<	4.46E+00	<	1.09E+00	<	7.22E-01	<	5.57E+00	<	6.60E+00	<	3.42E+01	<	1.34E+01
07/19/16	1.46E+03	+/-	1.68E+02	[a]		[a]		<	3.19E-01	<	7.20E+00	<	6.53E+00	<	2.49E+01	<	5.50E+00
08/17/16	1.43E+03	+/-	1.63E+02	[a]		[a]		<	5.33E-01	<	7.35E+00	<	8.11E+00	<	2.61E+01	<	7.38E+00
09/20/16	1.32E+03	+/-	1.78E+02	<	4.31E+00	<	1.38E+00	<	6.73E-01	+/-	7.98E+00	<	1.14E+01	<	4.63E+01	<	1.06E+01
10/19/16	1.44E+03	+/-	1.19E+02	[a]		[a]		<	5.61E-01	<	4.24E+00	<	5.35E+00	<	2.44E+01	<	6.79E+00
11/15/16	1.39E+03	+/-	2.06E+02	[a]		[a]		<	8.49E-01	<	7.70E+00	<	8.71E+00	<	3.10E+01	<	8.84E+00
12/20/16	1.35E+03	+/-	1.83E+02	<	4.35E+00	<	1.49E+00	<	6.87E-01	<	7.46E+00	<	8.53E+00	<	3.66E+01	<	8.51E+00
Sta. Mean	1.37E+03	+/-	1.65E+02														

* LLD identified in ODCM

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

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

Sampling Location	Sampling Date	Be-7	K-40	I-131*	Cs-134*	Cs-137*
	04/13/16	1.45E+03 +/- 1.72E+02	5.54E+03 +/- 3.72E+02	< 3.79E+01	< 1.96E+01	< 2.01E+01
14B	05/10/16	1.44E+03 +/- 3.96E+02	7.41E+03 +/- 7.03E+02	< 1.10E+01	< 3.33E+01	< 3.81E+01
	06/14/16	9.20E+02 +/- 3.07E+02	5.89E+03 +/- 7.16E+02	< 5.47E+01	< 3.22E+01	< 3.43E+01
	07/12/16	2.70E+03 +/- 4.20E+02	5.34E+03 +/- 7.56E+02	< 2.85E+01	< 3.69E+01	< 3.85E+01
	08/09/16	7.30E+02 +/- 4.35E+02	4.57E+03 +/- 8.91E+02	< 2.20E+01	< 4.45E+01	< 4.38E+01
	09/14/16	4.73E+02 +/- 2.37E+02	6.59E+03 +/- 7.92E+02	< 2.78E+01	< 3.44E+01	< 3.66E+01
	10/11/16	1.61E+03 +/- 3.16E+02	4.75E+03 +/- 5.67E+02	< 1.80E+01	< 2.25E+01	< 2.55E+01
	11/10/16	7.19E+02 +/- 2.05E+02	4.36E+03 +/- 3.74E+02	< 2.35E+01	< 2.41E+01	< 2.62E+01
	Mean	1.26E+03 +/- 3.11E+02	5.56E+03 +/- 6.46E+02	+/-	+/-	+/-

Sampling Location	Sampling Date	Be-7	K-40	I-131*	Cs-134*	Cs-137*
15	04/13/16	8.66E+02 +/- 1.54E+02	6.69E+03 +/- 3.48E+02	< 3.63E+01	< 1.55E+01	< 1.64E+01
	05/10/16	2.51E+03 +/- 3.89E+02	6.70E+03 +/- 6.54E+02	< 1.35E+01	< 3.28E+01	< 3.65E+01
	06/14/16	9.60E+02 +/- 2.04E+02	7.15E+03 +/- 5.07E+02	< 4.62E+01	< 2.05E+01	< 2.36E+01
	07/12/16	2.03E+03 +/- 4.64E+02	5.02E+03 +/- 7.31E+02	< 2.38E+01	< 3.42E+01	< 3.22E+01
	08/09/16	1.07E+03 +/- 4.38E+02	4.01E+03 +/- 6.79E+02	< 2.98E+01	< 4.23E+01	< 3.80E+01
	09/14/16	3.16E+03 +/- 3.62E+02	2.94E+03 +/- 5.19E+02	< 2.15E+01	< 2.94E+01	< 3.04E+01
	10/11/16	3.16E+03 +/- 4.02E+02	5.28E+03 +/- 6.40E+02	< 1.21E+01	< 2.76E+01	< 3.41E+01
	11/10/16	3.16E+03 +/- 1.81E+02	5.88E+03 +/- 3.65E+02	< 2.19E+01	< 1.79E+01	< 1.84E+01
	Mean	2.11E+03 +/- 3.24E+02	5.46E+03 +/- 5.55E+02	+/-	+/-	+/-

Sampling Location	Sampling Date	Be-7	K-40	I-131*	Cs-134*	Cs-137*
16**	04/13/16	1.11E+03 +/- 2.08E+02	5.99E+03 +/- 3.61E+02	< 3.22E+01	< 1.84E+01	< 1.87E+01
	05/10/16	1.40E+03 +/- 2.95E+02	3.82E+03 +/- 5.86E+02	< 1.35E+01	< 3.31E+01	< 3.66E+01
	06/14/16	1.66E+03 +/- 1.99E+02	8.36E+03 +/- 4.63E+02	< 3.37E+01	< 1.78E+01	< 1.90E+01
	07/12/16	1.70E+03 +/- 3.45E+02	3.46E+03 +/- 5.85E+02	< 2.95E+01	< 2.87E+01	< 3.14E+01
	08/09/16	1.20E+03 +/- 5.60E+02	3.76E+03 +/- 8.38E+02	< 2.86E+01	< 4.51E+01	< 5.14E+01
	09/14/16	1.06E+03 +/- 3.51E+02	4.72E+03 +/- 6.18E+02	< 2.99E+01	< 3.02E+01	< 2.91E+01
	10/11/16	2.38E+03 +/- 3.92E+02	3.57E+03 +/- 5.44E+02	< 1.48E+01	< 2.65E+01	< 2.70E+01
	11/10/16	1.40E+03 +/- 1.85E+02	4.90E+03 +/- 4.25E+02	< 2.57E+01	< 2.33E+01	< 2.41E+01
	Mean	1.49E+03 +/- 3.17E+02	4.82E+03 +/- 5.53E+02	+/-	+/-	+/-

* LLD identified in ODCM

** Control Station

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

Sampling Location	Sampling Date	Be-7			K-40			I-131*			Cs-134*			Cs-137*		
23	04/13/16	1.55E+03	+/-	2.35E+02	6.97E+03	+/-	5.31E+02	<	4.49E+01		<	2.33E+01		<	2.46E+01	
	05/10/16	1.77E+03	+/-	3.50E+02	5.11E+03	+/-	6.20E+02	<	1.88E+01		<	3.21E+01		<	3.64E+01	
	06/14/16	1.24E+03	+/-	1.84E+02	7.10E+03	+/-	3.80E+02	<	4.91E+01		<	1.78E+01		<	1.89E+01	
	07/12/16	2.36E+03	+/-	3.97E+02	4.39E+03	+/-	6.12E+02	<	2.81E+01		<	3.26E+01		<	3.45E+01	
	08/09/16	1.82E+03	+/-	3.96E+02	4.22E+03	+/-	6.75E+02	<	2.46E+01		<	3.98E+01		<	3.56E+01	
	09/14/16	6.71E+02	+/-	2.72E+02	5.93E+03	+/-	6.98E+02	<	2.52E+01		<	3.08E+01		<	3.17E+01	
	10/11/16	4.48E+03	+/-	4.85E+02	3.05E+03	+/-	6.25E+02	<	1.83E+01		<	3.32E+01		<	3.49E+01	
	11/10/16	5.79E+02	+/-	1.90E+02	5.54E+03	+/-	4.57E+02	<	2.70E+01		<	2.05E+01		<	2.13E+01	
	Mean	1.81E+03	+/-	3.14E+02	5.29E+03	+/-	5.75E+02	+/-			+/-			+/-		
Sampling Location	Sampling Date	Be-7			K-40			I-131*			Cs-134*			Cs-137*		
26	04/13/16	6.53E+02	+/-	1.70E+02	5.62E+03	+/-	3.68E+02	<	3.32E+01		<	1.88E+01		<	2.05E+01	
	05/10/16	1.03E+03	+/-	2.58E+02	5.11E+03	+/-	5.77E+02	<	1.16E+01		<	3.10E+01		<	3.16E+01	
	06/14/16	5.33E+02	+/-	2.74E+02	6.00E+03	+/-	7.52E+02	<	4.95E+01		<	2.67E+01		<	3.03E+01	
	07/12/16	1.78E+03	+/-	2.59E+02	7.00E+03	+/-	5.23E+02	<	3.01E+01		<	2.30E+01		<	2.64E+01	
	08/19/16	1.74E+03	+/-	5.88E+02	4.73E+03	+/-	1.13E+03	<	1.87E+01		<	5.86E+01		<	6.93E+01	
	09/14/16	1.66E+03	+/-	3.01E+02	5.46E+03	+/-	5.47E+02	<	3.81E+01		<	3.06E+01		<	3.25E+01	
	10/11/16	2.89E+03	+/-	4.90E+02	3.90E+03	+/-	6.18E+02	<	1.60E+01		<	3.44E+01		<	3.46E+01	
	11/10/16	1.13E+03	+/-	2.00E+02	3.81E+03	+/-	3.79E+02	<	2.49E+01		<	1.84E+01		<	2.23E+01	
	Mean	1.43E+03	+/-	3.18E+02	5.20E+03	+/-	6.12E+02	+/-			+/-			+/-		
Indicator locations		1.65E+03	+/-	3.17E+02	5.38E+03	+/-	5.97E+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
03/29/16	< 1.96E+03	[a]	[a]	< 3.77E+00	< 8.46E+00	< 4.35E+00	< 4.72E+00	< 8.37E+00
06/28/16	< 1.04E+03	< 3.47E+00	< 5.92E-01	< 4.95E+00	< 6.23E+00	< 2.50E+00	< 4.68E+00	< 7.94E+00
09/28/16	< 9.23E+02	[a]	[a]	< 5.44E+00	< 1.06E+01	< 5.48E+00	< 5.54E+00	< 1.07E+01
12/27/16	< 8.35E+02	[a]	[a]	< 4.34E+00	< 8.77E+00	< 5.12E+00	< 4.38E+00	< 1.09E+01
Mean								

Sampling Date	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
03/29/16	< 7.67E+00	< 4.77E+00	< 6.46E-01	< 4.71E+00	< 4.44E+00	< 2.00E+01	< 6.86E+00
06/28/16	< 6.78E+00	< 4.67E+00	< 5.57E-01	< 5.32E+00	< 4.99E+00	< 3.01E+01	< 9.35E+00
09/28/16	< 8.32E+00	< 6.39E+00	< 8.26E-01	< 5.20E+00	< 5.03E+00	< 2.65E+01	< 1.00E+01
12/27/16	< 9.75E+00	< 5.10E+00	< 7.74E-01	< 5.38E+00	< 4.90E+00	< 2.17E+01	< 6.73E+00
Mean							

[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*
01/12/16	[a]	[b]	[b]	< 4.70E+00	< 1.11E+01	< 4.48E+00	< 5.84E+00	< 1.07E+01
02/16/16	[a]	[b]	[b]	< 3.94E+00	< 8.70E+00	< 3.84E+00	< 4.28E+00	< 7.11E+00
03/14/16	4.16E+03 +/- 1.11E+03	[b]	[b]	< 5.95E+00	< 1.16E+01	< 5.10E+00	< 7.06E+00	< 1.11E+01
04/12/16	[a]	[b]	[b]	< 1.72E+00	< 3.36E+00	< 1.65E+00	< 1.72E+00	< 3.48E+00
05/16/16	[a]	[b]	[b]	< 4.24E+00	< 1.04E+01	< 5.07E+00	< 5.26E+00	< 9.14E+00
06/13/16	4.23E+03 +/- 8.47E+02	< 4.43E+00	< 7.47E-01	< 4.64E+00	< 8.56E+00	< 4.03E+00	< 4.44E+00	< 1.05E+01
07/11/16	[a]	[b]	[b]	< 4.50E+00	< 1.04E+01	< 4.64E+00	< 4.45E+00	< 8.85E+00
08/15/16	[a]	[b]	[b]	< 4.29E+00	< 9.71E+00	< 4.23E+00	< 5.50E+00	< 9.83E+00
09/12/16	3.34E+03 +/- 7.88E+02	[b]	[b]	< 4.03E+00	< 8.31E+00	< 4.19E+00	< 4.56E+00	< 7.66E+00
10/10/16	[a]	[b]	[b]	< 3.13E+00	< 6.98E+00	< 3.22E+00	< 3.21E+00	< 6.19E+00
11/14/16	[a]	[b]	[b]	< 4.46E+00	< 8.66E+00	< 4.42E+00	< 4.73E+00	< 1.07E+01
12/12/16	3.97E+03 +/- 7.91E+02	[b]	[b]	< 4.52E+00	< 9.98E+00	< 5.51E+00	< 4.64E+00	< 1.00E+01
MEAN	3.93E+03 +/- 8.84E+02	+/-	+/-	+/-	+/-	+/-	+/-	+/-

Sampling Date	Nb-95*	Zr-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/12/16	< 9.09E+00	< 5.45E+00	< 6.35E-01	< 4.63E+00	< 5.54E+00	< 2.78E+01	< 5.42E+00
02/16/16	< 7.90E+00	< 4.10E+00	< 5.46E-01	< 3.96E+00	< 4.68E+00	< 2.07E+01	< 6.45E+00
03/14/16	< 1.12E+01	< 6.64E+00	< 3.73E-01	< 5.18E+00	< 6.10E+00	< 2.35E+01	< 5.08E+00
04/12/16	< 3.02E+00	< 1.70E+00	< 5.07E-01	< 1.57E+00	< 1.71E+00	< 8.63E+00	< 2.64E+00
05/16/16	< 8.70E+00	< 5.13E+00	< 5.10E-01	< 4.51E+00	< 4.12E+00	< 2.45E+01	< 8.32E+00
06/13/16	< 8.20E+00	< 5.69E+00	< 7.34E-01	< 3.98E+00	< 4.35E+00	< 2.14E+01	< 5.90E+00
07/11/16	< 8.17E+00	< 4.92E+00	< 3.99E-01	< 4.04E+00	< 4.81E+00	< 2.51E+01	< 8.81E+00
08/15/16	< 7.93E+00	< 4.83E+00	< 5.49E-01	< 3.39E+00	< 5.58E+00	< 2.20E+01	< 5.92E+00
09/12/16	< 7.01E+00	< 4.61E+00	< 5.24E-01	< 3.89E+00	< 3.82E+00	< 2.41E+01	< 8.80E+00
10/10/16	< 5.79E+00	< 3.22E+00	< 3.32E-01	< 3.07E+00	< 3.42E+00	< 1.68E+01	< 5.82E+00
11/14/16	< 8.60E+00	< 6.36E+00	< 4.34E-01	< 4.03E+00	< 5.12E+00	< 2.15E+01	< 6.93E+00
12/12/16	< 1.03E+01	< 5.87E+00	< 4.60E-01	< 5.12E+00	< 5.36E+00	< 2.13E+01	< 8.29E+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 08

Sampling Date	H-3*	Sr-89	Sr-90	Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*
01/12/16	[a]	[b]	[b]	< 4.87E+00	< 8.71E+00	< 4.94E+00	< 4.46E+00	< 1.22E+01
02/16/16	[a]	[b]	[b]	< 3.91E+00	< 7.00E+00	< 3.34E+00	< 3.45E+00	< 8.16E+00
03/14/16	5.81E+03 +/- 1.21E+03	[b]	[b]	< 3.78E+00	< 9.96E+00	< 3.12E+00	< 4.37E+00	< 8.61E+00
04/12/16	[a]	[b]	[b]	< 2.57E+00	< 6.06E+00	< 2.81E+00	< 2.92E+00	< 5.19E+00
05/16/16	[a]	[b]	[b]	< 4.52E+00	< 9.69E+00	< 4.34E+00	< 4.83E+00	< 9.61E+00
06/13/16	3.77E+03 +/- 8.16E+02	< 4.14E+00	< 5.55E-01	< 4.87E+00	< 1.21E+01	< 5.86E+00	< 5.08E+00	< 9.78E+00
07/11/16	[a]	[b]	[b]	< 4.25E+00	< 9.70E+00	< 5.19E+00	< 4.94E+00	< 9.07E+00
08/15/16	[a]	[b]	[b]	< 4.27E+00	< 9.97E+00	< 5.14E+00	< 4.84E+00	< 8.17E+00
09/12/16	3.92E+03 +/- 8.16E+02	[b]	[b]	< 3.75E+00	< 8.72E+00	< 3.89E+00	< 4.62E+00	< 7.23E+00
10/10/16	[a]	[b]	[b]	< 3.12E+00	< 6.53E+00	< 3.30E+00	< 3.22E+00	# +/- 5.62E+00
11/14/16	[a]	[b]	[b]	< 4.97E+00	< 1.43E+01	< 4.48E+00	< 5.68E+00	< 1.55E+01
12/12/16	3.58E+03 +/- 7.64E+02	[b]	[b]	< 3.97E+00	< 9.64E+00	< 3.91E+00	< 4.31E+00	< 9.68E+00
Mean	4.27E+03 +/- 9.02E+02	+/-	+/-	+/-	+/-	+/-	+/-	+/-

Sampling Date	Zr-95*	Nb-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/12/16	< 1.04E+01	< 5.38E+00	< 5.74E-01	< 4.59E+00	< 3.69E+00	< 2.39E+01	< 6.48E+00
02/16/16	< 6.44E+00	< 3.74E+00	< 4.39E-01	< 3.40E+00	< 3.53E+00	< 1.67E+01	< 6.74E+00
03/14/16	< 6.47E+00	< 3.99E+00	< 5.18E-01	< 3.77E+00	< 4.06E+00	< 1.73E+01	< 6.68E+00
04/12/16	< 4.67E+00	< 2.72E+00	< 5.67E-01	< 2.45E+00	< 2.75E+00	< 1.36E+01	< 4.42E+00
05/16/16	< 9.33E+00	< 5.08E+00	< 5.92E-01	< 4.20E+00	< 5.36E+00	< 2.58E+01	< 8.89E+00
06/13/16	< 9.38E+00	< 5.11E+00	< 5.65E-01	< 4.73E+00	< 5.31E+00	< 2.84E+01	< 1.04E+01
07/11/16	< 8.55E+00	< 4.43E+00	< 4.79E-01	< 4.40E+00	< 5.51E+00	< 2.55E+01	< 8.85E+00
08/15/16	< 8.51E+00	< 4.89E+00	< 3.69E-01	< 4.84E+00	< 4.80E+00	< 2.31E+01	< 7.67E+00
09/12/16	< 6.99E+00	< 4.34E+00	< 6.37E-01	< 3.74E+00	< 3.95E+00	< 2.42E+01	< 8.42E+00
10/10/16	< 5.40E+00	5.93E+00 +/- 2.37E+00	< 3.40E-01	3.95E+01 +/- 3.92E+00	< 3.24E+00	< 1.51E+01	< 5.15E+00
11/14/16	< 9.26E+00	< 8.33E+00	< 5.43E-01	< 6.12E+00	< 6.42E+00	< 1.95E+01	< 6.56E+00
12/12/16	< 7.08E+00	< 5.17E+00	< 3.66E-01	< 4.23E+00	< 5.22E+00	< 2.05E+01	< 5.57E+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*
01/12/16	[a]	[b]	[b]	< 3.72E+00	< 1.36E+01	< 3.23E+00	< 2.48E+00	< 1.23E+01
02/16/16	[a]	[b]	[b]	< 3.78E+00	< 8.87E+00	< 3.86E+00	< 4.27E+00	< 8.24E+00
03/14/16	< 1.32E+03	[b]	[b]	< 6.27E+00	< 1.04E+01	< 6.14E+00	< 6.23E+00	< 1.12E+01
04/12/16	[a]	[b]	[b]	< 1.24E+00	< 3.14E+00	< 1.31E+00	< 1.35E+00	< 2.53E+00
05/16/16	[a]	[b]	[b]	< 5.36E+00	< 1.11E+01	< 5.49E+00	< 5.39E+00	< 1.03E+01
06/13/16	< 9.93E+02	< 4.84E+00	< 5.49E-01	< 4.64E+00	< 9.69E+00	< 4.95E+00	< 6.14E+00	< 8.72E+00
07/11/16	[a]	[b]	[b]	< 4.61E+00	< 1.02E+01	< 4.19E+00	< 5.41E+00	< 1.02E+01
08/15/16	[a]	[b]	[b]	< 5.92E+00	< 1.34E+01	< 6.13E+00	< 5.55E+00	< 1.18E+01
09/12/16	< 9.37E+02	[b]	[b]	< 3.22E+00	< 6.45E+00	< 3.04E+00	< 3.61E+00	< 5.55E+00
10/10/16	[a]	[b]	[b]	< 3.39E+00	< 7.51E+00	< 3.49E+00	< 3.63E+00	< 7.74E+00
11/14/16	[a]	[b]	[b]	< 6.12E+00	< 1.46E+01	< 5.45E+00	< 6.40E+00	< 1.43E+01
12/12/16	< 8.64E+02	[b]	[b]	< 5.19E+00	< 8.91E+00	< 4.92E+00	< 5.05E+00	< 1.00E+01
MEAN	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-

Sampling Date	Zr-95*	Nb-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/12/16	< 8.15E+00	< 4.83E+00	< 6.81E-01	< 6.60E+00	< 4.12E+00	< 2.30E+01	< 1.42E+01
02/16/16	< 8.24E+00	< 4.35E+00	< 3.87E-01	< 3.64E+00	< 4.66E+00	< 1.91E+01	< 6.51E+00
03/14/16	< 9.58E+00	< 6.77E+00	< 3.68E-01	< 6.29E+00	< 5.70E+00	< 2.39E+01	< 9.38E+00
04/12/16	< 2.50E+00	< 1.45E+00	< 4.09E-01	< 1.16E+00	< 1.26E+00	< 9.96E+00	< 3.21E+00
05/16/16	< 9.09E+00	< 6.30E+00	< 5.50E-01	< 5.02E+00	< 5.50E+00	< 2.76E+01	< 7.93E+00
06/13/16	< 7.65E+00	< 5.44E+00	< 9.19E-01	< 4.95E+00	< 5.57E+00	< 2.51E+01	< 8.56E+00
07/11/16	< 8.66E+00	< 5.37E+00	< 4.50E-01	< 4.33E+00	< 4.88E+00	< 2.26E+01	< 7.37E+00
08/15/16	< 1.02E+01	< 5.03E+00	< 5.56E-01	< 5.04E+00	< 5.95E+00	< 2.95E+01	< 8.06E+00
09/12/16	< 6.58E+00	< 3.54E+00	< 6.01E-01	< 3.27E+00	< 3.67E+00	< 1.96E+01	< 6.39E+00
10/10/16	< 5.79E+00	< 3.54E+00	< 3.64E-01	< 3.80E+00	< 3.70E+00	< 1.66E+01	< 6.13E+00
11/14/16	< 9.86E+00	< 7.78E+00	< 4.78E-01	< 6.36E+00	< 7.12E+00	< 3.12E+01	< 8.85E+00
12/12/16	< 9.97E+00	< 6.25E+00	< 4.51E-01	< 4.98E+00	< 5.43E+00	< 2.27E+01	< 6.56E+00
MEAN	+/-	+/-	+/-	+/-	+/-	+/-	+/-

* LLD identified in ODCM

[a] Tritium analyses on quarterly composite.

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

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

Sample Date	Sr-89	Sr-90	K-40	Cs-134*	Cs-137*
4/21/2016					
Station 08	[a]	[a]	1.28E+03 +/- 4.28E+02	< 3.04E+01	< 2.88E+01
Station 09A**	[a]	[a]	2.25E+04 +/- 1.63E+03	< 5.21E+01	< 6.13E+01
Station 11	[a]	[a]	1.40E+04 +/- 1.39E+03	< 5.68E+01	< 7.84E+01

	Ra-226	Th-228	Th-232
4/21/2016			
Station 08	7.64E+02 +/- 6.71E+02	1.12E+02 +/- 4.45E+01	< 1.65E+02
Station 09A**	2.76E+03 +/- 9.70E+02	7.69E+02 +/- 1.05E+02	8.45E+02 +/- 1.52E+02
Station 11	< 1.23E+03	4.26E+02 +/- 1.13E+02	5.25E+02 +/- 1.67E+02

Sample Date	Sr-89	Sr-90	K-40	Cs-134*	Cs-137*
10/18/2016					
Station 08	< 1.70E+02	< 3.37E+01	1.72E+03 +/- 4.68E+02	< 4.02E+01	< 3.30E+01
Station 09A**	< 2.01E+02	< 3.52E+01	2.36E+04 +/- 1.44E+03	< 8.33E+01	< 6.13E+01
Station 11	< 1.83E+02	< 3.71E+01	2.18E+04 +/- 1.25E+03	< 6.30E+01	< 5.96E+01

	Ra-226	Th-228	Th-232
10/18/2016			
Station 08	7.73E+02 +/- 5.63E+02	8.17E+01 +/- 6.15E+01	< 1.02E+02
Station 09A**	2.27E+03 +/- 8.51E+02	9.53E+02 +/- 1.64E+02	5.91E+02 +/- 1.98E+02
Station 11	2.13E+03 +/- 8.86E+02	7.79E+02 +/- 1.32E+02	5.00E+02 +/- 1.35E+02

MEAN

	Sr-89	Sr-90	K-40	Cs-134*	Cs-137*
Indicator	+/-	+/-	9.70E+03 +/- 8.84E+02	+/-	+/-
Control	+/-	+/-	2.31E+04 +/- 1.54E+03	+/-	+/-

	Ra-226	Th-228	Th-232
Indicator	1.22E+03 +/- 8.93E+02	3.50E+02 +/- 8.78E+01	5.13E+02 +/- 1.42E+02
Control	2.52E+03 +/- 9.70E+02	8.61E+02 +/- 1.35E+02	7.18E+02 +/- 1.75E+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*
4/21/2016 Station 08	[a]	[a]	5.32E+02 +/- 4.00E+02	< 3.48E+01	< 3.76E+01

Ra-226	Th-228	Th-232
< 8.49E+02	< 6.79E+01	< 1.81E+02

Sample Date	Sr-89	Sr-90	K-40	Cs-134*	Cs-137*
10/18/2016 Station 08	< 2.02E+02	< 4.26E+01	1.08E+03 +/- 6.31E+02	< 4.75E+01	< 4.90E+01

Ra-226	Th-228	Th-232
< 9.88E+02	< 9.65E+01	< 2.03E+02

MEAN

Sr-89	Sr-90	K-40	Cs-134*	Cs-137*
+/-	+/-	8.06E+02 +/- 5.16E+02	+/-	+/-

Ra-226	Th-228	Th-232
+/-	+/-	+/-

*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*
04/19/16	1.52E+03	+/-	5.88E+02	< 4.42E+01	< 1.24E+02	< 5.57E+01	< 5.31E+01	< 9.22E+01	< 5.61E+01	< 5.65E+01
10/19/16	1.74E+03	+/-	5.35E+02	< 3.48E+01	< 8.59E+01	< 2.96E+01	< 3.93E+01	< 7.57E+01	< 3.98E+01	< 4.14E+01

Sampling Date	K-40			Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*	Cs-134*	Station 25** Cs-137*
04/19/16	1.44E+03	+/-	2.89E+02	< 2.10E+01	< 5.06E+01	< 2.41E+01	< 2.05E+01	< 4.78E+01	< 2.00E+01	< 2.12E+01
10/19/16	1.51E+03	+/-	6.78E+02	< 4.49E+01	< 7.23E+01	< 4.82E+01	< 3.77E+01	< 1.10E+02	< 4.74E+01	< 6.11E+01

catfish [b]

Sampling Date	K-40			Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*	Cs-134*	Station 08 Cs-137*
04/19/16	2.00E+03	+/-	6.43E+02	< 4.97E+01	< 1.04E+02	< 4.53E+01	< 4.84E+01	< 6.07E+01	< 3.84E+01	< 5.68E+01
10/19/16	1.75E+03	+/-	8.06E+02	< 5.19E+01	< 1.08E+02	< 6.10E+01	< 3.63E+01	< 6.59E+01	< 5.80E+01	< 5.37E+01

Sampling Date	K-40			Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*	Cs-134*	Station 25** Cs-137*
04/19/16	2.14E+03	+/-	8.03E+02	< 5.42E+01	< 1.29E+02	< 5.65E+01	< 4.97E+01	< 9.71E+01	< 4.66E+01	< 5.58E+01
10/19/16	1.40E+03	+/-	8.17E+02	< 6.76E+01	< 1.44E+02	< 7.49E+01	< 7.33E+01	< 1.73E+02	< 7.10E+01	< 7.89E+01

Mean	1.75E+03	+/-	6.45E+02
Indicator	1.75E+03	+/-	6.43E+02
Control	1.62E+03	+/-	6.47E+02

* LLD identified in ODCM

** Control Station

[a] Non-bottom dwelling species of gamefish.

[b] Bottom dwelling species of fish.

DISCUSSION OF RESULTS

Data from the radiological analyses of environmental media collected during 2016 and tabulated in Section 3, are discussed below. Except for TLDs, Teledyne Brown Engineering 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 2016 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 2016 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.

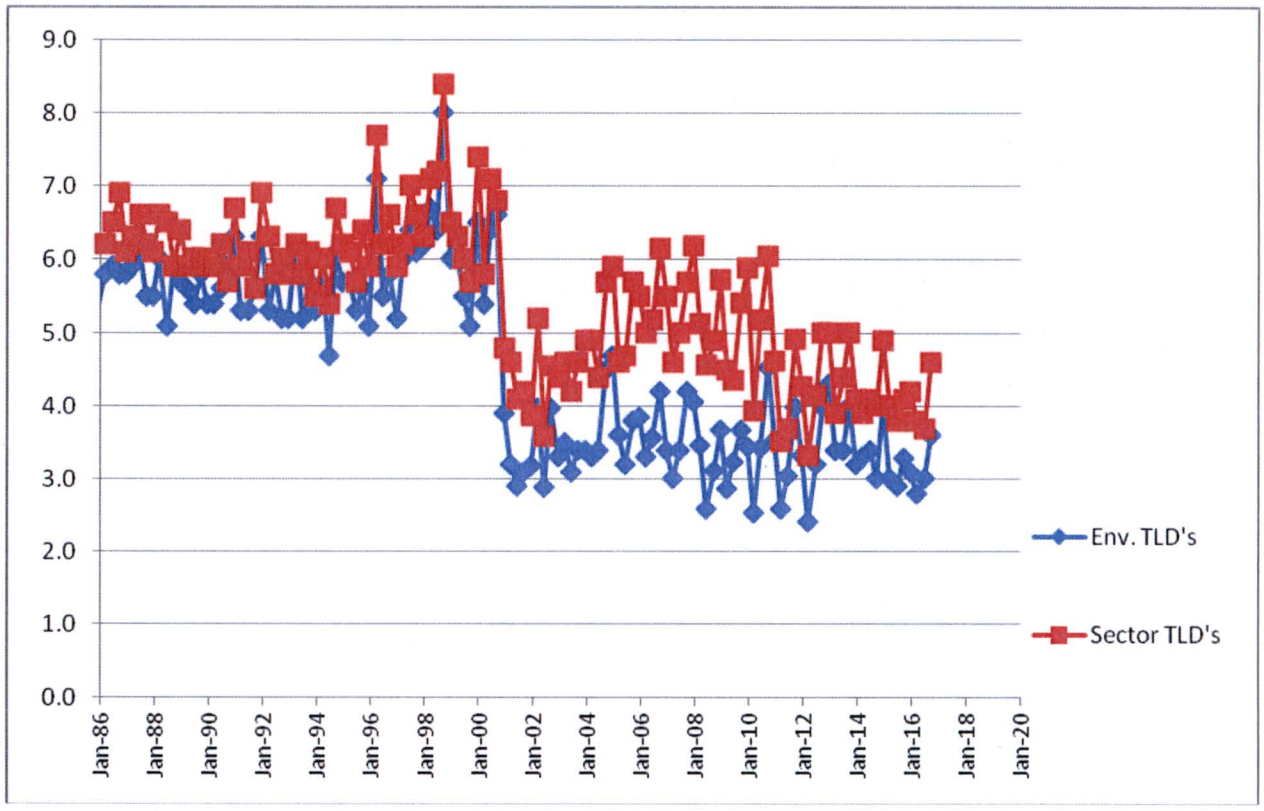

Figure 4-1 TLD (mrem/Standard Month)

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 these 32 sector TLD locations (two badges at each location) was 4.1 mR/standard month with a range of 1.0 to 8.1 mR/standard month. The highest quarterly average reading for any single location was obtained at location NW-29/61. This value was 7.0 mR/standard month. This location is on site on the north gate of the construction side laydown area. Quarterly and annual TLDs are also located at twelve environmental air sampling stations. For the eleven indicator locations within 10 miles of the station the average quarterly reading was 3.2 mR/standard month with a range of 0.8 to 6.0 mR/standard month. The average annual reading for these locations was 2.8 mR/standard month with a range from 1.7 to 4.7 mR/standard month. The control location showed a quarterly average of 3.2 mR/standard month with a range of 1.9 to 4.3 mR/standard month. Its annual reading was 2.5 mR/standard month. 10 emergency sector TLDs, which are all located onsite had a quarterly average of 5.2 mR/standard month with EPSP-9/10 having the highest quarterly average of 7.7 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 mR/ standard month, while Station C-1/2 and C-5/6 had a quarterly average of 2.4 mR/standard month with a range of 1.1 to 4.6 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 of a return to the vendor used from 1988 until 2001. This will be monitored in the future to see if this is 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.

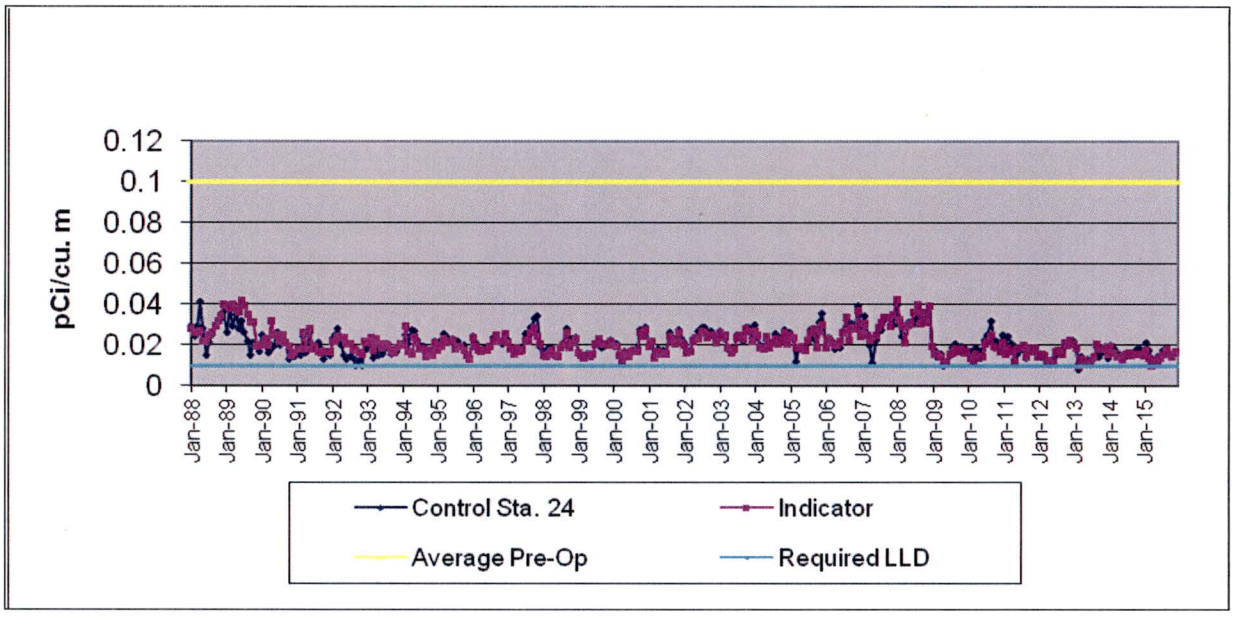

Figure 4-2 Historical Gross Beta in Air Particulates

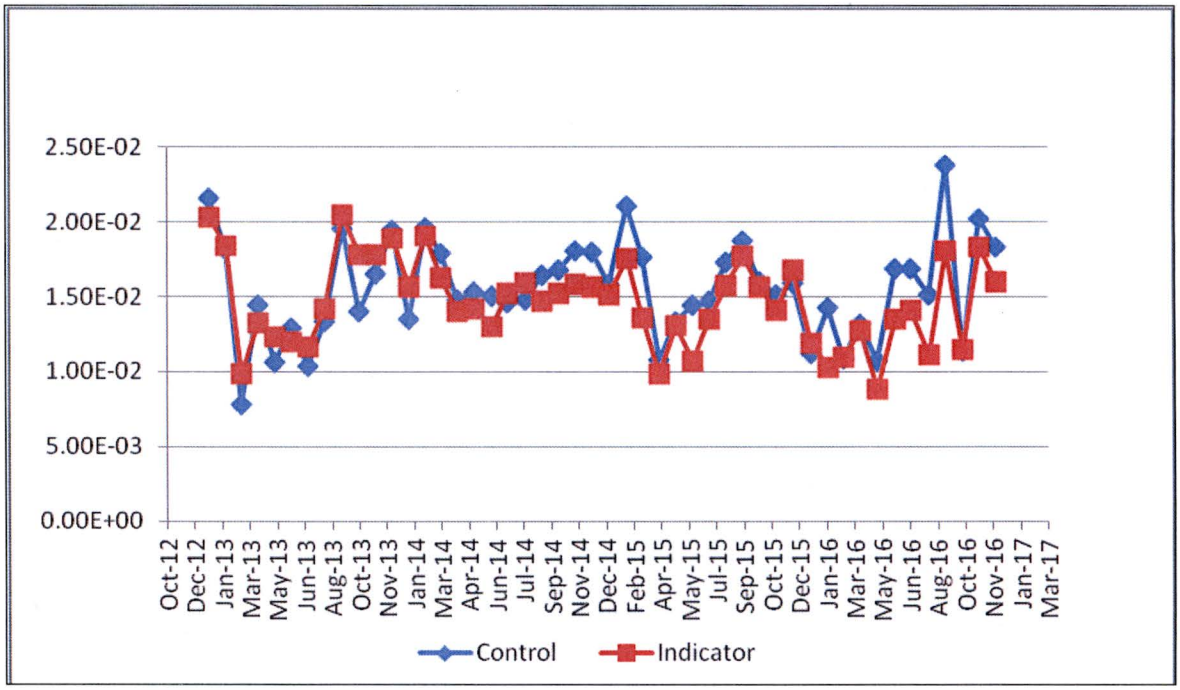

Figure 4-3 2016 Gross Beta in Air Particulates (pCi/m^3)

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.

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 spectroscopy. 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 2016. Cs-137 was identified in 6 of 11 indicator samples. The average for indicator stations was 362 pCi/Kg. No plant related isotopes were identified in the sample from the control station. 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 current levels are also varied significantly by location and date. 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. No other plant related isotopes were identified in Soil samples during 2016.

4.7 Precipitation

A sample of rain water was collected monthly at on-site station 01A and analyzed for gross beta activity and H-3. The results are presented in Table 3-7. Twelve precipitation samples were obtained in 2016. Semi-annual composites are prepared and analyzed for gamma emitting isotopes in accordance with program requirements. No plant related isotopes were reported in any precipitation water sample at the indicator location. Naturally occurring gamma emitting radioisotopes were detected. No positive H-3 result was reported. 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 2016 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. No sample indicated positive results. Gamma 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. These 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 the collection station 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 spectroscopy. 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. No plant related isotopes were identified in any Vegetation sample during 2016.

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 by vendor for Sr-89, Sr-90, H-3, I-131, and gamma emitters. The results of these analyses are presented in Table 3-10. No plant related isotopes were detected. No gamma emitting isotopes were detected during the pre-operational period.

4.11 River Water

Samples of water from the North Anna River were collected monthly. The analyses are presented in Table 3-11. All monthly samples are analyzed by gamma spectroscopy. The monthly samples are 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. There was no measured activity of strontium-89 or strontium-90. Tritium was measured in all four samples with an average annual concentration of 3930 pCi/liter and a range of 3340 to 4230 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.

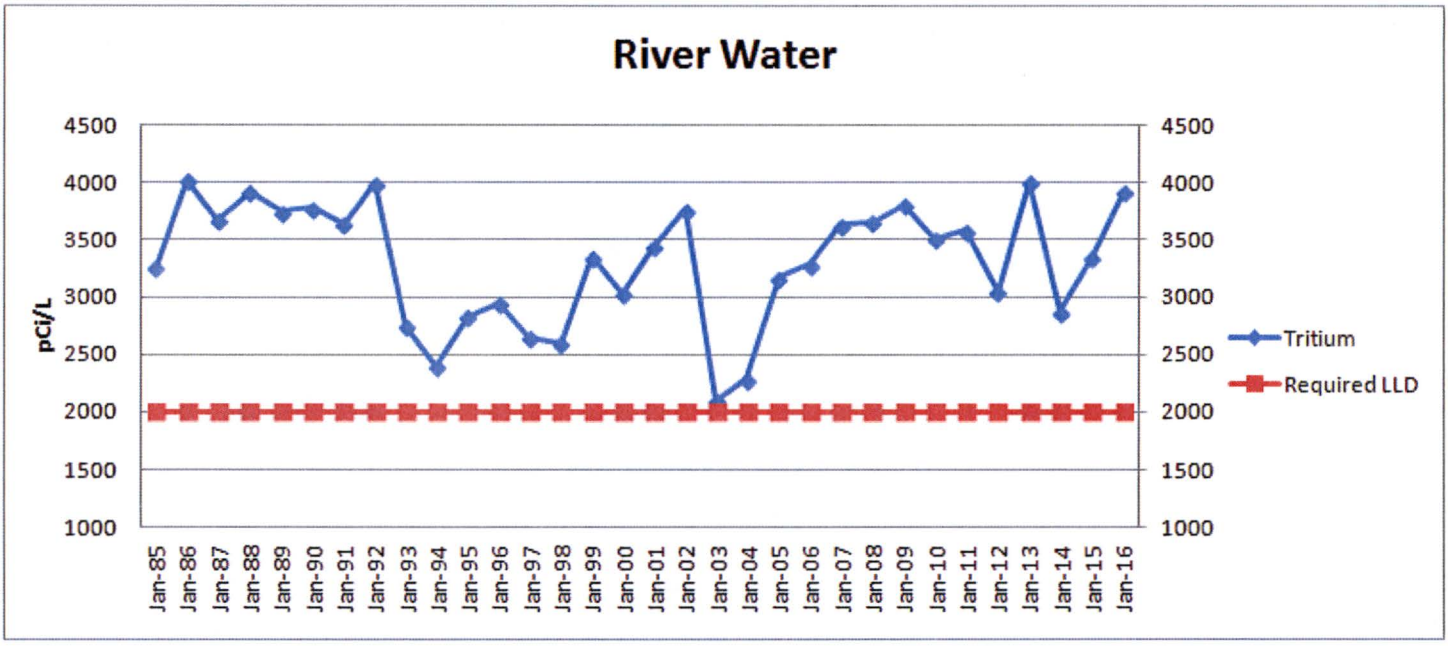

Figure 4-4 Tritium in River water

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 spectroscopy 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 samples. No tritium was detected at the control location. The average level of tritium activity at the indicator station was 4270 pCi/liter with a range of 3580 to 5810 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.

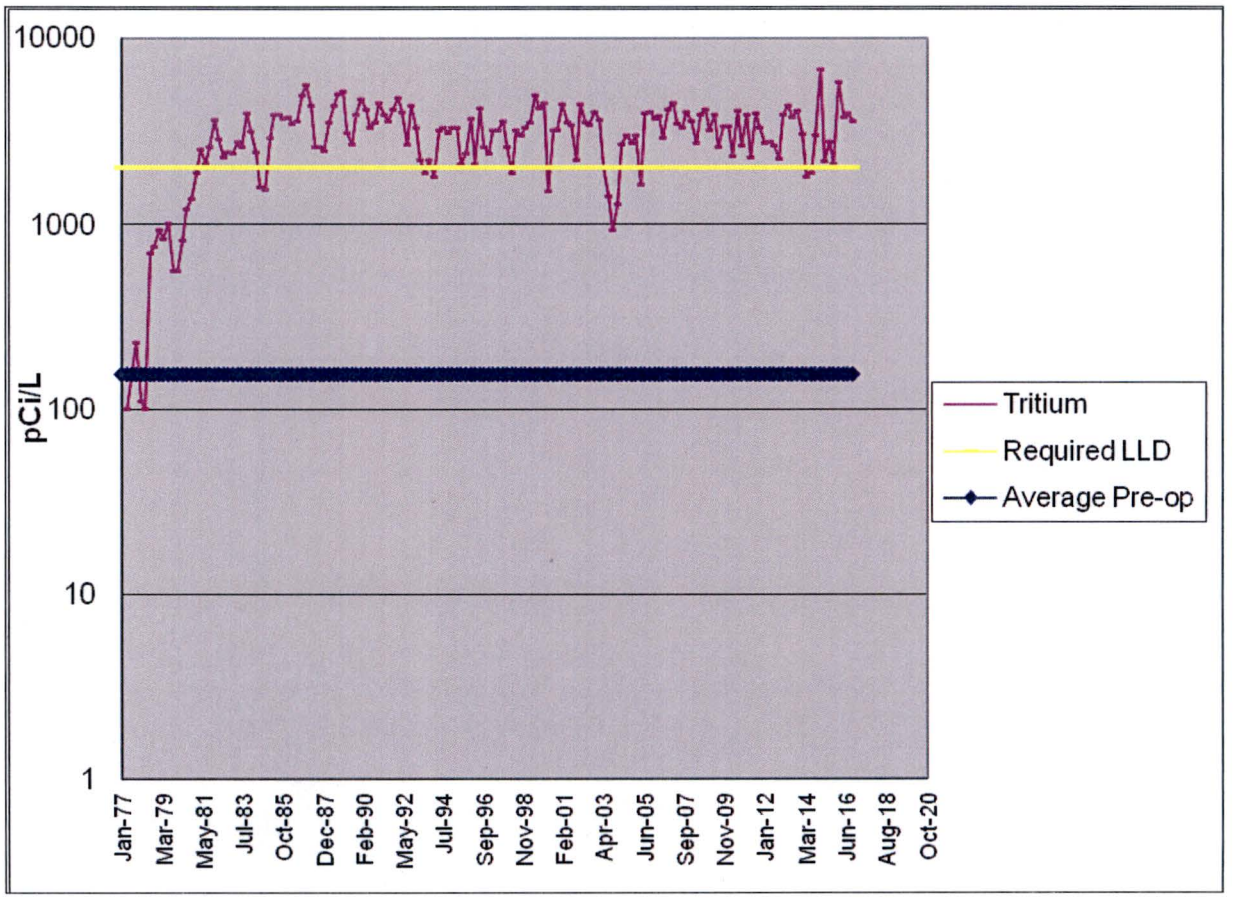

Figure 4.5 Tritium in Surface Water

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 spectroscopy. The October samples were analyzed for strontium-89 and strontium-90. The results are presented in Table 3-13.

No plant related isotopes were detected in 2016. 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 spectroscopy. Figure 4-6 shows the historical trend of Cs-137 in sediments.

Neither Strontium-89 nor Strontium-90 was detected in any samples of aquatic sediment/silt in 2016. 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.

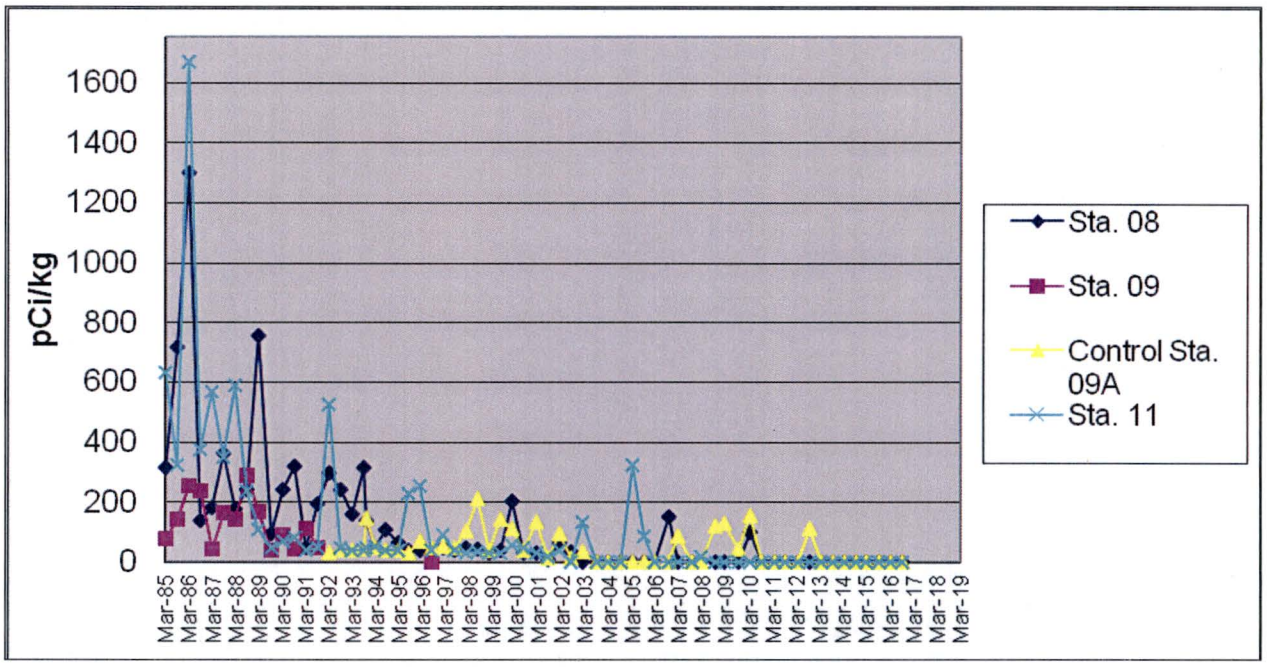

Figure 4-6 Cs-137 in Sediment/Silt

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 spectroscopy. 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 any indicator 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 2016 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 2016 – North Anna

Location	Description	Date of Sampling	Reason(s) for Loss/Exception
14B,15,16,23,26	Vegetation	01/12/16	Seasonal unavailability
14B,15,16,23, 26	Vegetation	02/10/16	Seasonal unavailability
14B,15,16,23,26	Vegetation	03/08/16	Seasonal unavailability
14B,15,16,23, 26	Vegetation	12/13/16	Seasonal unavailability

There was one exception to the Interlaboratory Comparison Program (ICP) for 2016. A QA/QC sample for gross beta analyses for Air Filter (AP) geometry was not provided to Teledyne Brown Engineering, Inc. (TBE) for analysis in the second half of 2016. The provider, Mixed Analyte Performance Evaluation Program (MAPEP), did not supply TBE the required sample media due to funding issues. TBE did not request a QA/QC sample from addidional contracted providers. Eckert & Ziegler Analytics, Inc. will provide the QA/QC sample for AP geometry until MAPEP puts the geometry back into production. This issue is documented in TBE NCR 17-5.

REFERENCES

References

Dominion, North Anna Power Station Technical Specifications, Units 1 and 2.

Dominion, North Anna Power Station Independent Spent Fuel Storage Installation Technical Specifications.

Dominion, Station Administrative Procedure, VPAP-2103N, "Offsite Dose Calculation Manual".

Virginia Electric and Power Company, North Anna Technical Procedure, HP-3051.010, "Radiological Environmental Monitoring Program".

Title 10 Code of Federal Regulation, Part 50 (10CFR50), "Domestic Licensing of Production and Utilization Facilities".

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.

United States Nuclear Regulatory Commission, Regulatory Guide 4.8 "Environmental Technical Specifications for Nuclear Power Plants", December 1975.

USNRC Branch Technical Position, "Acceptable Radiological Environmental Monitoring Program", Rev. 1, November 1979.

NUREG 0472, "Radiological Effluent Technical Specifications for PWRs", Rev. 3, March 1982.

HASL-300, Environmental Measurements Laboratory, "EML Procedures Manual," 27th Edition, Volume 1, February 1992.

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 2016

LAND USE CENSUS

North Anna Power Station

Louisa County, Virginia

January 1 to December 31, 2016

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	1.56	2.9	*NONE*	*NONE*
NNE	0.9	0.9	1.22	3.1	*NONE*	*NONE*
NE	0.8	0.9	1.6	1.6	*NONE*	*NONE*
ENE	0.8	2.37	2.4	2.49	*NONE*	*NONE*
E	0.8	1.3	2.04	3.5	*NONE*	*NONE*
ESE	0.9	1.7	1.7	NONE	*NONE*	*NONE*
SE	0.9	1.4	1.54	1.4	*NONE*	*NONE*
SSE	0.9	1.0	1.0	1.6	*NONE*	*NONE*
S	0.9	1.03	1.14	2.0	*NONE*	*NONE*
SSW	1	1.27	1.33	2.0	*NONE*	*NONE*
SW	1.1	1.65	1.65	NONE	*NONE*	*NONE*
WSW	1.1	1.62	2.22	NONE	*NONE*	*NONE*
W	1.1	1.5	1.93	NONE	*NONE*	*NONE*
WNW	1	1.1	2.67	4.98	*NONE*	*NONE*
NW	1	1.0	1.28	NONE	*NONE*	*NONE*
NNW	0.9	1.0	2.54	2.3	*NONE*	*NONE*

2015 to 2016 Land Use Census Changes			
Nearest	Direction	2015 Distance	2016 Distance
Resident	ENE	2.37	2.37*
Site Boundary	NONE		
Garden	N	1.76	1.56
	ESE	1.7	1.7
	W	1.93	1.93*
	NW	1.96	1.28
	NNW	1.22	2.54
Meat Animal	ENE	2.65	2.49
	W	4.40	NONE
Milch Cow	NONE		
Milch Goat	NONE		

*Change in physical address only. Distance remains the same as previous.

APPENDIX B: SUMMARY OF INTERLABORATORY COMPARISONS

YEAR 2016

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:

For the TBE laboratory, 156 out of 160 analyses performed met the specified acceptance criteria. Four analyses (Milk – Sr-90, Vegetation Sr-90, and Water-H-3 samples) did not meet the specified acceptance criteria for the following reasons and were addressed through the TBE Corrective Action Program. One sample is no longer being analyzed by TBE through MAPEP:

Note: The Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP) samples are created to mimic conditions found at DOE sites which do not resemble typical environmental samples obtained at commercial nuclear power facilities.

1. Teledyne Brown Engineering's MAPEP February 2016 air particulate cross check samples is now being provided to TBE by Analytics. MAPEP's policy is to evaluate as failed non reported nuclides that were reported in the previous study. Since the Sr-90 was reported in the previous MAPEP study but not in this study MAPEP evaluated the Sr-90 as failed. NCR 16-14

   The MAPEP February 2016 Sr-90 in vegetation was evaluated as failing a false positive test. In reviewing the data that was reported vs the data in LIMS, it was found that the error was incorrectly reported as 0.023 rather than the correct value of 0.230. If the value had been reported with the correct activity and uncertainty of 0.301 ± 0.230, MAPEP would have evaluated the result as acceptable. NCR 16-14

2. Teledyne Brown Engineering's Analytics' March 2016 milk Sr-90 result of 15 ± .125 pCi/L was higher than the known value of 11.4 pCi/L with a ratio of 1.31. The upper ratio of 1.30 (acceptable with warning) was exceeded. After an extensive review of the data it is believed the technician did not rinse the filtering apparatus properly and some cross contamination from one of the internal laboratory spike samples may have been transferred to the analytics sample. We feel the issue is specific to the March 2016 Analytics sample. NCR 16-26

3. Teledyne Brown Engineering's ERA December 2016 sample for H-3 in water was evaluated as failing. A result of 918 pCi/L was reported incorrectly due to a data entry issue. If the correct value of 9180 had been reported, ERA would have evaluated the result as acceptable. NCR 16-34

4. Teledyne Brown Engineering's Analytics' December 2016 milk Sr-90 sample result of 14.7 ± .26 pCi/L was higher than the known value of 10 pCi/L with a ratio of 1.47. The upper ratio of 1.30 (acceptable with warning) was exceeded. The technician entered the wrong aliquot into the LIMS system. To achieve a lower error term we use a larger aliquot of 1.2L (Normally we use .6L for client samples). NCR 16-35

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Analytics

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Atlanta, GA 30318, USA

Tel: 404-352-8677
Fax: 404-352-2837

RESULTS OF RADIOCHEMISTRY

CROSS CHECK PROGRAM

1ST QUARTER 2016

(Ref. Date 19 FEB 16)
REVISED

L. T. 15 Sep 16

L. Tkavadze, Nuclear Metrologist

SAMPLE	ANALYSIS	VALUE microCi/cc	ANALYTICS VALUE microCi/cc	RATIO	RESOLUTION	COMPARISON
A31518 LIQUID	Tritium	6.79E-04	7.40E-04	0.92	12.5	AGREEMENT
A31519* FILTER	Sr-89	2.04E-03	2.46E-03	0.83	17	AGREEMENT
	Sr-90	2.08E-04	2.68E-04	0.78	12.5	AGREEMENT

*microCi

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L69513

COPY

RESULTS OF RADIOCHEMISTRY

CROSS CHECK PROGRAM

3RD QUARTER 2016

(Ref. Date 12 AUG 16)

L. Tk 26 Oct 16

L. Tkavadze, Nuclear Metrologist

SAMPLE	ANALYSIS	VALUE microCi	ANALYTICS VALUE microCi	RATIO	RESOLUTION	COMPARISON
A32035	Sr-89	2.83E-03	2.96E-03	0.96	17	AGREEMENT
FILTER	Sr-90	2.64E-04	2.81E-04	0.94	12.5	AGREEMENT
A32034	Fe-55	3.67E-03	2.76E-03	1.33	12.5	AGREEMENT
FILTER						

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2016	E11476	Milk	Sr-89	pCi/L	97	86.7	1.12	A
			Sr-90	pCi/L	15	11.4	1.32	N(2)
	E11477	Milk	I-131	pCi/L	85.9	82.2	1.05	A
			Ce-141	pCi/L	106	98.4	1.08	A
			Cr-51	pCi/L	255	243	1.05	A
			Cs-134	pCi/L	134	130	1.03	A
			Cs-137	pCi/L	174	161	1.08	A
			Co-58	pCi/L	123	117	1.05	A
			Mn-54	pCi/L	141	117	1.21	W
			Fe-59	pCi/L	152	131	1.16	A
			Zn-65	pCi/L	193	179	1.08	A
			Co-60	pCi/L	259	244	1.06	A
	E11184	AP	Ce-141	pCi	69	81.1	0.85	A
			Cr-51	pCi	242	201	1.20	W
			Cs-134	pCi	98.1	107.0	0.92	A
			Cs-137	pCi	136	133	1.02	A
			Co-58	pCi	91.9	97	0.95	A
			Mn-54	pCi	98.6	96.2	1.02	A
			Fe-59	pCi	98.8	108	0.91	A
			Zn-65	pCi	131	147	0.89	A
			Co-60	pCi	209	201	1.04	A
	E11478	Charcoal	I-131	pCi	85.3	88.3	0.97	A
	E11185	Water	Fe-55	pCi/L	1800	1666	1.08	A
June 2016	E11537	Milk	Sr-89	pCi/L	94.4	94.4	1.00	A
			Sr-90	pCi/L	13.4	15.4	0.87	A
	E11538	Milk	I-131	pCi/L	96.8	94.5	1.02	A
			Ce-141	pCi/L	129	139	0.93	A
			Cr-51	pCi/L	240	276	0.87	A
			Cs-134	pCi/L	157	174	0.90	A
			Cs-137	pCi/L	117	120	0.98	A
			Co-58	pCi/L	131	142	0.92	A
			Mn-54	pCi/L	128	125	1.02	A
			Fe-59	pCi/L	132	122	1.08	A
			Zn-65	pCi/L	235	235	1.00	A
			Co-60	pCi/L	169	173	0.98	A

(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.

(2) NCR 16-26 was initiated

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2016	E11539	Charcoal	I-131	pCi	86.1	89.4	0.96	A
	E11540	AP	Ce-141	pCi	105	99.8	1.05	A
			Cr-51	pCi	216	198.0	1.09	A
			Cs-134	pCi	113	125	0.90	A
			Cs-137	pCi	94.5	86.6	1.09	A
			Co-58	pCi	101	102	0.99	A
			Mn-54	pCi	88.8	90.2	0.98	A
			Fe-59	pCi	82	87.5	0.94	A
			Zn-65	pCi	174	169	1.03	A
			Co-60	pCi	143	124	1.15	A
	E11185	Water	Fe-55	pCi/L	164	186	0.88	A
September 2016	E11609	Milk	Sr-89	pCi/L	90	90.9	0.99	A
			Sr-90	pCi/L	13.3	13.7	0.97	A
		Milk	I-131	pCi/L	80.4	71.9	1.12	A
			Ce-141	pCi/L	81.3	93	0.87	A
			Cr-51	pCi/L	198	236	0.84	A
			Cs-134	pCi/L	122	136	0.90	A
			Cs-137	pCi/L	119	119	1.00	A
			Co-58	pCi/L	92.2	97.4	0.95	A
			Mn-54	pCi/L	156	152	1.03	A
			Fe-59	pCi/L	97.5	90.6	1.08	A
			Zn-65	pCi/L	189	179	1.06	A
			Co-60	pCi/L	131	135	0.97	A
	E11611	Charcoal	I-131	pCi	52.4	59.9	0.87	A
	E11612	AP	Ce-141	pCi	67.5	63.6	1.06	A
			Cr-51	pCi	192	161.0	1.19	A
			Cs-134	pCi	91.4	92.6	0.99	A
			Cs-137	pCi	93.9	80.8	1.16	A
			Co-58	pCi	66	66.4	0.99	A
			Mn-54	pCi	104	104	1.00	A
			Fe-59	pCi	60.5	61.8	0.98	A
			Zn-65	pCi	140	122	1.15	A
			Co-60	pCi	119	91.9	1.29	W

(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.

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
September 2016	E11613	Water	Fe-55	pCi/L	1990	1670	1.19	A
	E11614	Soil	Ce-141	pCi/g	0.153	0.175	0.87	A
			Cr-51	pCi/g	0.482	0.441	1.09	A
			Cs-134	pCi/g	0.270	0.254	1.06	A
			Cs-137	pCi/g	0.313	0.299	1.05	A
			Co-58	pCi/g	0.177	0.182	0.97	A
			Mn-54	pCi/g	0.340	0.285	1.19	A
			Fe-59	pCi/g	0.206	0.17	1.21	W
			Zn-65	pCi/g	0.388	0.335	1.16	A
			Co-60	pCi/g	0.284	0.252	1.13	A
December 2016	E11699	Milk	Sr-89	pCi/L	95	74.2	1.28	W
			Sr-90	pCi/L	14.7	10	1.47	N(3)
	E11700	Milk	I-131	pCi/L	97.5	97.4	1.00	A
			Ce-141	pCi/L	136	143	0.95	A
			Cr-51	pCi/L	247	280	0.88	A
			Cs-134	pCi/L	164	178	0.92	A
			Cs-137	pCi/L	120	126	0.95	A
			Co-58	pCi/L	139	146	0.95	A
			Mn-54	pCi/L	126	129	0.98	A
			Fe-59	pCi/L	114	125	0.91	A
			Zn-65	pCi/L	237	244	0.97	A
			Co-60	pCi/L	168	178	0.94	A
	E11701	Charcoal	I-131	pCi	95.6	98	0.98	A
	E11702	AP	Ce-141	pCi	91.7	97.7	0.94	A
			Cr-51	pCi	210	192.0	1.09	A
			Cs-134	pCi	122	122	1.00	A
			Cs-137	pCi	93.9	86.4	1.09	A
			Co-58	pCi	92	100	0.92	A
			Mn-54	pCi	93.7	88.5	1.06	A
			Fe-59	pCi	84.9	85.4	1.00	A
			Zn-65	pCi	176	167	1.05	A
			Co-60	pCi	151	122	1.24	W
	E11703	Water	Fe-55	pCi/L	2180	1800	1.21	W
	E11730	AP	Sr-89	pCi	79.7	92	0.86	A
			Sr-90	pCi	10	12.5	0.80	A

(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.

(3) NCR 16-35 was initiated

DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide*	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2016	16-MaW34	Water	Am-241	Bq/L	0.008		(1)	A
			Ni-63	Bq/L	12.4	12.3	8.6-16.0	A
			Pu-238	Bq/L	1.4900	1.2440	0.871-1.617	A
			Pu-239/240	Bq/L	0.729	0.641	0.449-0.833	A
	16-MaS34	Soil	Ni-63	Bq/kg	1140	1250.0	875-1625	A
			Sr-90	Bq/kg	8.15		(1)	A
	16-RdF34	AP	U-234/233	Bq/sample	0.1620	0.1650	0.116-0.215	A
			U-238	Bq/sample	0.163	0.172	0.120-0.224	A
	16-GrF34	AP	Gr-A	Bq/sample	0.608	1.20	0.36-2.04	A
			Gr-B	Bq/sample	0.8060	0.79	0.40-1.19	A
	16-RdV34	Vegetation	Cs-134	Bq/sample	10.10	10.62	7.43-13.81	A
			Cs-137	Bq/sample	6.0	5.62	3.93-7.31	A
			Co-57	Bq/sample	13.3000	11.8	8.3-15.3	A
			Co-60	Bq/sample	0.013		(1)	A
			Mn-54	Bq/sample	0.0150		(1)	A
			Sr-90	Bq/sample	0.301		(1)	N(4)
			Zn-65	Bq/sample	10.500	9.6	6.7-12.5	A
September 2016	16-MaW35	Water	Am-241	Bq/L	0.626	0.814	.570-1058	W
			Ni-63	Bq/L	12.4	17.2	12.0-22.4	A
			Pu-238	Bq/L	1.23	1.13	0.79-1.47	W
			Pu-239/240	Bq/L	0.0318	0.013	(1)	A
	16-MaS35	Soil	Ni-63	Bq/kg	724	990	693-1287	A
			Sr-90	Bq/kg	747	894	626-1162	A
	16-RdF35	AP	U-234/233	Bq/sample	0.160	0.15	0.105-0.195	A
			U-238	Bq/sample	0.157	0.156	0.109-0.203	A
	16-RdV35	Vegetation	Cs-134	Bq/sample	-0.103		(1)	A
			Cs-137	Bq/sample	5.64	5.54	3.88-7.20	A
			Co-57	Bq/sample	7.38	6.81	4.77-8.85	A
			Co-60	Bq/sample	4.81	4.86	3.40-6.32	A
			Mn-54	Bq/sample	7.4	7.27	5.09-9.45	A
			Sr-90	Bq/sample	0.774	0.80	0.56-1.04	A
			Zn-65	Bq/sample	5.46	5.4	3.78-7.02	A

(1) False positive test.

(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.

(4)NCR 16-14 was initiated

ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2016	RAD-105	Water	Sr-89	pCi/L	48.9	48.2	37.8 - 55.6	A
			Sr-90	pCi/L	25.0	28.5	20.7 - 33.1	A
			Ba-133	pCi/L	53.1	58.8	48.7 - 64.9	A
			Cs-134	pCi/L	40.9	43.3	34.6 - 47.6	A
			Cs-137	pCi/L	84.8	78.4	70.6 - 88.9	A
			Co-60	pCi/L	108	102	91.8 - 114	A
			Zn-65	pCi/L	226	214	193 - 251	A
			Gr-A	pCi/L	38.9	62.7	32.9 - 77.8	A
			Gr-B	pCi/L	41.9	39.2	26.0 - 46.7	A
			I-131	pCi/L	24.1	26.6	22.1 - 31.3	A
			U-Nat	pCi/L	4.68	4.64	3.39 - 5.68	A
			H-3	pCi/L	7720	7840	6790 - 8620	A
November 2016	RAD-107	Water	Sr-89	pCi/L	43.0	43.3	33.4-50.5	A
			Sr-90	pCi/L	30.0	33.6	24.6-38.8	A
			Ba-133	pCi/L	47.8	54.9	45.4-60.7	A
			Cs-134	pCi/L	72.9	81.8	67.0-90.0	A
			Cs-137	pCi/L	189	210	189-233	A
			Co-60	pCi/L	58.4	64.5	58.0-73.4	A
			Zn-65	pCi/L	243	245	220-287	A
			Gr-A	pCi/L	37.2	68.4	35.9-84.5	A
			Gr-B	pCi/L	35.1	33.9	22.1-41.6	A
			I-131	pCi/L	23.5	26.3	21.9-31.0	A
			U-Nat	pCi/L	49.2	51.2	41.6-56.9	A
			H-3	pCi/L	918	9820	8540-10800	N(5)
	MRAD-25	AP	Gr-A	pCi/Filter	56.8	71.2	23.9-111	A

(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.

(5) NCR 16-34 was initiated