VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 20, 2020

United States Nuclear Regulatory Commission
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Washington, D. C. 20555

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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 2019 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. Neil S. Turner at (540) 894-2100.

Very truly yours,

N. Larry Lane
Site Vice President

Enclosure

Commitments made in this letter: None

IE25
NMSS26
NRR
NMSS

cc: U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

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 Energy

North Anna Power Station

Radiological Environmental Monitoring Program

January 1, 2019 to December 31, 2019

Prepared by

Dominion Energy, North Anna Power Station

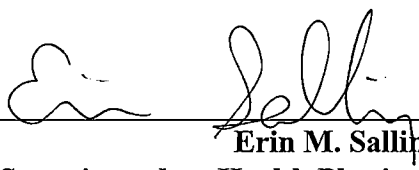
Annual Radiological Environmental Operating Report

North Anna Power Station

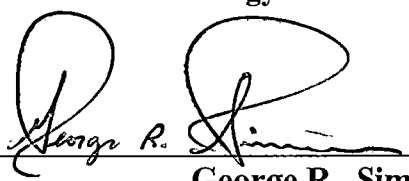
January 1, 2019 to December 31, 2019

Prepared by: 

Leonard E. Oakes
Supervisor Radiological Analysis and Instrumentation
Dominion Energy North Anna Power Station

Reviewed by: 

Erin M. Salling
Superintendent Health Physics Technical Services
Dominion Energy North Anna Power Station

Approved by: 

George R. Simmons
Manager Radiological Protection and Chemistry
Dominion Energy North Anna Power Station

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1. EXECUTIVE SUMMARY

This document is a detailed report of the 2019 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, 2019, in water, silt, shoreline sediment, 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 are 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 equipment used for radiological environmental monitoring 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 2019 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 2019 was 2938 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 3220 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. Plant related isotope, Cs-137, was identified in one indicator sample at a level of 45.91 pCi/kg The detection of Cs-137 in bottom sediment is historically common with positive indication usually apparent in both indicator and control samples. 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 2019. Cs-137 was identified in 6 of 11 indicator samples. For the indicator stations the average was 285.88 pCi/Kg with a range of 140.3 pCi/Kg to 380.3 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 2019.

The terrestrial exposure pathway includes milk and food/vegetation products. No milk samples were obtained during the reporting period since the last operating dairy farm within the sampling area closed on 01/01/2018 rendering milk samples unavailable. No plant related isotope was detected in any vegetation sample. Low levels of Cs-137 have been detected intermittently in past years due to weapons testing, Chernobyl, and Fukushima.

The direct exposure pathway measures environmental radiation doses by use of thermoluminescent dosimeters (TLDs). TLD results have remained essentially constant over the years.

During 2019, 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 2019 was 0.702 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 2019 North Anna Power Station operational Radiological Environmental Monitoring Program (REMP).

The North Anna Power Station of Virginia Electric and Power Company (Dominion Energy) 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 2019 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 2019 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 2019.

TABLE 2-1

North Anna Power Station – 2019

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	
Dosimetry (TLD)	Fredericks Hall	02	5.30	SSW	203°	Quarterly & Annually	
	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 – 2019

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 SE Switchyard	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	
	Fredericks Hall	02	5.30	SSW	203°	Weekly	
	Mineral, VA	03	7.10	WSW	243°	Weekly	
	Wares Crossroads	04	5.10	WNW	287°	Weekly	
	Route 752	05	4.20	NNE	20°	Weekly	
	Sturgeon's Creek Marina	05A	2.04	N	11°	Weekly	
	Levy, VA	06	4.70	ESE	115°	Weekly	
	Bumpass, VA	07	7.30	SSE	167°	Weekly	

TABLE 2-1

North Anna Power Station – 2019

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 – 2019

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
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	
	2nd Quarter	Sr-89	(b)	pCi/m^3
	Composite	Sr-90	(b)	
Surface Water	Monthly	I-131	1(c)	pCi/L
		Gamma Isotopic		pCi/L
		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
	Quarterly(a)	Tritium (H-3)	2000	pCi/L
	2nd Quarter	Sr-89	(b)	pCi/L
	Composite	Sr-90	(b)	
River Water	Monthly	I-131	1(c)	pCi/L
		Gamma Isotopic		pCi/L
		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	

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

(a) Quarterly composite of each location's samples are used for the required analysis
(b) There are no required LLDs for Sr-89/90
(c) LLD for non-drinking water is 10 pCi/liter
(d) LLD applied are those for water samples. However, since this is a semi-annual composite no LLD is applied for these nuclides due to their short half-lives.

TABLE 2-2
North Anna Power Station
SAMPLE ANALYSIS PROGRAM

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

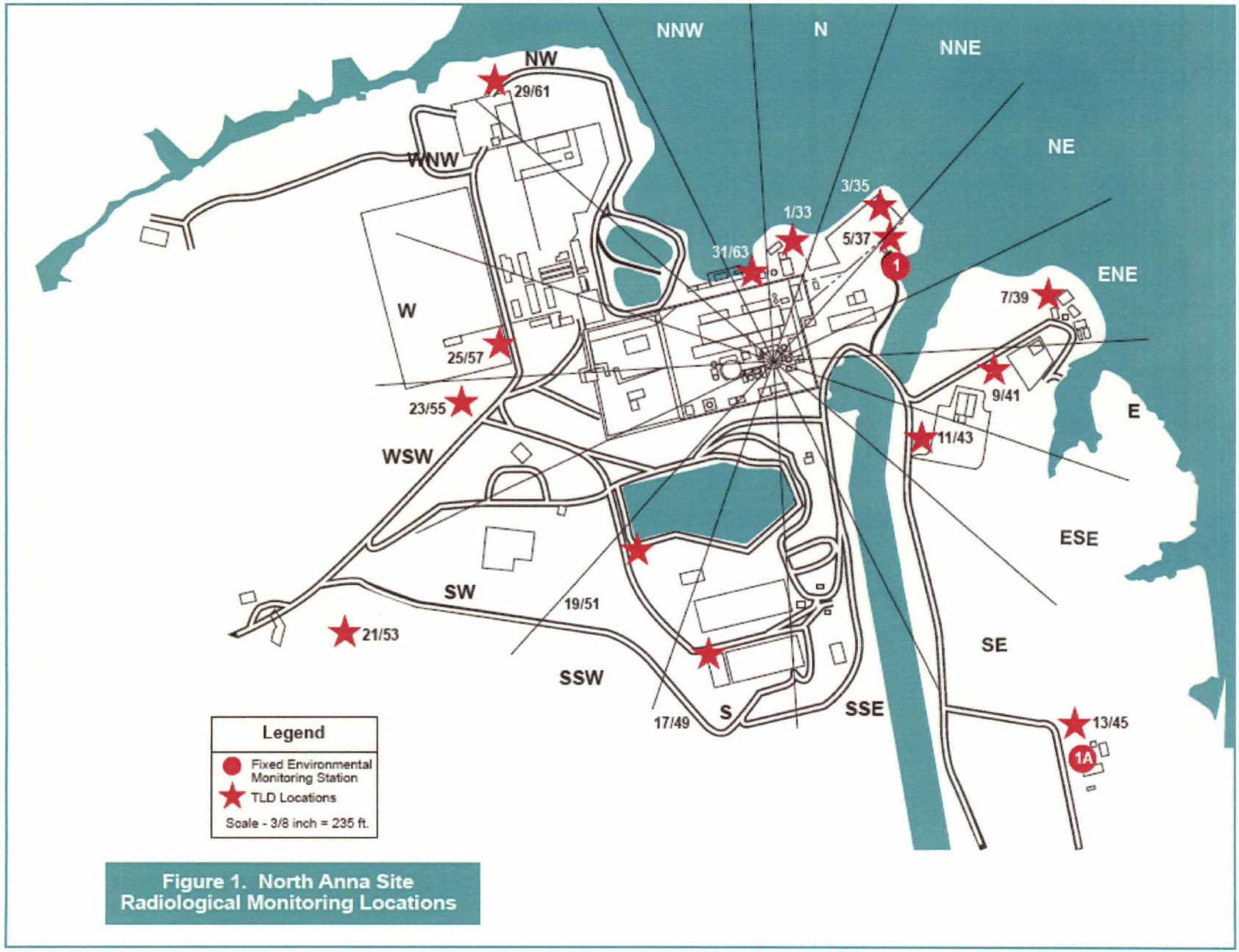
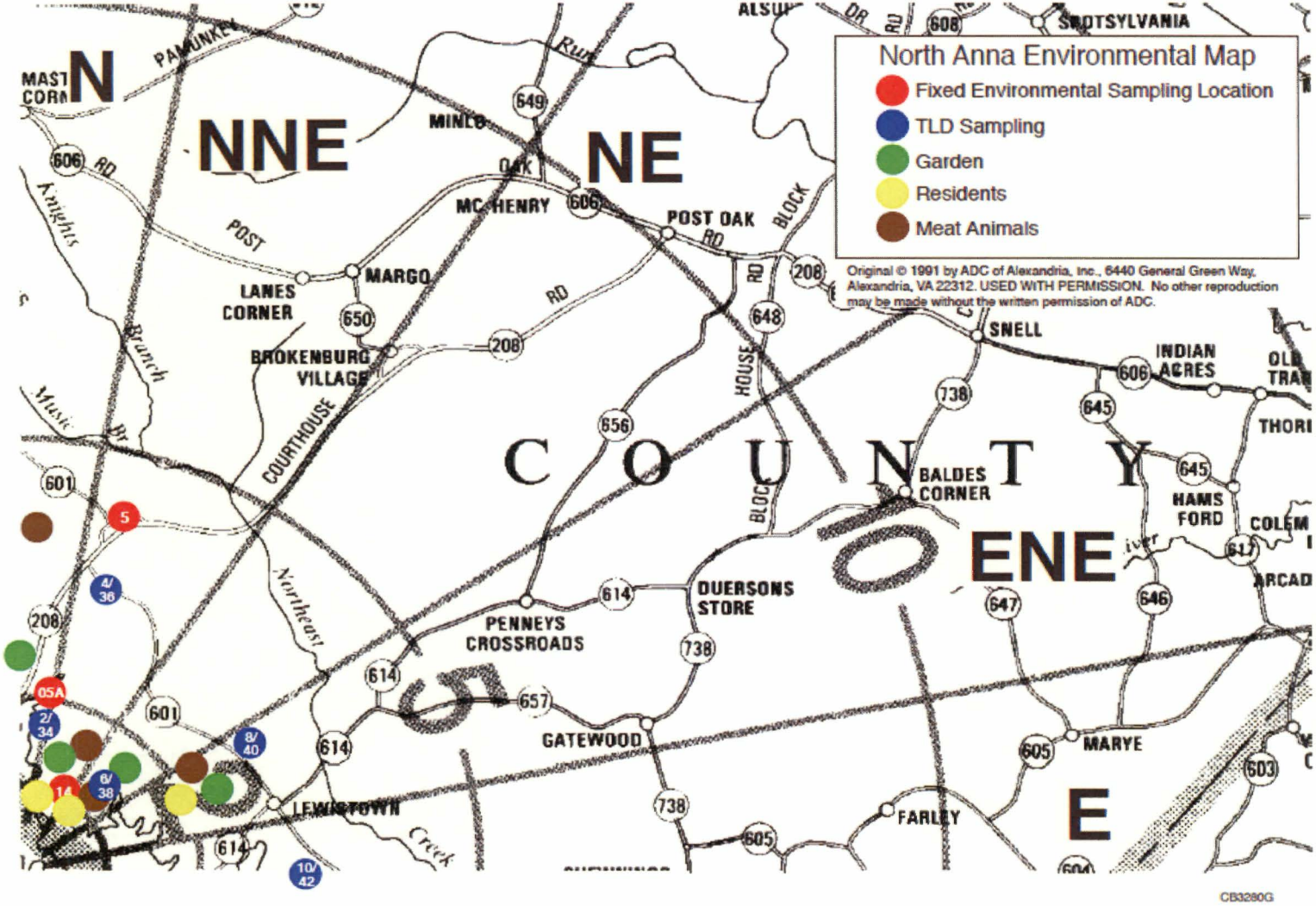


Figure 1. North Anna Site Radiological Monitoring Locations


North Anna Environmental Map
Fixed Environmental Sampling Location
TLD Sampling
Garden
Residents
Meat Animals
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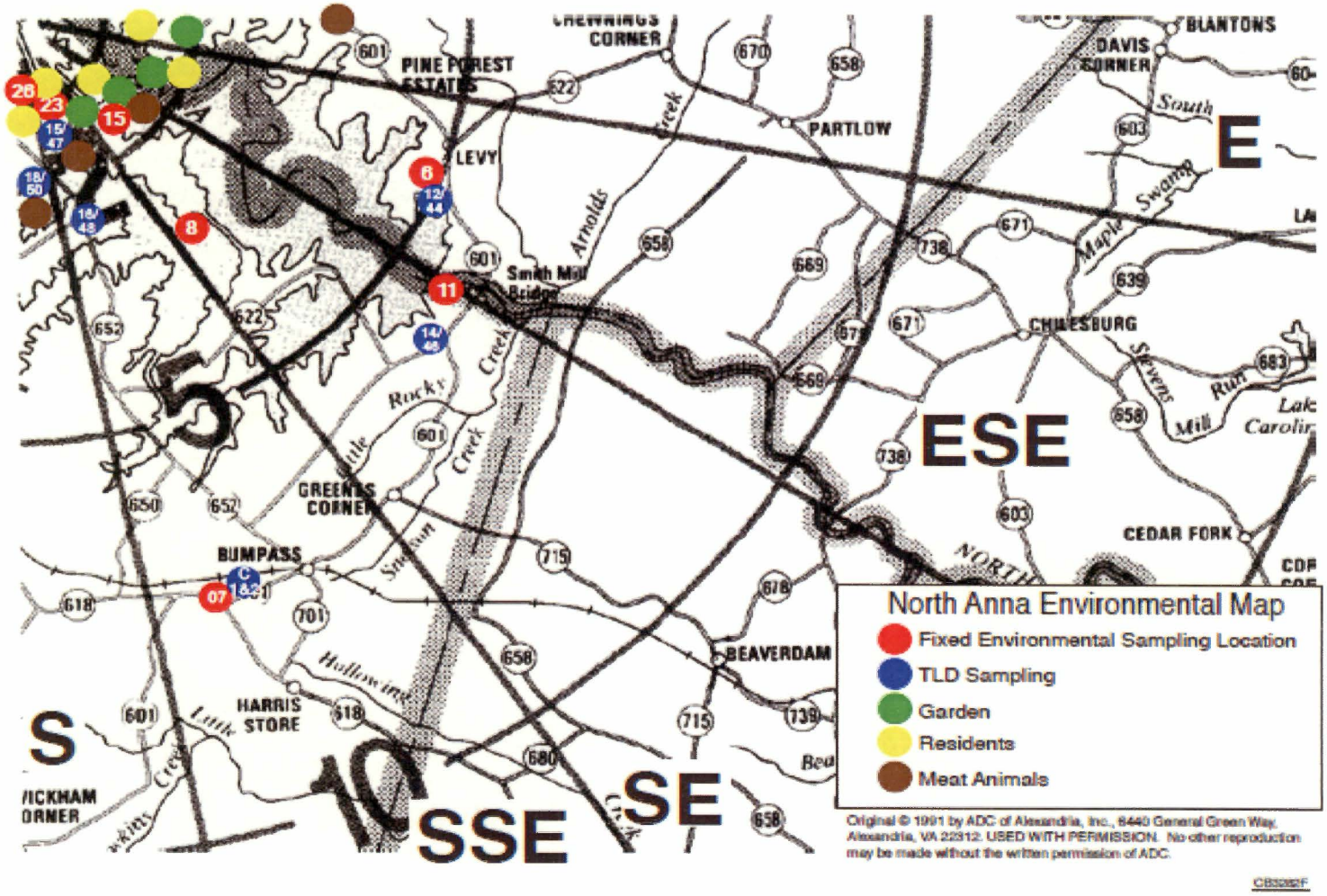
N
NNE
NE
ENE
E
SPOTSYLVANIA
MINERAL
MC HENRY
POST OAK
SNELL
INDIAN ACRES
MARGO
LANES CORNER
BROKENBURG VILLAGE
COURTHOUSE
BALDES CORNER
HAMS FORD
DUERSONS STORE
PENNEYS CROSSROADS
GATEWOOD
MARYE
FARLEY
LEWISTOWN
Northeast
Creek
CB3280G


North Anna Environmental Map
Fixed Environmental Sampling Location
TLD Sampling
Garden
Residents
Meat Animals
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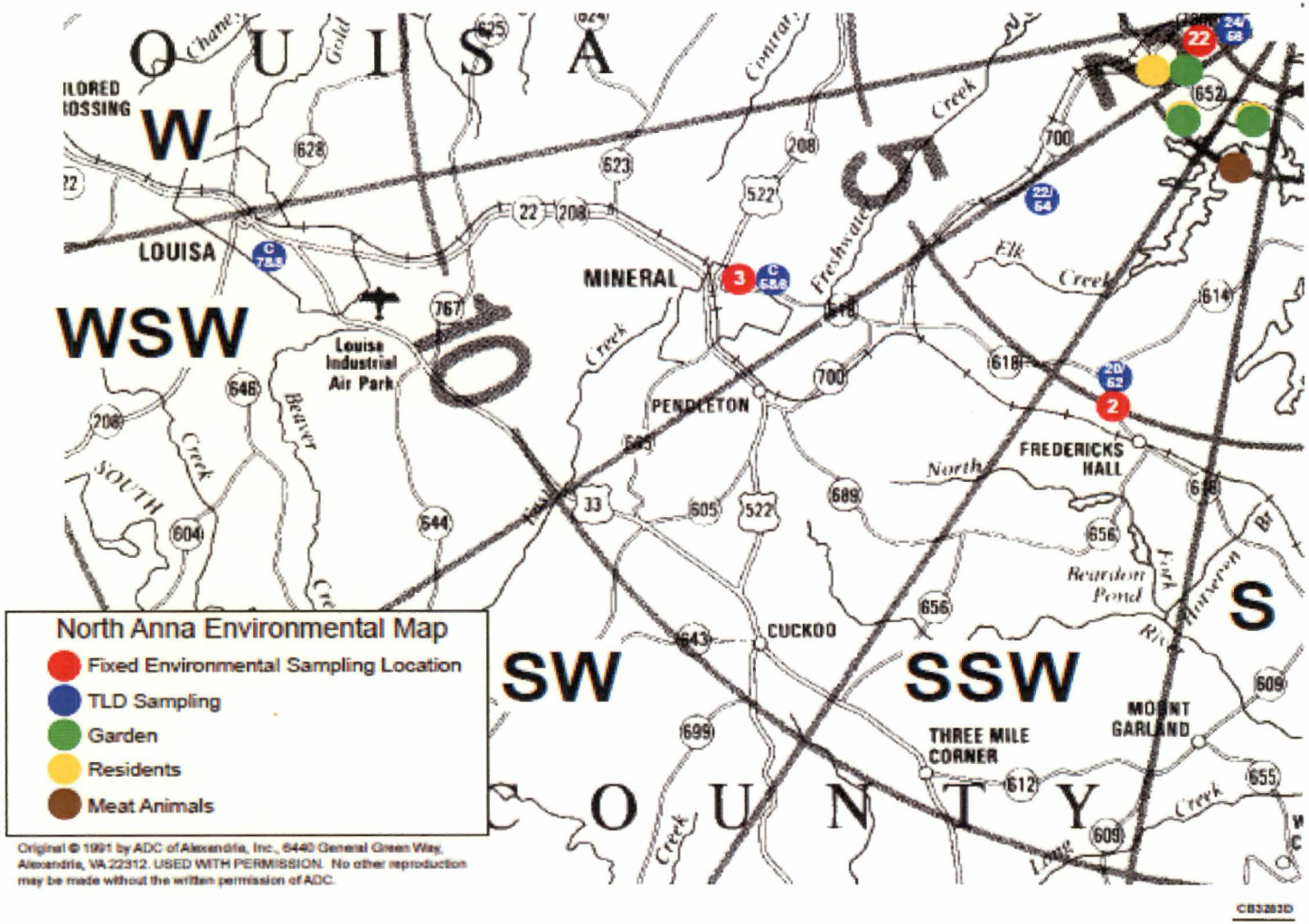
CB3282F
PINE FOREST ESTATES
LEVY
PARTLOW
DAVIS CORNER
BLANTONS
CHILESBURG
CEDAR FORK
GREENES CORNER
BUMPASS
HARRIS STORE
BEAVERDAM
Smith Mill Bridge
Arnolds Creek
Rocky Creek
Little Rocky Creek
Hollowing
Maple Swamp
Stevens Mill Run
Lake Caroline
E
ESE
SE
SSE
S
5
10


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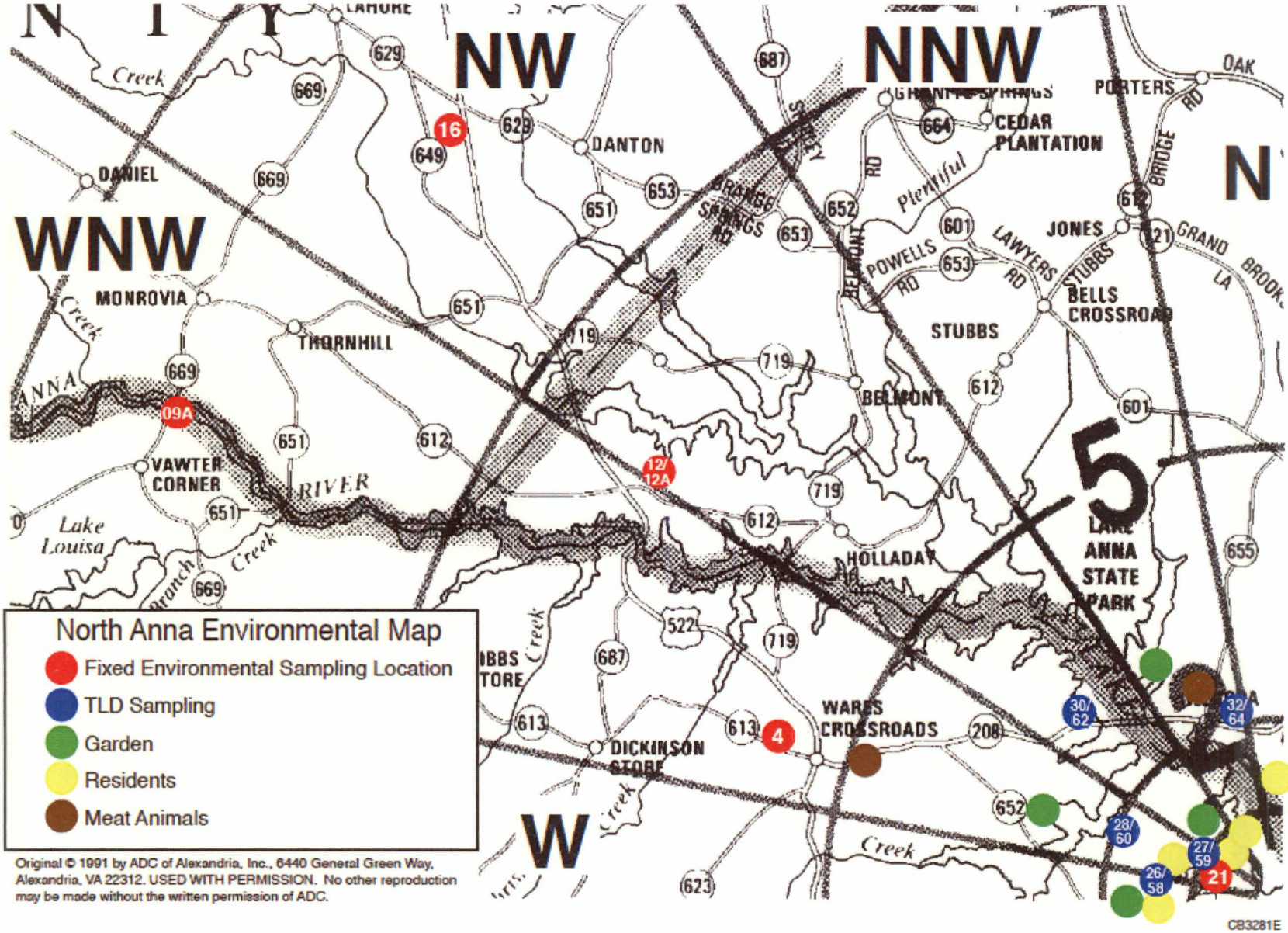
CB3283D


NW
NNW
WNW
N
W
5
DANTON
DANIEL
MONROVIA
THORNHILL
VAWTER CORNER
RIVER
Lake Louisa
CEDAR PLANTATION
POWELLS RD
LAWYERS RD
STUBBS
BELLS CROSSROAD
JONES
BELMONT
HOLLADAY
LAKE ANNA STATE PARK
WARES CROSSROADS
DICKINSON STORE
PORTERS
OAK
GRAND
BROOK
16
09A
12/ 12A
4
21
30/ 62
32/ 64
28/ 60
27/ 59
26/ 58
North Anna Environmental Map
Fixed Environmental Sampling Location
TLD Sampling
Garden
Residents
Meat Animals
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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.

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Direct Radiation *(mR.std. Month)* *(Sector TLDs)*	**Gamma Dose**	256	2	4.2 (256/256) **(1.3-8.8)**	29/61	0.52 Mi. NW	7.3 (8/8) **(6.0-8.8)**	3.3 (16/16)* **(2.5-4.3)**	0
** C3/4, -7/8 used for control locations*									
Direct Radiation *(mR.std. Month)* *(Pre-operational TLDs)*	**Gamma Dose**	32	2	2.6 (16/16) **(1.3-3.8)**	C-1/2	7.30 Mi. SSE	3.1 (8/8) **(2.4-3.8)**	3.3 (16/16)* **(2.5-4.3)**	0
** C3/4, -7/8 used for control locations*									
Direct Radiation *(mR.std. Month)* *(Emergency Sector TLDs)*	**Gamma Dose**	40	2	5.0 (40/40) **(2.7-8.3)**	EPSP 09/10	0.37 Mi. ENE	7.1 (8/8) **(5.8-8.3)**	3.3 (16/16)* **(2.5-4.3)**	0
** C3/4, -7/8 used for control locations*									
Direct Radiation *(mR.std. Month)* *(Environmental TLDs)*	**Gamma Dose**	48	2	3.4 (44/44) **(1.3-5.9)**	STA-23	0.93 Mi. SSE	5.1 (4/4) **(4.4-5.9)**	3.2 (4/4) **(2.5-3.7)**	0
Direct Radiation *(mR.std. Month)* *(Annual TLDs)*	**Gamma Dose**	12	2	3.2 (11/11) **(1.8-4.9)**	STA-23	0.93 Mi. SSE	4.9 (1/1) **(4.9)**	3.4 (1/1) **(3.4)**	0
Air Particulate *($1e^{-3}$ pCi/m^3)*	**GR-B**	689	0.01	14.2 (636/636) **(4.5-30.1)**	23	0.93 Mi. SSE	15.0 (53/53) **(7.5-30.1)**	15.9 (53/53) **(6.7-31.0)**	0
	GAMMA	52							
	BE-7	52	-	138.1 (48/48) **(104.4-174.9)**	04	5.10 Mi. WNW	153.9 (4/4) **(130.1-174.9)**	155.7 (4/4) **(145.6-168.4)**	0
	Cs-134	52	0.05	**(0/48)**	N/A	N/A	N/A	**(0/4)**	0
	Cs-137	52	0.06	**(0/48)**	N/A	N/A	N/A	**(0/4)**	0
	Sr-89	13	0.01	**(0/12)**	N/A	N/A	N/A	**(0/1)**	0
	Sr-90	13	0.01	**(0/12)**	N/A	N/A	N/A	**(0/1)**	0
Air Iodine *($1e^{-3}$ pCi/m^3)*	**I-131**	689	0.07	**(0/624)**	N/A	N/A	N/A	**(0/53)**	0

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

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Soil*	**GAMMA**	12							
(pCi/kg dry wt.)	K-40	12	-	12482 (11/11) (3604-26390)	23	0.93 Mi. SSE	26390 (1/1) (26390)	24090 (1/1) (24090)	0
	CS-134	12	150	(0/11)	N/A	N/A	N/A	(0/1)	0
	CS-137	12	180	285.9 (6/11) (140.3-383.8)	02	5.30 Mi. SSW	383.8 (1/1) (383.8)	(0/1)	0
	Ra-226	12	-	2633 (7/11) (1564-3642)	22	1.00 Mi. WSW	3642 (1/1) (3642)	(0/1)	0
	Th-228	12	-	1157 (11/11) (478.4-2129)	06	4.70 Mi. ESE	2129 (1/1) (2129)	423.4 (1/1) (423.4)	0
	Th-232	12	-	917.3 (11/11) (438.7-1647)	22	1.00 Mi. WSW	1647 (1/1) (1647)	(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
*Soil samples are obtained triennially.									
Precipitation	**GR-B**	12	4	4.6 (9/12) (1.5-10.4)	01A	0.64 Mi. SE	4.6 (9/12) (1.5-10.4)	N/A	0
(pCi/liter)									
	H-3	12	2000	(0/12)	N/A	N/A	N/A	N/A	0
	GAMMA	2							
	Be-7	2	-	(0/2)	N/A	N/A	N/A	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
	Co-60	2	15	(0/2)	N/A	N/A	N/A	N/A	0

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Precipitation (cont'd) *(pCi/liter)*	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
	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	60	(0/2)	N/A	N/A	N/A	N/A	0
	La-140	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
	Th-228	2	-	(0/2)	N/A	N/A	N/A	N/A	0
Fruits & Vegetables *(pCi/kg wet wt.)*	GAMMA	30							
	Be-7	30	-	1447 (23/24) (603.2-4635)	26	1.15 Mi. S	1672 (6/6) (603.2-4635)	1514 (5/6) (847.8-2342)	0
	K-40	30	-	4952 (24/24) (3176-9893)	26	1.15 Mi. S	5431 (6/6) (3729-9893)	5624 (6/6) (4511-8101)	0
	I-131	30	60	(0/24)	N/A	N/A	N/A	(0/6)	0
	Cs-134	30	60	(0/24)	N/A	N/A	N/A	(0/6)	0
	Cs-137	30	80	(0/24)	N/A	N/A	N/A	(0/6)	0
	Ra-226	30	-	555.7 (2/24) (417.2-694.2)	16	12.60 Mi. NW	1199 (1/6) (1199)	1199 (1/6) (1199)	0

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					Number	Distance Direction	Mean (Range)		
Fruits & Vegetables (cont'd) *(pCi/kg wet wt.)*	Ac-228	30	-	**(0/24)**	N/A	N/A	N/A	**(0/6)**	0
	Th-228	30	-	**88.8 (7/24) (26.5-139.0)**	23	0.93 Mi. SSE	**102.9 (2/6) (84.2-121.6)**	**(0/6)**	0
	Th-232	30	-	**119.2 (2/24) (112.4-126.0)**	23	0.93 Mi. SSE	**126.0 (1/6) (126.0)**	**(0/6)**	0
Well Water *(pCi/liter)*	H-3	4	2000	**(0/4)**	N/A	N/A	N/A	N/A	0
	GAMMA	4							
	Mn-54	4	15	**(0/4)**	N/A	N/A	N/A	N/A	0
	Fe-59	4	30	**(0/4)**	N/A	N/A	N/A	N/A	0
	Co-58	4	15	**(0/4)**	N/A	N/A	N/A	N/A	0
	Co-60	4	15	**(0/4)**	N/A	N/A	N/A	N/A	0
	Zn-65	4	30	**(0/4)**	N/A	N/A	N/A	N/A	0
	Zr-95	4	30	**(0/4)**	N/A	N/A	N/A	N/A	0
	Nb-95	4	15	**(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
	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

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Well Water (cont'd) *(pCi/liter)*	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)*	H-3	4	2000	3220 (4/4) (2110-4150)	11	5.80 Mi. SE	3220 (4/4) (2110-4150)	N/A	0
	GAMMA	12							
	Mn-54	12	15	(0/12)	N/A	N/A	N/A	N/A	0
	Fe-59	12	30	(0/12)	N/A	N/A	N/A	N/A	0
	Co-58	12	15	(0/12)	N/A	N/A	N/A	N/A	0
	Co-60	12	15	(0/12)	N/A	N/A	N/A	N/A	0
	Zn-65	12	30	(0/12)	N/A	N/A	N/A	N/A	0
	Zr-95	12	30	(0/12)	N/A	N/A	N/A	N/A	0
	Nb-95	12	15	(0/12)	N/A	N/A	N/A	N/A	0
	I-131	12	1	(0/12)	N/A	N/A	N/A	N/A	0
	Cs-134	12	15	(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

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
River Water (cont'd) *(pCi/liter)*	Sr-89	1	-	(0/1)	N/A	N/A	N/A	N/A	0
	Sr-90	1	-	(0/1)					0
Surface Water *(pCi/liter)*	H-3	8	2000	2938 (4/4) (2070-4000)	08	3.37 Mi. SSE	2938 (4/4) (2070-4000)	(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

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Surface Water (cont'd) *(pCi/liter)*	Sr-89	2	-	(0/1)	N/A	N/A	N/A	(0/1)	0
	Sr-90	2	-	(0/1)	N/A	N/A	N/A	(0/1)	0
Sediment Silt	**GAMMA**	6							
(pCi/kg dry wt.)	K-40	6	-	13445 (4/4) (1683-28060)	11	5.80 Mi. SE	24215 (2/2) (20370-28060)	14730 (2/2) (13000-16460)	0
	Cs-134	6	150	(0/4)	N/A	N/A	N/A	(0/2)	0
	Cs-137	6	180	45.9 (1/4) (45.9)	11	5.80 Mi. SE	45.9 (1/4) (45.9)	(0/2)	0
	Ra-226	6	-	(0/4)	N/A	N/A	N/A	899.6 (1/2) (899.6)	0
	Th-228	6	-	516.2 (4/4) (155.3-951.9)	11	5.80 Mi. SE	838.1 (2/2) (724.2-951.9)	661.7 (2/2) (195.3-1128)	0
	Th-232	6	-	712.9 (2/4) (584.2-841.5)	11	5.80 Mi. SE	712.9 (2/2) (584.2-841.5)	720.3 (2/2) (220.6-1220)	0
	Sr-89 (Annually)	3	-	(0/2)	N/A	N/A	N/A	(0/1)	0
	Sr-90 (Annually)	3	-	(0/2)	N/A	N/A	N/A	(0/1)	0
Shoreline Soil	**GAMMA**	2							
(pCi/kg dry wt.)	K-40	2	-	1307 (2/2) (1144-1470)	08	3.37 Mi. SSE	1307 (2/2) (1144-1470)	N/A	0
	Cs-134	2	150	(0/2)	N/A	N/A	N/A	N/A	0
	Cs-137	2	180	(0/2)	N/A	N/A	N/A	N/A	0
	Ra-226	2	-	(0/2)	N/A	N/A	N/A	N/A	0
	Th-228	2	-	112.8 (2/2) (79.8-145.7)	08	3.37 Mi. SSE	112.8 (2/2) (79.8-145.7)	N/A	0

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Shoreline Soil (cont'd) *(pCi/kg dry wt.)*	Th-232	2	-	(0/2)	N/A	N/A	N/A	N/A	0
	Sr-89 (Annually)	1	-	(0/1)	N/A	N/A	N/A	N/A	0
	Sr-90 (Annually)	1	-	(0/1)	N/A	N/A	N/A	N/A	0
Fish - Other	GAMMA	8							
(pCi/kg wet wt.)	K-40	8	-	1337 (4/4) (1079-1624)	08	3.37 Mi. SSE	1337 (4/4) (1079-1624)	1225 (4/4) (966.6-1774)	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 2019 REMP Samples

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

Because of counting statistics, negative values, zeros and numbers below the Minimum Detectable Level (MDL) are statistically valid pieces of data[1]. For clarity of this report only detectable results are presented. TBE's analytical methods meet the Lower Limit of Detection (LLD) requirements given in Table 2 of the USNRC Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program", (November 1979, Revision 1) and the North Anna ODCM.

Data are given according to sample type as indicated below.

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

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

TABLE 3-2
QUARTERLY
GAMMA EXPOSURE RATE
(mR/Std. Month) ± 2 Sigma

Station	First Quarter 12/26/2018-3/26/2019	Second Quarter 3/26/2019-6/25/2019	Third Quarter 6/25/2019-9/26/2019	Fourth Quarter 9/26/2019-12/30/2019	Quarterly Average* (+/-) 2 S.D.
N-1	5.3	4.8	3.8	5.6	4.8 (+/-) 1.1
N-33	5.1	4.5	4.6	5.2	
N-2	3.1	2.5	2.6	3.4	2.9 (+/-) 1.0
N-34	3.6	2.2	2.8	3.1	
NNE-3	6.3	4.8	5.1	7.2	6.1 (+/-) 2.0
NNE-35	7.3	5.5	5.9	7.1	
NNE-4	4.2	3.9	3.6	4.8	4.1 (+/-) 0.9
NNE-36	4.6	3.7	3.6	4.1	
NE-5	4.8	3.4	3.4	5.1	4.2 (+/-) 1.7
NE-37	4.7	3.6	3.4	5.3	
NE-6	3.5	3.0	3.4	4.2	3.4 (+/-) 0.9
NE-38	3.2	2.7	3.1	4.0	
ENE-7	6.4	4.5	4.9	6.6	5.6 (+/-) 1.9
ENE-39	6.2	4.8	4.4	6.5	
ENE-8	2.1	1.8	1.5	2.6	2.0 (+/-) 1.0
ENE-40	1.9	1.7	2.0	2.9	
E-9	5.1	4.1	4.7	5.6	5.2 (+/-) 1.7
E-41	5.6	4.2	5.7	6.7	
E-10	4.5	3.5	3.4	4.6	4.0 (+/-) 1.2
E-42	4.1	3.3	3.6	4.7	
ESE-11	5.5	3.4	3.1	4.2	4.2 (+/-) 1.8
ESE-43	4.3	3.8	3.6	5.6	
ESE-12	4.1	3.4	4.1	5.7	4.4 (+/-) 1.6
ESE-44	4.5	3.7	4.1	5.3	
SE-13	4.4	3.3	3.8	5.3	4.2 (+/-) 1.4
SE-45	4.4	3.4	4.2	5.0	
SE-14	6.7	5.4	5.7	7.4	6.3 (+/-) 2.0
SE-46	7.2	5.0	5.4	7.3	
SSE-15	4.9	3.7	4.7	5.3	4.8 (+/-) 1.3
SSE-47	5.0	4.2	4.9	5.8	
SSE-16	3.4	2.4	2.5	4.0	3.1 (+/-) 1.2
SSE-48	3.3	2.2	3.1	3.6	
S-17	5.5	3.9	3.3	5.5	4.5 (+/-) 2.4
S-49	5.5	2.5	4.1	5.7	

*Average of collocated TLDs

TABLE 3-2
QUARTERLY
GAMMA EXPOSURE RATE
(mR/Std. Month) ± 2 Sigma

Station	First Quarter 12/26/2018-3/26/2019	Second Quarter 3/26/2019-6/25/2019	Third Quarter 6/25/2019-9/26/2019	Fourth Quarter 9/26/2019-12/30/2019	Quarterly Average* (+/-) 2 S.D.
S-18	2.7	1.8	1.8	3.1	2.3 (+/-) 1.0
S-50	2.4	1.9	1.8	2.6	
SSW-19	5.8	5.5	5.4	6.9	6.0 (+/-) 1.4
SSW-51	6.6	5.5	5.6	7.0	
SSW-20	2.2	1.7	2.1	3.1	2.3 (+/-) 1.2
SSW-52	2.6	1.4	2.0	3.0	
SW-21	4.3	3.1	3.4	4.3	3.8 (+/-) 1.0
SW-53	4.1	3.4	3.6	4.2	
SW-22	4.6	4.1	4.4	5.2	4.3 (+/-) 0.9
SW-54	4.4	3.7	3.9	4.2	
WSW-23	4.7	3.6	4.4	6.0	4.6 (+/-) 1.6
WSW-55	4.8	3.7	3.9	5.3	
WSW-24	4.7	3.9	3.6	5.1	4.3 (+/-) 1.4
WSW-56	4.6	3.6	3.8	5.4	
W-25	7.7	6.1	6.0	7.8	6.9 (+/-) 1.9
W-57	7.6	6.1	5.7	7.9	
W-26	3.0	2.0	2.8	2.9	2.6 (+/-) 1.1
W-58	3.1	1.9	2.1	3.1	
WNW-27	3.0	2.8	2.9	4.5	3.2 (+/-) 1.4
WNW-59	3.2	2.3	2.9	4.0	
WNW-28	4.2	2.5	2.6	3.3	3.1 (+/-) 1.5
WNW-60	3.8	2.1	2.8	3.8	
NW-29	7.8	6.0	7.2	8.0	7.3 (+/-) 2.1
NW-61	8.1	6.0	6.4	8.8	
NW-30	2.3	1.3	1.5	2.5	2.0 (+/-) 1.2
NW-62	2.6	1.4	1.8	2.7	
NNW-31	5.1	3.7	3.4	4.2	4.0 (+/-) 1.4
NNW-63	4.8	3.4	3.3	4.5	
NNW-32	3.7	3.0	3.4	4.6	3.6 (+/-) 1.5
NNW-64	4.1	2.3	3.6	4.3	
				Mean	4.2 (+/-) 1.5

*Average of collocated TLDs

TABLE 3-2
QUARTERLY
GAMMA EXPOSURE RATE
(mR/Std. Month) ± 2 Sigma

Station	First Quarter 12/26/2018-3/26/2019	Second Quarter 3/26/2019-6/25/2019	Third Quarter 6/25/2019-9/26/2019	Fourth Quarter 9/26/2019-12/30/2019	Quarterly Average* (+/-) 2 S.D.
C-1	3.3	2.5	2.8	3.8	3.1 (+/-) 1.1
C-2	3.3	2.4	2.6	3.7	
C-3**	3.4	2.6	2.8	3.8	3.0 (+/-) 1.0
C-4**	3.7	2.5	2.8	2.8	
C-5	2.5	1.6	2.3	2.8	2.2 (+/-) 1.1
C-6	2.4	1.3	2.0	2.6	
C-7**	4.3	3.0	3.3	4.2	3.7 (+/-) 1.1
C-8**	4.0	3.1	3.3	4.1	
				Indicator Mean	2.6 (+/-) 1.4
				Control Mean	3.3 (+/-) 1.2
EPSA-01***	5.0	4.2	3.6	5.4	4.5 (+/-) 1.5
EPSA-02***	5.1	3.7	3.6	5.2	
EPSF-03***	4.2	3.6	3.3	4.8	3.9 (+/-) 1.0
EPSF-04***	4.1	3.7	3.6	4.3	
EPSR-05***	6.3	4.8	4.6	6.5	5.7 (+/-) 1.7
EPSR-06***	6.4	5.1	5.1	6.5	
EPSJ-07***	4.5	2.9	2.8	4.7	3.7 (+/-) 1.9
EPSJ-08***	4.8	2.7	2.9	4.6	
EPSP-09***	8.1	5.8	6.0	8.1	7.1 (+/-) 2.1
EPSP-10***	8.3	6.3	6.2	7.7	
				Mean	5.0 (+/-) 3.0

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

TABLE 3-2
QUARTERLY
GAMMA EXPOSURE RATE
(mR/Std. Month) ± 2 Sigma

Station	First Quarter 12/26/2018-3/26/2019	Second Quarter 3/26/2019-6/25/2019	Third Quarter 6/25/2019-9/26/2019	Fourth Quarter 9/26/2019-12/30/2019	Quarterly Average* (+/-) 2 S.D.	Annual TLD
STA-01	4.9	4.1	3.3	5.3	4.4 (+/-) 1.8	4.2
STA-02	2.5	1.5	2.0	2.4	2.1 (+/-) 0.9	1.8
STA-03	4.0	1.3	2.0	2.5	2.5 (+/-) 2.3	1.8
STA-04	2.7	2.3	2.3	3.2	2.6 (+/-) 0.8	2.7
STA-05	2.9	2.8	3.6	3.2	3.1 (+/-) 0.7	2.9
STA-05A	3.3	2.4	2.8	3.2	2.9 (+/-) 0.8	3.1
STA-06	4.2	3.3	4.1	4.9	4.1 (+/-) 1.3	4.0
STA-07	3.9	2.3	2.8	3.5	3.1 (+/-) 1.4	2.9
STA-21	3.4	2.6	3.4	3.7	3.3 (+/-) 0.9	3.5
STA-22	5.0	3.3	3.8	4.7	4.2 (+/-) 1.6	3.6
STA-23	5.6	4.4	4.6	5.9	5.1 (+/-) 1.5	4.9
STA-24**	3.7	2.5	2.9	3.7	3.2 (+/-) 1.2	3.4
				Mean Indicator Locations	3.4 (+/-) 2.2	3.2 (+/-) 1.9

*Average of collocated TLDs
** Control

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(10^{-3} pCi/m^3)

LOCATIONS

PERIOD ENDING	01	(+/-)	02	(+/-)	03	(+/-)	04	(+/-)	05	(+/-)	06	(+/-)	07	(+/-)	21	(+/-)
01/02/19	12.30	2.590	8.490	2.320	11.50	2.460	10.10	2.410	10.60	2.430	13.10	2.590	13.90	2.640	10.20	2.380
01/09/19	10.60	2.420	8.230	2.270	10.90	2.440	11.00	2.450	8.010	2.260	13.00	2.570	11.30	2.460	15.10	2.680
01/16/19	8.630	2.240	7.300	2.150	10.00	2.330	10.50	2.360	8.990	2.250	8.770	2.240	8.610	2.240	11.80	2.440
01/22/19	11.00	2.790	9.920	2.690	12.90	2.900	10.90	2.780	11.70	2.850	12.00	2.850	9.600	2.670	12.40	2.880
01/29/19	14.00	2.690	9.660	2.470	10.40	2.480	14.20	2.700	12.00	2.580	9.140	2.420	14.00	2.710	13.30	2.650
02/05/19	21.40	3.150	15.50	2.850	18.10	2.930	24.80	3.290	14.50	2.800	23.30	3.250	24.50	3.300	16.90	2.920
02/12/19	15.50	2.730	12.50	2.450	17.20	2.770	18.10	2.800	18.00	2.760	15.80	2.640	16.90	2.710	17.10	2.720
02/19/19	13.40	2.730	10.50	2.420	14.90	2.680	14.00	2.630	12.70	2.560	13.10	2.590	10.60	2.430	14.60	2.670
02/26/19	11.80	2.690	8.900	2.380	12.20	2.580	9.330	4.090	13.10	2.650	9.120	2.400	14.00	2.680	14.30	2.700
03/06/19	12.90	2.280	10.70	2.060	9.920	2.010	14.30	2.280	6.470	1.770	8.890	1.940	12.30	2.160	8.300	1.900
03/13/19	11.00	2.630	9.640	2.410	13.20	2.610	11.80	2.550	11.70	2.530	8.050	2.310	11.00	2.500	13.90	2.660
03/19/19	10.20	2.660	10.40	2.540	8.780	2.430	12.80	2.700	7.170	2.320	10.50	2.550	9.560	2.480	10.40	2.550
03/26/19	10.60	2.520	5.650	2.120	13.00	2.540	13.30	2.570	7.630	2.250	6.890	2.200	9.170	2.350	10.10	2.410
04/02/19	11.30	2.730	10.70	2.670	12.70	2.830	14.00	2.910	12.30	2.800	12.00	2.740	8.700	2.550	12.20	2.790
04/09/19	10.20	2.380	12.50	2.550	11.00	2.460	10.30	2.390	11.70	2.460	12.90	2.570	13.50	2.610	10.80	2.420
04/16/19	7.330	2.360	7.640	2.380	7.420	2.360	5.070	2.210	6.490	2.290	5.690	2.240	7.490	2.370	7.080	2.390
04/24/19	7.980	2.160	6.020	2.050	7.520	2.130	6.480	2.070	5.730	2.030	7.730	2.160	6.910	2.120	6.460	2.090
04/30/19	9.510	2.890	8.980	2.860	11.40	3.000	10.50	2.950	9.970	2.930	11.70	3.030	14.10	3.180	8.000	2.800
05/07/19	11.40	2.540	10.70	2.520	12.10	2.580	13.40	2.650	8.730	2.380	12.30	2.590	9.310	2.410	11.20	2.530
05/14/19	8.480	2.440	9.160	2.480	7.160	2.350	7.240	2.350	9.020	2.460	7.720	2.370	7.000	2.340	10.70	2.570
05/22/19	14.80	2.560	14.60	2.560	16.70	2.670	17.80	2.730	16.40	2.670	16.40	2.670	19.90	2.830	17.50	2.710
05/29/19	11.00	2.690	12.40	2.770	13.30	2.820	12.40	2.770	12.10	2.740	14.90	2.900	13.60	2.830	10.00	2.630
06/04/19	12.80	3.020	11.00	2.920	12.10	2.990	10.90	2.910	12.30	3.000	12.20	3.000	17.60	3.300	11.80	2.960
06/11/19	10.50	2.560	9.560	2.500	8.790	2.460	14.90	2.800	12.20	2.630	10.90	2.560	14.10	2.760	12.00	2.640
06/18/19	11.70	2.560	11.30	2.660	13.20	2.660	14.30	2.720	12.80	2.640	11.50	2.560	12.50	2.630	11.50	2.560
06/25/19	9.270	2.490	9.990	2.440	8.750	2.390	9.920	2.460	7.010	2.290	7.730	2.330	8.830	2.370	9.700	2.480

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(10^{-3} pCi/m^3)

LOCATIONS

PERIOD ENDING	01	(+/-)	02	(+/-)	03	(+/-)	04	(+/-)	05	(+/-)	06	(+/-)	07	(+/-)	21	(+/-)
07/03/19	16.10	2.570	16.30	2.640	14.90	2.550	18.30	2.730	17.20	2.660	15.40	2.580	18.20	2.740	17.10	2.640
07/09/19	12.90	2.870	8.610	2.660	7.180	2.560	11.00	2.740	11.00	2.750	10.80	2.730	11.30	2.770	11.40	2.770
07/17/19	14.70	2.600	14.30	2.580	11.70	2.430	14.80	2.570	17.10	2.710	16.60	2.690	16.60	2.700	16.30	2.690
07/23/19	10.60	2.810	11.90	2.900	9.930	2.880	10.10	2.850	11.00	2.860	11.50	2.890	11.00	2.860	12.50	2.940
07/30/19	13.60	2.670	12.60	2.610	14.10	2.700	12.50	2.610	17.70	2.890	11.40	2.550	11.40	2.550	12.70	2.620
08/06/19	20.80	3.120	21.80	3.160	20.90	3.120	17.90	2.960	24.20	3.430	23.70	3.250	20.40	3.080	21.00	3.120
08/14/19	19.40	2.690	21.30	2.770	20.80	2.750	19.60	2.690	16.10	2.520	18.90	2.660	19.20	2.680	19.70	2.700
08/21/19	18.20	3.100	16.10	3.000	21.40	3.260	21.70	3.280	21.70	3.280	25.40	3.450	18.80	3.130	18.50	3.130
08/27/19	7.590	2.690	9.480	2.790	8.020	2.690	13.40	3.050	12.70	2.990	10.70	2.870	8.050	2.700	9.380	2.800
09/03/19	17.10	2.970	13.60	2.800	22.50	3.260	19.20	3.080	16.90	2.980	14.30	2.840	21.80	3.230	18.50	3.040
09/10/19	20.00	3.010	23.20	3.170	25.80	3.290	22.70	3.140	21.60	3.080	21.20	3.070	17.50	2.870	24.40	3.220
09/17/19	29.00	3.390	27.60	3.330	28.50	3.310	24.80	3.160	24.80	3.190	25.40	3.220	19.80	2.950	26.50	3.280
09/24/19	17.80	2.810	20.40	2.940	20.10	2.990	18.30	2.880	22.20	3.040	20.90	2.980	21.30	2.990	19.80	2.910
10/01/19	19.50	2.890	17.10	2.770	19.10	2.880	21.50	3.000	22.90	3.070	20.90	2.970	16.50	2.740	21.80	3.010
10/08/19	15.50	2.620	14.70	2.610	13.90	2.530	17.60	2.730	16.60	2.680	13.40	2.490	16.40	2.670	17.30	2.720
10/15/19	17.70	2.840	17.80	2.850	20.90	3.010	21.70	3.050	17.00	2.800	19.80	2.940	17.80	2.850	21.20	3.030
10/22/19	15.10	2.880	14.50	2.850	17.30	3.000	16.50	2.960	13.10	2.770	12.80	2.760	12.90	2.750	16.80	2.970
10/29/19	8.330	2.360	11.50	2.550	11.50	2.560	11.20	2.530	9.380	2.440	7.450	2.300	10.80	2.500	11.10	2.520
11/05/19	11.10	2.340	12.80	2.450	14.40	2.540	12.90	2.450	14.70	2.550	13.70	2.490	13.60	2.490	11.40	2.360
11/13/19	18.80	2.600	15.80	2.450	23.70	2.840	18.30	2.580	20.70	2.680	16.70	2.490	21.90	2.790	20.80	2.700
11/20/19	14.10	2.860	17.20	3.020	18.20	3.070	18.60	3.090	13.90	2.860	16.70	3.010	16.60	2.990	12.40	2.760
11/26/19	18.00	3.160	15.90	3.010	20.00	3.240	13.70	2.890	16.10	3.060	13.70	2.920	18.20	3.170	17.10	3.100
12/04/19	4.500	2.280	7.690	2.460	7.030	2.420	6.950	2.410	7.600	2.430	8.450	2.470	6.590	2.360	8.640	2.460
12/10/19	7.500	2.680	13.40	3.050	10.40	2.880	8.380	2.760	10.50	2.880	13.20	3.060	11.40	2.960	11.20	2.970
12/17/19	14.10	2.700	14.90	2.740	12.70	2.630	18.00	2.910	14.40	2.710	14.30	2.700	13.60	2.670	16.00	2.810
12/23/19	24.90	3.650	22.90	3.560	26.00	3.700	27.10	3.760	26.90	3.760	20.00	3.420	25.30	3.840	22.90	3.560
12/30/19	26.30	3.360	22.30	3.170	26.40	3.310	27.90	3.400	26.20	3.350	21.90	3.160	23.70	3.240	26.70	3.380
Mean	13.83	2.717	13.16	2.668	14.58	2.741	14.85	2.788	14.03	2.712	13.86	2.702	14.33	2.734	14.54	2.742

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(10^{-3} pCi/m^3)

PERIOD ENDING	LOCATIONS									
	22		23		24*		01A		05A	
		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)
01/02/19	12.70	2.540	11.20	2.510	9.780	2.340	12.90	2.550	10.40	2.410
01/09/19	11.60	2.490	9.550	2.350	9.620	2.360	12.10	2.510	13.90	2.610
01/16/19	9.510	2.300	11.20	2.400	11.90	2.430	11.90	2.450	10.50	2.340
01/22/19	11.50	2.820	12.20	2.810	7.940	2.640	9.930	2.820	12.50	2.900
01/29/19	8.480	2.370	8.430	2.410	11.40	2.520	11.40	2.550	10.80	2.510
02/05/19	10.80	2.570	16.80	2.910	21.00	3.130	24.60	3.300	23.40	3.250
02/12/19	16.90	2.710	13.40	2.520	16.60	2.700	16.30	2.680	16.50	2.680
02/19/19	9.160	2.330	14.20	2.640	14.30	2.650	13.30	2.590	14.60	2.670
02/26/19	12.10	2.580	9.660	2.430	12.50	2.600	13.10	2.630	11.90	2.560
03/06/19	9.610	1.990	10.30	2.030	9.970	2.010	10.20	2.030	10.30	2.030
03/13/19	11.90	2.550	14.00	2.670	13.50	2.630	10.40	2.460	13.10	2.610
03/19/19	9.470	2.480	11.90	2.640	10.10	2.520	11.30	2.600	10.10	2.530
03/26/19	11.70	2.490	9.180	2.340	8.400	2.310	8.150	2.290	9.310	2.360
04/02/19	9.650	2.650	11.20	2.740	11.30	2.700	9.040	2.600	12.20	2.790
04/09/19	13.20	2.600	13.00	2.550	14.10	2.640	10.70	2.410	12.60	2.520
04/16/19	4.470	2.170	7.480	2.360	6.710	2.310	5.790	2.260	6.650	2.310
04/24/19	6.920	2.120	7.450	2.150	7.210	2.120	7.530	2.130	8.660	2.210
04/30/19	14.90	3.200	11.20	2.990	12.20	3.060	11.00	2.980	9.690	2.900
05/07/19	13.40	2.650	11.00	2.520	9.830	2.450	12.30	2.590	9.680	2.440
05/14/19	8.480	2.440	11.50	2.620	12.30	2.650	8.880	2.470	8.100	2.400
05/22/19	19.60	2.810	18.00	2.730	16.40	2.680	16.50	2.650	19.00	2.800
05/29/19	9.250	2.590	13.30	2.820	13.40	2.810	13.20	2.810	15.10	2.910
06/04/19	11.70	2.960	12.90	3.030	11.50	2.970	15.90	3.200	13.20	3.060
06/11/19	12.30	2.660	14.00	2.760	13.40	2.690	12.90	2.700	14.50	2.760
06/18/19	13.30	2.650	16.90	2.850	15.50	2.830	14.10	2.700	13.40	2.680
06/25/19	6.660	2.290	7.850	2.370	8.180	2.380	8.610	2.440	9.920	2.480

*Control Station

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(10^{-3} pCi/m^3)

PERIOD ENDING	LOCATIONS 22	(+/-)	23	(+/-)	24*	(+/-)	01A	(+/-)	05A	(+/-)
07/03/19	15.60	2.560	18.00	2.680	19.50	2.740	16.60	2.600	19.60	2.780
07/09/19	11.40	2.780	10.40	2.720	10.00	2.680	8.690	2.600	11.50	2.780
07/17/19	17.00	2.710	15.20	2.610	14.00	2.560	15.60	2.640	16.00	2.650
07/23/19	14.80	3.080	12.20	2.930	11.70	2.900	11.50	2.880	13.60	3.020
07/30/19	14.90	2.730	13.90	2.630	17.40	2.890	11.20	2.520	9.060	2.410
08/06/19	14.00	2.760	22.60	3.260	27.80	3.610	19.40	3.050	20.00	3.060
08/14/19	17.20	2.590	19.90	2.720	22.30	2.810	21.50	2.800	22.20	2.810
08/21/19	23.20	3.330	20.40	3.210	27.50	3.540	20.60	3.210	25.30	3.450
08/27/19	11.90	2.960	13.90	3.080	14.90	3.180	11.00	2.910	13.00	3.010
09/03/19	20.00	3.120	20.90	3.160	24.30	3.310	14.80	2.850	22.40	3.260
09/10/19	17.80	2.900	23.30	3.170	26.00	3.290	22.20	3.120	25.90	3.290
09/17/19	24.10	3.150	23.40	3.120	31.00	3.470	23.80	3.140	24.60	3.180
09/24/19	18.90	2.870	21.00	2.980	25.30	3.180	16.80	2.760	18.80	2.880
10/01/19	15.70	2.700	21.50	3.000	26.10	3.210	22.00	3.020	15.20	2.680
10/08/19	17.30	2.720	17.20	2.710	16.00	2.630	15.20	2.610	18.00	2.750
10/15/19	17.50	2.830	20.80	3.000	22.60	3.090	18.20	2.860	20.60	2.990
10/22/19	12.30	2.720	15.70	2.910	18.50	3.080	11.20	2.660	14.10	2.840
10/29/19	12.90	2.620	13.90	2.680	11.30	2.530	9.740	2.440	9.960	2.460
11/05/19	9.310	2.220	13.30	2.470	16.70	2.670	11.70	2.370	10.90	2.320
11/13/19	21.50	2.740	17.00	2.510	18.50	2.580	16.40	2.480	19.60	2.650
11/20/19	14.50	2.870	18.90	3.100	16.90	3.010	16.30	2.970	15.50	2.950
11/26/19	13.70	2.910	21.20	3.320	18.90	3.210	14.60	2.970	16.50	3.160
12/04/19	8.300	2.480	8.750	2.510	9.390	2.570	5.980	2.360	8.870	2.500
12/10/19	10.10	2.840	15.80	3.170	12.30	2.950	9.240	2.790	8.620	2.770
12/17/19	13.20	2.650	13.50	2.670	19.40	2.980	15.50	2.780	16.50	2.820
12/23/19	24.60	3.640	22.50	3.530	27.90	3.820	22.80	3.540	26.70	3.760
12/30/19	24.10	3.260	30.10	3.520	27.30	3.390	23.10	3.210	29.90	3.510
Mean	13.68	2.693	14.96	2.765	15.90	2.812	13.92	2.708	14.96	2.763
							Mean all indicatior location		14.22	2.728

*Control Station

TABLE 3-4
AIRBORNE IODINE
(10^{-3} pCi/m^3)

PERIOD ENDING	LOCATIONS 01	02	03	04	05	06	07	21
01/02/19	< 23.21	< 22.75	< 22.01	< 22.33	< 20.32	< 20.43	< 20.54	< 20.04
01/09/19	< 26.28	< 26.32	< 26.32	< 26.32	< 24.19	< 24.19	< 24.19	< 24.15
01/16/19	< 13.46	< 13.46	< 13.46	< 13.46	< 18.81	< 7.932	< 18.94	< 18.98
01/22/19	< 29.23	< 28.82	< 29.23	< 29.29	< 22.89	< 22.75	< 22.43	< 22.80
01/29/19	< 35.81	< 36.32	< 35.74	< 35.74	< 17.14	< 17.26	< 17.32	< 17.08
02/05/19	< 33.26	< 33.38	< 32.51	< 32.91	< 29.53	< 29.43	< 29.43	< 29.38
02/12/19	< 43.63	< 41.05	< 42.15	< 41.63	< 39.45	< 13.89	< 39.59	< 39.65
02/19/19	< 19.37	< 32.80	< 32.74	< 32.80	< 32.92	< 42.05	< 41.90	< 41.83
02/26/19	< 29.91	< 27.93	< 27.98	< 54.06	< 36.42	< 15.17	< 36.17	< 36.23
03/06/19	< 14.72	< 32.99	< 32.94	< 32.99	< 32.99	< 15.98	< 15.98	< 15.98
03/13/19	< 26.74	< 24.95	< 24.78	< 25.00	< 33.56	< 33.56	< 33.73	< 33.73
03/19/19	< 18.39	< 31.06	< 31.06	< 31.06	< 31.25	< 13.57	< 38.49	< 38.57
03/26/19	< 18.72	< 21.32	< 20.81	< 21.06	< 21.32	< 32.49	< 32.49	< 32.43
04/02/19	< 29.45	< 29.15	< 29.87	< 29.92	< 43.88	< 43.13	< 43.13	< 43.73
04/09/19	< 15.97	< 38.69	< 38.69	< 38.21	< 38.01	< 20.49	< 37.13	< 36.60
04/16/19	< 36.46	< 36.52	< 36.52	< 36.52	< 43.83	< 43.83	< 44.14	< 45.25
04/24/19	< 13.29	< 31.76	< 31.47	< 31.47	< 31.61	< 23.96	< 24.07	< 24.11
04/30/19	< 18.44	< 18.44	< 18.44	< 18.44	< 17.80	< 17.80	< 17.91	< 17.73
05/07/19	< 39.08	< 39.42	< 39.01	< 16.45	< 39.01	< 12.56	< 35.60	< 35.60
05/14/19	< 18.15	< 18.11	< 18.11	< 18.11	< 15.08	< 24.21	< 24.38	< 24.38
05/22/19	< 16.38	< 19.64	< 19.67	< 19.67	< 19.79	< 16.28	< 38.58	< 38.58
05/29/19	< 21.55	< 21.51	< 21.51	< 14.75	< 35.04	< 35.11	< 35.17	< 35.17
06/04/19	< 9.737	< 11.64	< 11.64	< 11.64	< 11.69	< 7.440	< 17.70	< 17.70
06/11/19	< 18.17	< 18.08	< 18.20	< 8.891	< 21.02	< 21.05	< 21.20	< 21.24
06/18/19	< 9.551	< 18.47	< 17.43	< 17.37	< 17.52	< 7.542	< 21.54	< 21.42
06/25/19	< 7.503	< 20.27	< 20.58	< 20.58	< 20.66	< 20.36	< 8.439	< 20.64

TABLE 3-4
AIRBORNE IODINE
(10^{-3} pCi/m^3)

PERIOD ENDING	LOCATIONS 01	02	03	04	05	06	07	21
07/03/19	< 8.479	< 8.802	< 8.706	< 8.733	< 7.261	< 16.94	< 17.04	< 16.65
07/09/19	< 15.33	< 37.78	< 37.78	< 36.47	< 36.62	< 13.09	< 15.62	< 15.59
07/17/19	< 21.35	< 21.38	< 21.28	< 14.53	< 14.66	< 14.70	< 14.79	< 12.40
07/23/19	< 34.92	< 35.07	< 12.89	< 35.95	< 35.35	< 22.71	< 27.04	< 26.93
07/30/19	< 32.39	< 32.50	< 32.50	< 32.50	< 17.64	< 16.24	< 38.51	< 38.44
08/06/19	< 18.29	< 18.22	< 18.22	< 18.22	< 16.35	< 28.14	< 28.14	< 28.24
08/14/19	< 15.37	< 27.82	< 27.82	< 27.82	< 27.65	< 33.31	< 33.41	< 33.36
08/21/19	< 18.72	< 18.75	< 18.82	< 18.82	< 15.83	< 13.72	< 16.29	< 16.35
08/27/19	< 21.84	< 25.80	< 25.70	< 26.01	< 25.75	< 46.59	< 46.59	< 46.97
09/03/19	< 19.75	< 19.96	< 19.96	< 19.78	< 11.00	< 12.94	< 10.86	< 12.82
09/10/19	< 18.99	< 18.96	< 18.92	< 18.92	< 15.86	< 19.83	< 19.83	< 19.79
09/17/19	< 41.34	< 14.63	< 40.22	< 40.70	< 41.34	< 31.87	< 17.65	< 32.04
09/24/19	< 18.71	< 18.64	< 16.16	< 19.04	< 18.74	< 11.70	< 27.74	< 27.79
10/01/19	< 17.53	< 17.56	< 17.56	< 17.59	< 14.74	< 26.56	< 26.56	< 26.60
10/08/19	< 23.43	< 20.02	< 23.35	< 23.35	< 23.35	< 29.49	< 29.49	< 29.49
10/15/19	< 24.30	< 20.43	< 24.38	< 24.38	< 24.26	< 34.39	< 14.50	< 34.57
10/22/19	< 22.11	< 18.59	< 22.18	< 22.18	< 22.14	< 16.80	< 39.85	< 39.92
10/29/19	< 35.78	< 35.78	< 35.97	< 35.78	< 15.14	< 15.56	< 37.09	< 37.03
11/05/19	< 18.34	< 18.40	< 18.30	< 18.30	< 18.30	< 17.27	< 31.87	< 31.87
11/13/19	< 17.93	< 17.91	< 17.96	< 17.96	< 17.82	< 23.29	< 10.91	< 23.47
11/20/19	< 23.38	< 23.42	< 23.42	< 23.42	< 11.41	< 8.698	< 16.91	< 16.91
11/26/19	< 22.92	< 22.64	< 22.64	< 22.64	< 19.24	< 34.24	< 40.86	< 40.70
12/04/19	< 18.38	< 15.48	< 18.44	< 18.38	< 18.24	< 33.75	< 33.65	< 33.50
12/10/19	< 33.96	< 34.17	< 34.24	< 14.42	< 34.31	< 32.95	< 33.16	< 27.96
12/17/19	< 20.63	< 20.63	< 20.63	< 20.63	< 11.33	< 19.39	< 19.49	< 19.49
12/23/19	< 15.39	< 15.39	< 15.39	< 15.39	< 7.237	< 13.91	< 6.720	< 13.83
12/30/19	< 29.83	< 29.83	< 29.11	< 29.47	< 26.64	< 26.69	< 26.73	< 26.78

TABLE 3-4
AIRBORNE IODINE
(10^{-3} pCi/m^3)

PERIOD ENDING	LOCATIONS 22	23	24*	01A	05A
01/02/19	< 33.32	< 34.59	< 32.97	< 33.38	< 14.10
01/09/19	< 45.62	< 45.46	< 45.46	< 45.46	< 19.03
01/16/19	< 18.98	< 19.29	< 19.16	< 19.29	< 19.16
01/22/19	< 43.58	< 42.45	< 44.49	< 45.63	< 15.50
01/29/19	< 12.41	< 12.68	< 10.26	< 12.43	< 12.41
02/05/19	< 41.76	< 41.69	< 17.51	< 41.76	< 41.98
02/12/19	< 39.72	< 20.93	< 20.89	< 20.89	< 20.71
02/19/19	< 41.75	< 45.77	< 45.93	< 45.85	< 46.10
02/26/19	< 36.23	< 33.68	< 33.62	< 33.68	< 33.62
03/06/19	< 15.98	< 26.24	< 26.32	< 26.24	< 26.24
03/13/19	< 13.63	< 32.49	< 32.21	< 32.49	< 32.26
03/19/19	< 38.49	< 38.49	< 42.61	< 42.52	< 42.79
03/26/19	< 32.32	< 17.77	< 38.57	< 38.44	< 38.37
04/02/19	< 14.89	< 35.31	< 34.52	< 35.06	< 35.24
04/09/19	< 37.39	< 36.60	< 52.87	< 52.13	< 28.15
04/16/19	< 34.60	< 34.60	< 18.96	< 34.60	< 34.48
04/24/19	< 24.11	< 31.21	< 30.78	< 30.73	< 30.83
04/30/19	< 12.08	< 28.79	< 28.97	< 28.79	< 28.85
05/07/19	< 35.67	< 35.67	< 20.80	< 20.80	< 20.80
05/14/19	< 24.42	< 13.45	< 20.33	< 20.58	< 20.37
05/22/19	< 38.40	< 38.46	< 20.76	< 20.40	< 20.66
05/29/19	< 27.12	< 27.12	< 11.28	< 27.12	< 26.98
06/04/19	< 17.67	< 17.67	< 12.54	< 12.42	< 12.49
06/11/19	< 13.22	< 13.19	< 10.87	< 13.22	< 13.03
06/18/19	< 21.31	< 21.31	< 23.56	< 22.95	< 23.23
06/25/19	< 20.67	< 20.67	< 9.701	< 9.854	< 9.651

*Control Station

TABLE 3-4
AIRBORNE IODINE
(10^{-3} pCi/m^3)

PERIOD ENDING	LOCATIONS 22	23	24*	01A	05A
07/03/19	< 16.65	< 6.971	< 5.722	< 16.23	< 16.53
07/09/19	< 15.68	< 15.68	< 20.34	< 20.43	< 20.39
07/17/19	< 26.43	< 26.35	< 26.47	< 26.43	< 11.09
07/23/19	< 27.04	< 27.10	< 43.12	< 42.94	< 43.21
07/30/19	< 38.31	< 37.33	< 24.68	< 24.38	< 24.59
08/06/19	< 28.29	< 12.16	< 9.112	< 8.473	< 8.429
08/14/19	< 33.51	< 14.13	< 30.30	< 30.67	< 30.25
08/21/19	< 16.26	< 16.29	< 21.64	< 21.57	< 21.72
08/27/19	< 46.97	< 19.70	< 26.81	< 26.32	< 26.11
09/03/19	< 12.82	< 12.80	< 22.62	< 22.74	< 23.02
09/10/19	< 8.329	< 19.83	< 25.49	< 25.63	< 25.49
09/17/19	< 31.87	< 31.87	< 49.33	< 49.59	< 49.59
09/24/19	< 27.84	< 27.89	< 15.60	< 15.65	< 15.79
10/01/19	< 26.56	< 11.16	< 17.55	< 17.52	< 17.64
10/08/19	< 12.41	< 29.54	< 10.15	< 24.50	< 24.37
10/15/19	< 34.45	< 34.51	< 12.41	< 15.09	< 11.16
10/22/19	< 39.99	< 39.99	< 22.41	< 22.21	< 22.33
10/29/19	< 37.03	< 37.03	< 24.12	< 24.16	< 24.16
11/05/19	< 31.87	< 31.73	< 26.71	< 26.71	< 26.62
11/13/19	< 23.43	< 23.43	< 25.08	< 25.20	< 25.28
11/20/19	< 16.91	< 16.91	< 14.68	< 14.68	< 14.81
11/26/19	< 40.78	< 40.70	< 55.64	< 55.64	< 57.78
12/04/19	< 34.17	< 14.33	< 17.61	< 17.37	< 17.24
12/10/19	< 32.55	< 32.48	< 25.69	< 26.00	< 26.22
12/17/19	< 19.49	< 16.31	< 18.53	< 18.60	< 18.57
12/23/19	< 13.83	< 13.83	< 23.26	< 23.02	< 23.21
12/30/19	< 17.24	< 17.21	< 17.15	< 17.24	< 17.18

*Control Station

TABLE 3-5
AIR PARTICULATES
(10^{-3} pCi/m^3)

GAMMA SPECTRA - QTR 1 (12/26/18 - 03/26/19)

LOCATION	Be-7	(+/-)	Cs-134	Cs-137
01	147.30	26.120	< 1.6730	< 1.3330
02	109.70	19.750	< 0.9551	< 0.9721
03	164.60	27.530	< 1.4260	< 0.8306
04	154.60	24.390	< 1.2300	< 1.0950
05	130.70	26.170	< 1.4630	< 0.9902
06	132.10	31.500	< 1.9140	< 1.4240
07	137.10	23.250	< 1.3410	< 1.4020
21	131.60	23.450	< 1.2910	< 0.9391
22	122.70	29.930	< 1.7670	< 1.4830
23	141.50	22.970	< 1.6870	< 1.3350
24*	147.00	24.410	< 1.7090	< 1.1340
01A	141.90	27.300	< 1.4350	< 1.3580
05A	132.90	25.160	< 1.0330	< 1.0970

GAMMA SPECTRA AND STRONTIUM 89/90- QTR 2 (03/26/19 - 06/25/19)

LOCATION	Be-7	(+/-)	Cs-134	Cs-137	Sr-89	Sr-90
01	132.50	20.820	< 1.1060	< 1.0120	< 8.9700	< 4.7700
02	144.50	26.700	< 1.1640	< 1.4610	< 8.3500	< 4.2100
03	145.40	24.520	< 0.9553	< 0.8402	< 9.8300	< 3.3900
04	174.90	29.670	< 1.3760	< 1.4400	< 9.0300	< 3.3200
05	156.70	25.640	< 1.4630	< 0.9872	< 9.1000	< 3.6400
06	125.40	22.490	< 1.3400	< 1.1650	< 8.5600	< 4.0400
07	162.20	30.920	< 1.5450	< 1.4250	< 7.4000	< 3.2800
21	139.10	22.690	< 1.1440	< 0.9255	< 5.6300	< 3.0800
22	174.90	28.690	< 1.5540	< 1.3630	< 9.9400	< 4.0700
23	173.00	28.750	< 1.7830	< 1.4650	< 9.9600	< 4.8700
24*	168.40	24.910	< 1.1400	< 0.9642	< 9.7900	< 5.6400
01A	130.00	22.730	< 1.3010	< 1.0470	< 8.2600	< 5.3000
05A	168.00	24.950	< 1.1400	< 1.3030	< 8.6400	< 3.9300

* Control Location

TABLE 3-5
AIR PARTICULATES
(10^{-3} pCi/m^3)

GAMMA SPECTRA - QTR 3 (06/25/19 - 09/24/19)

LOCATION	Be-7	(+/-)	Cs-134	Cs-137
01	127.60	23.060	< 1.4880	< 1.0990
02	137.40	21.420	< 1.1230	< 0.8835
03	138.30	24.440	< 0.3457	< 0.8812
04	155.90	24.520	< 0.9950	< 0.9353
05	141.60	22.640	< 1.2130	< 1.1720
06	120.90	25.860	< 1.7730	< 1.2450
07	145.00	21.840	< 1.3210	< 1.0610
21	137.20	21.900	< 0.8420	< 1.0850
22	168.70	23.220	< 1.1390	< 0.8897
23	148.50	27.720	< 1.1020	< 0.8871
24*	161.60	22.780	< 1.1060	< 0.6694
01A	149.20	23.400	< 1.3390	< 1.0310
05A	147.80	30.710	< 1.5420	< 1.1420

GAMMA SPECTRA - QTR 4 (09/24/19 - 12/30/19)

LOCATION	Be-7	(+/-)	Cs-134	Cs-137	Annual Mean Be-7	(+/-)
01	109.40	22.690	< 1.0790	< 1.0200	129.20	23.173
02	126.50	23.950	< 1.4790	< 1.1430	129.53	22.955
03	139.30	27.020	< 1.4530	< 1.5440	146.90	25.878
04	130.10	22.880	< 1.0050	< 0.9802	145.88	25.365
05	111.70	21.300	< 0.8578	< 0.9642	135.18	23.938
06	126.80	21.760	< 1.4630	< 1.2460	126.30	25.403
07	109.70	27.610	< 1.6720	< 1.3890	138.50	25.905
21	125.40	20.350	< 0.9746	< 0.8163	133.33	22.098
22	107.40	19.010	< 1.2190	< 0.7038	143.43	25.213
23	131.00	20.240	< 0.8086	< 0.8131	144.18	24.920
24*	145.60	20.820	< 1.5340	< 1.1420	155.65	23.230
01A	104.40	14.760	< 0.6959	< 0.5660	131.38	22.048
05A	114.00	15.280	< 0.5278	< 0.7340	140.68	24.025
				Mean of All Indicator Locations	138.06	24.243

* Control Location

TABLE 3-6
Soil
(pCi/kg dry wt.)

LOCATION	COLLECTION DATE	Sr-89	Sr-90	K-40	(+/-)	Cs-134	Cs-137	(+/-)	Ra-226	(+/-)
01	07/03/19	< 721.00	< 42.700	15930	1816.0	< 105.20		< 80.120		< 1707.0
02	07/03/19	< 545.00	< 32.900	8386.0	1612.0	< 88.530	383.80	113.20	1716.0	1470.0
03	07/03/19	< 732.00	< 31.100	4864.0	1487.0	< 137.70	375.70	113.70		< 3147.0
04	07/03/19	< 820.00	< 43.500	6622.0	1462.0	< 94.650	260.50	104.20		< 2113.0
05	07/03/19	< 1270.0	< 38.100	14260	2025.0	< 132.40	172.30	144.50	2579.0	2372.0
06	07/03/19	< 581.00	< 35.900	9590.0	1335.0	< 120.00		< 94.750	3398.0	2235.0
07	07/03/19	< 869.00	< 41.700	3604.0	1326.0	< 119.00	140.30	82.020		< 2184.0
21	07/03/19	< 924.00	< 39.100	11640	1587.0	< 82.480		< 79.020	2175.0	1241.0
22	07/03/19	< 756.00	< 44.300	18250	1573.0	< 102.00		< 76.930	3642.0	1727.0
23	07/03/19	< 1010.0	< 42.900	26390	2880.0	< 117.20	382.70	125.20	3357.0	1682.0
24*	07/03/19	< 624.00	< 44.500	24090	2550.0	< 107.00		< 97.560		< 1597.0
05A	07/03/19	< 637.00	< 40.300	17770	1693.0	< 83.300		< 77.190	1564.0	1251.0
Mean				12482	1708.7		285.88	113.80	2633.0	1787.8

LOCATION	COLLECTION DATE	Th-228	(+/-)	Th-232	(+/-)
01	07/03/19	1046.0	142.50	678.30	235.00
02	07/03/19	478.40	105.10	531.50	152.20
03	07/03/19	798.40	190.70	438.70	274.40
04	07/03/19	891.80	186.20	515.60	201.10
05	07/03/19	1483.0	168.60	966.60	279.90
06	07/03/19	2129.0	175.00	1579.0	294.50
07	07/03/19	782.40	187.60	833.00	230.70
21	07/03/19	1259.0	128.20	997.90	175.70
22	07/03/19	1703.0	125.90	1647.0	208.30
23	07/03/19	1318.0	154.70	1143.0	338.90
24*	07/03/19	423.40	137.70		< 518.60
05A	07/03/19	835.10	93.750	760.10	176.40
Mean		1095.6	149.66	917.34	233.37

* Control Location

TABLE 3-7
Precipitation
(pCi/L)

LOCATION 01A

COLLECTION DATE	Gr-B	(+/-)	H-3	RainFall (inches)
01/29/19	3.3	1.2	< 777	3.33
02/26/19	< 1.5		< 813	5.11
03/26/19	1.5	1.0	< 747	3.92
04/30/19	5.3	1.3	< 786	2.77
05/29/19	3.8	1.3	< 186	2.46
06/25/19	2.2	1.1	< 724	6.74
07/30/19	9.0	1.5	< 714	3.56
08/27/19	3.9	1.1	< 990	2.17
09/24/19	10.4	4.7	< 951	0.59
10/29/19	< 1.6		< 184	4.84
11/26/19	2.2	1.1	< 302	2.30
12/30/19	< 1.5		< 963	2.25
Mean	4.6	1.6	-	Total 40.04

TABLE 3-7
Precipitation
(pCi/L)

LOCATION 01A

COLLECTION DATE	Be-7	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95
06/25/19	< 56.60	< 1.975	< 16.91	< 4.448	< 1.674	< 4.376	< 8.994
12/30/19	< 47.48	< 1.829	< 15.37	< 3.780	< 1.597	< 3.917	< 7.676
Mean	-	-	-	-	-	-	-

COLLECTION DATE	Nb-95	Cs-134	Cs-137	Ba-140	La-140	I-131	Th-228
06/25/19	< 4.980	< 1.968	< 1.633	< 2331	< 795.7	< 24940	< 3.460
12/30/19	< 4.301	< 1.808	< 1.541	< 1492	< 510.4	< 11970	< 3.188
Mean	-	-	-	-	-	-	-

TABLE 3-8
MILK
(pCi/L)

LOCATION	COLLECTION DATE	K-40 (+/-)	Sr-89	Sr-90	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
12A									

***Milk samples could not be obtained in 2019 due the lack of dairy farms within the sampling area.**

Mean

* LLD Identified in ODCM

TABLE 3-9
Food and Vegetation
(pCi/kg wet wt.)

LOCATION 14B

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	I-131**	Cs-134**	Cs-137**	Th-228	(+/-)	Th-232	(+/-)
05/14/19	1053	270.4	4223	551.2	< 41.80	< 36.43	< 32.44	58.73	49.09		< 145.3
06/11/19	1873	219.9	4234	508.1	< 30.40	< 29.07	< 27.12		< 47.79		< 121.8
07/09/19	1038	172.7	4983	419.0	< 54.20	< 20.94	< 21.80	96.48	26.67	112.4	55.51
08/14/19	1106	366.0	4377	677.3	< 22.70	< 42.07	< 39.01	94.99	82.83		< 167.0
09/10/19	1395	485.4	5568	1081	< 48.70	< 50.43	< 60.82	139.0	89.76		< 251.1
10/08/19	1185	350.7	4479	687.2	< 48.90	< 54.23	< 49.32		< 89.44		< 185.3
Mean	1275	310.9	4644	654.0	-	-	-	97.30	62.09	112.4	55.51

LOCATION 15

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	I-131**	Cs-134**	Cs-137**
05/14/19	1477	377.5	3694	722.0	< 49.40	< 37.70	< 36.17
06/11/19	1479	458.6	5311	924.6	< 26.20	< 44.23	< 55.25
07/09/19	1088	174.0	4415	390.5	< 36.90	< 18.21	< 17.91
08/14/19	979.9	352.8	4524	643.5	< 34.90	< 35.18	< 37.28
09/10/19	665.6	450.7	4893	795.6	< 57.70	< 49.08	< 44.87
10/08/19	3060	542.3	8626	1263	< 41.80	< 56.66	< 48.11
Mean	1458	392.7	5244	789.9	-	-	-

LOCATION 16*

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	I-131**	Cs-134**	Cs-137**	Ra-226	(+/-)
05/14/19	847.8	434.1	5161	785.4	< 40.90	< 50.59	< 40.96	1199	887.8
06/11/19	1408	421.4	5146	954.7	< 20.30	< 43.67	< 36.62		< 789.1
07/09/19	1478	420.2	6104	863.9	< 41.70	< 47.30	< 43.96		< 1066
08/14/19	1495	249.2	4511	595.6	< 31.00	< 32.81	< 24.12		< 668.7
09/10/19		< 307.0	8101	1012	< 42.50	< 34.19	< 30.65		< 719.9
10/08/19	2342	488.4	4721	908.8	< 54.90	< 53.16	< 48.35		< 931.0
Mean	1514	402.7	5624	853.4	-	-	-	1199	887.8

*Control Station
** LLD identifed in ODCM

TABLE 3-9
Food and Vegetation
(pCi/kg wet wt.)

LOCATION 23

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	I-131**	Cs-134**	Cs-137**	Ra-226	(+/-)	Th-228	(+/-)	Th-232	(+/-)
05/14/19	975.0	291.1	4922	593.5	< 34.10	< 38.48	< 33.61		< 771.6		< 57.44		< 127.6
06/11/19	1918	349.1	3345	528.8	< 42.40	< 37.83	< 34.45		< 790.9		< 69.12		< 125.0
07/09/19	1420	204.3	5960	427.2	< 36.50	< 22.41	< 22.88	694.2	471.5	121.6	35.91	126.0	44.56
08/14/19	1674	282.1	3176	477.7	< 44.70	< 23.45	< 23.80		< 607.9		< 53.31		< 104.8
09/10/19	861.2	267.9	5223	647.4	< 55.70	< 48.23	< 37.20		< 905.8	84.17	47.78		< 186.8
10/08/19		< 619.1	4302	578.0	< 26.80	< 42.01	< 35.54		< 823.6		< 69.05		< 157.6
Mean	1370	278.9	4488	542.1	-	-	-	694.2	471.5	102.9	41.85	126.0	44.56

LOCATION 26

COLLECTION DATE	Be-7	(+/-)	K-40	(+/-)	I-131**	Cs-134**	Cs-137**	Ra-226	(+/-)	Th-228	(+/-)
05/14/19	1379	294.1	4815	585.4	< 43.10	< 34.84	< 37.25		< 829.9		< 62.70
06/11/19	1129	314.5	5107	646.2	< 19.40	< 34.77	< 33.67		< 785.9		< 68.03
07/09/19	603.2	276.2	5173	866.4	< 23.40	< 36.15	< 43.17		< 1088		< 81.90
08/14/19	972.5	213.5	3871	462.0	< 32.10	< 23.56	< 18.40		< 466.2		< 35.23
09/10/19	1314	164.8	3729	322.2	< 51.80	< 18.15	< 17.30	417.2	364.0	26.52	22.55
10/08/19	4635	546.8	9893	969.3	< 53.90	< 42.15	< 51.22		< 947.4		< 79.59
Mean	1672	301.7	5431	641.9	-	-	-	417.2	364.0	26.52	22.55

	Be-7	(+/-)	K-40	(+/-)	I-131**	Cs-134**	Cs-137**	Ra-226	(+/-)	Th-228	(+/-)	Th-232	(+/-)
All Indicator Mean	1447	322.8	4952	657.0	-	-	-	555.7	417.8	88.78	50.66	119.2	50.04

** LLD identifed in ODCM

TABLE 3-10
WELL WATER
(pCi/L)

LOCATION	COLLECTION DATE	H-3	Sr-89	Sr-90	Mn-54	Fe-59	Co-58	Co-60	Zn-65
01A	03/26/19	< 759	(a)	(a)	< 2.95	< 5.84	< 3.05	< 3.25	< 6.47
	06/25/19	< 715	< 3.32	< 0.856	< 2.01	< 3.84	< 2.01	< 2.13	< 4.55
	09/24/19	< 938	(a)	(a)	< 6.08	< 12.6	< 5.75	< 6.70	< 11.8
	12/30/19	< 968	(a)	(a)	< 3.85	< 8.53	< 4.22	< 3.58	< 7.54
	Mean	-	-	-	-	-	-	-	-

LOCATION	COLLECTION DATE	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
01A	03/26/19	< 5.06	< 4.41	< 4.31	< 3.32	< 3.17	< 12.8	< 4.33
	06/25/19	< 3.37	< 2.92	< 2.65	< 2.18	< 2.19	< 8.05	< 2.91
	09/24/19	< 10.1	< 9.07	< 8.23	< 7.17	< 6.79	< 25.9	< 8.34
	12/30/19	< 6.99	< 4.30	< 7.35	< 4.47	< 3.73	< 19.8	< 7.18
	Mean	-	-	-	-	-	-	-

(a) Sr-89/90 analyses performed on the second quarter sample.

TABLE 3-11
River Water
(pCi/L)

LOCATION 11

COLLECTION DATE	H-3	(+/-)	Sr-89	Sr-90	Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*
01/16/19	(a)		(b)	(b)	< 1.353	< 3.671	< 1.436	< 1.357	< 2.761
02/12/19	(a)		(b)	(b)	< 4.841	< 8.748	< 4.498	< 5.121	< 13.01
03/13/19	3530	694.0	(b)	(b)	< 5.777	< 9.807	< 5.919	< 5.555	< 10.34
04/16/19	(a)		(b)	(b)	< 4.910	< 8.440	< 4.399	< 5.126	< 9.708
05/14/19	(a)		(b)	(b)	< 2.610	< 5.612	< 2.611	< 3.088	< 4.099
06/11/19	3090	692.0	< 3.470	< 0.881	< 5.159	< 9.465	< 5.375	< 6.041	< 11.97
07/17/19	(a)		(b)	(b)	< 5.240	< 11.07	< 5.377	< 4.621	< 9.205
08/14/19	(a)		(b)	(b)	< 5.524	< 11.09	< 4.338	< 7.295	< 12.60
09/17/19	2110	628.0	(b)	(b)	< 6.154	< 13.61	< 6.780	< 6.675	< 11.52
10/15/19	(a)		(b)	(b)	< 4.487	< 9.789	< 5.679	< 7.626	< 10.74
11/13/19	(a)		(b)	(b)	< 6.060	< 10.46	< 5.381	< 2.791	< 11.38
12/17/19	4150	842.0	(b)	(b)	< 6.699	< 12.12	< 6.078	< 7.907	< 14.58
Mean	3220	714.0	-	-	-	-	-	-	-

	Nb-95*	Zr-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/16/19	< 1.675	< 2.993	< 0.671	< 1.466	< 1.308	< 16.23	< 5.226
02/12/19	< 5.601	< 9.522	< 0.684	< 4.635	< 4.901	< 26.20	< 7.714
03/13/19	< 5.181	< 5.763	< 0.546	< 5.191	< 6.142	< 25.51	< 10.15
04/16/19	< 4.700	< 6.471	< 0.626	< 5.079	< 4.580	< 21.96	< 8.829
05/14/19	< 2.805	< 4.600	< 0.879	< 3.202	< 2.745	< 10.28	< 4.668
06/11/19	< 5.027	< 10.11	< 0.547	< 6.460	< 6.401	< 21.84	< 6.737
07/17/19	< 5.293	< 10.42	< 0.806	< 6.472	< 4.940	< 27.72	< 8.975
08/14/19	< 4.148	< 9.350	< 0.651	< 6.727	< 6.870	< 24.74	< 6.721
09/17/19	< 6.608	< 13.42	< 0.959	< 6.536	< 7.421	< 27.90	< 9.465
10/15/19	< 6.423	< 9.438	< 0.828	< 4.585	< 4.113	< 23.24	< 7.062
11/13/19	< 6.054	< 11.36	< 0.885	< 5.420	< 6.295	< 24.88	< 7.248
12/17/19	< 6.221	< 11.96	< 0.805	< 6.349	< 7.600	< 24.73	< 9.474
Mean	-	-	-	-	-	-	-

* LLD identified in ODCM
(a) Tritium analyses on quarterly composite
(b) Sr-89/90 performed on 2nd quarter composite sample.

TABLE 3-12
Surface Water
(pCi/L)

LOCATION 08

COLLECTION DATE	H-3	(+/-)	Sr-89	Sr-90	Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*
01/16/19	(a)		(b)	(b)	< 1.209	< 3.277	< 1.368	< 1.225	< 2.514
02/12/19	(a)		(b)	(b)	< 5.328	< 10.07	< 4.008	< 4.052	< 15.02
03/13/19	3380	685.0	(b)	(b)	< 4.591	< 11.58	< 5.899	< 5.656	< 14.33
04/16/19	(a)		(b)	(b)	< 4.257	< 8.369	< 4.262	< 4.415	< 7.193
05/14/19	(a)		(b)	(b)	< 2.629	< 5.655	< 2.521	< 2.998	< 5.614
06/11/19	2300	648.0	< 4.320	< 0.833	< 6.885	< 11.09	< 6.229	< 5.136	< 14.14
07/17/19	(a)		(b)	(b)	< 4.061	< 10.55	< 4.769	< 5.609	< 10.67
08/14/19	(a)		(b)	(b)	< 4.786	< 10.88	< 5.251	< 5.637	< 10.10
09/17/19	2070	615.0	(b)	(b)	< 5.753	< 11.92	< 6.542	< 6.320	< 13.58
10/15/19	(a)		(b)	(b)	< 9.064	< 14.21	< 5.558	< 9.529	< 13.23
11/13/19	(a)		(b)	(b)	< 5.642	< 12.25	< 5.215	< 7.265	< 10.94
12/17/19	4000	836.0	(b)	(b)	< 5.382	< 12.29	< 5.626	< 5.065	< 15.45
Mean	2938	696.0	-	-	-	-	-	-	-

	Nb-95*	Zr-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/16/19	< 1.505	< 2.618	< 0.607	< 1.317	< 1.329	< 14.10	< 4.927
02/12/19	< 5.119	< 8.583	< 0.731	< 5.570	< 4.770	< 25.16	< 6.123
03/13/19	< 5.786	< 10.24	< 0.458	< 5.766	< 5.452	< 24.03	< 8.961
04/16/19	< 4.135	< 7.205	< 0.531	< 3.777	< 3.994	< 19.65	< 5.638
05/14/19	< 2.555	< 4.472	< 0.633	< 2.784	< 2.490	< 10.37	< 3.876
06/11/19	< 7.041	< 11.28	< 0.823	< 5.826	< 6.716	< 25.85	< 8.602
07/17/19	< 4.583	< 7.690	< 0.659	< 5.921	< 5.397	< 26.07	< 8.064
08/14/19	< 5.810	< 8.947	< 0.948	< 5.304	< 5.164	< 24.57	< 7.125
09/17/19	< 8.066	< 9.360	< 0.737	< 7.149	< 6.782	< 25.96	< 7.939
10/15/19	< 4.906	< 7.769	< 0.686	< 6.536	< 7.397	< 27.79	< 10.93
11/13/19	< 6.765	< 9.469	< 0.834	< 6.708	< 6.632	< 28.56	< 7.964
12/17/19	< 5.683	< 9.254	< 0.792	< 7.085	< 6.604	< 21.03	< 7.160
Mean	-	-	-	-	-	-	-

* LLD identified in ODCM
(a) Tritium analyses on quarterly composite
(b) Sr-89/90 performed on 2nd quarter composite sample.

TABLE 3-12
Surface Water
(pCi/L)

LOCATION 09A**

COLLECTION DATE	H-3	Sr-89	Sr-90	Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*
01/16/19	(a)	(b)	(b)	< 1.307	< 3.314	< 1.428	< 1.306	< 2.350
02/12/19	(a)	(b)	(b)	< 3.794	< 11.12	< 5.068	< 6.440	< 11.46
03/13/19	< 753	(b)	(b)	< 3.222	< 8.306	< 4.120	< 3.910	< 7.583
04/16/19	(a)	(b)	(b)	< 3.456	< 7.925	< 4.225	< 3.646	< 6.652
05/14/19	(a)	(b)	(b)	< 2.573	< 5.487	< 2.835	< 3.431	< 5.603
06/11/19	< 828	< 4.650	< 0.758	< 6.376	< 8.262	< 4.934	< 5.437	< 10.71
07/17/19	(a)	(b)	(b)	< 4.396	< 11.45	< 5.265	< 5.120	< 11.53
08/14/19	(a)	(b)	(b)	< 6.222	< 10.17	< 4.763	< 5.188	< 15.29
09/17/19	< 784	(b)	(b)	< 5.088	< 12.48	< 4.144	< 5.101	< 13.13
10/15/19	(a)	(b)	(b)	< 7.119	< 14.93	< 6.577	< 7.227	< 12.60
11/13/19	(a)	(b)	(b)	< 1.836	< 4.260	< 1.961	< 2.066	< 4.138
12/17/19	< 959	(b)	(b)	< 3.501	< 12.13	< 2.654	< 6.236	< 14.23
Mean	-	-	-	-	-	-	-	-

	Nb-95*	Zr-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*
01/16/19	< 1.591	< 2.558	< 0.920	< 1.426	< 1.352	< 15.12	< 4.279
02/12/19	< 5.248	< 10.20	< 0.627	< 6.339	< 6.397	< 25.33	< 5.721
03/13/19	< 3.483	< 6.383	< 0.484	< 4.686	< 3.659	< 19.15	< 6.904
04/16/19	< 3.348	< 5.333	< 0.525	< 4.025	< 3.893	< 17.74	< 6.793
05/14/19	< 2.476	< 4.640	< 0.747	< 3.091	< 3.145	< 11.53	< 3.436
06/11/19	< 5.392	< 8.609	< 0.617	< 4.666	< 5.112	< 22.09	< 6.113
07/17/19	< 4.726	< 11.43	< 0.811	< 5.187	< 5.749	< 21.24	< 8.688
08/14/19	< 5.806	< 9.608	< 0.581	< 5.970	< 6.801	< 28.24	< 9.577
09/17/19	< 6.692	< 9.242	< 0.491	< 5.139	< 6.245	< 22.22	< 7.200
10/15/19	< 6.689	< 11.73	< 0.912	< 8.376	< 7.736	< 26.26	< 11.17
11/13/19	< 2.008	< 3.329	< 0.774	< 1.958	< 2.114	< 9.835	< 3.632
12/17/19	< 6.919	< 8.168	< 0.778	< 5.073	< 6.693	< 22.36	< 5.873
Mean	-	-	-	-	-	-	-

* LLD identified in ODCM
**Control location
(a) Tritium analyses on quarterly composite
(b) Sr-89/90 performed on 2nd quarter composite sample.

TABLE 3-13
Sediment Silt
(pCi/kg dry wt.)

LOCATION	COLLECTION DATE	Sr-89	Sr-90	K-40	(+/-)	Cs-134	Cs-137	(+/-)	Ra-226	(+/-)
08	04/04/19	(a)	(a)	3666	604.2	< 39.22	< 39.40			< 709.7
09A*	04/04/19	(a)	(a)	13000	892.5	< 33.63	< 31.39		899.6	506.6
11	04/04/19	(a)	(a)	20370	1080	< 47.16	45.91	33.64		< 654.2
08	10/08/19	< 350.0	< 39.70	1683	681.4	< 59.05	< 46.49			< 925.8
09A*	10/08/19	< 291.0	< 42.20	16460	2660	< 147.0	< 149.5			< 2702
11	10/08/19	< 301.0	< 40.10	28060	2009	< 84.40	< 90.40			< 1595
	Indicator Mean	-	-	13445	1094	-	45.91	33.64		-
	Control Mean	-	-	14730	1776	-	-		899.6	506.6

LOCATION	COLLECTION DATE	Th-228	(+/-)	Th-232	(+/-)
08	04/04/19	233.2	51.38	< 195.4	
09A*	04/04/19	195.3	35.82	220.6	68.16
11	04/04/19	951.9	59.70	841.5	93.55
08	10/08/19	155.3	92.52	< 238.0	
09A*	10/08/19	1128	207.8	1220	270.7
11	10/08/19	724.2	117.5	584.2	166.9
	Indicator Mean	516.2	80.28	712.9	130.2
	Control Mean	661.7	121.8	720.3	169.4

(a) Sr-89/90 analyses preformed annually.
* Control location, Background location

TABLE 3-14
Shoreline Soil
(pCi/kg dry wt.)

LOCATIONS

LOCATION	COLLECTION DATE	Sr-89	Sr-90	K-40	(+/-)	Cs-134*	Cs-137*	Ra-226
08	04/04/19	(a)	(a)	1144	345.4	< 29.28	< 29.53	< 664.0
08	10/04/19	< 426.0	< 43.30	1470	840.1	< 52.48	< 46.01	< 988.0
	Mean	-	-	1307	592.8	-	-	-

LOCATION	COLLECTION DATE	Th-228		Th-232
08	04/04/19	79.83	39.40	< 136.8
08	10/04/19	145.7	61.28	< 236.1
	Mean	112.8	50.34	-

* LLD identified on ODCM
(a) Sr-89/90 analyses performed annually.

TABLE 3-15
Fish
(pCi/kg wet wt.)

LOCATION	Fish Type	COLLECTION DATE	K-40	(+/-)	Mn-54*	Fe-59*	Co-58*	Co-60*	Zn-65*
08	(a)	05/07/19	1079	497.6	< 36.36	< 67.61	< 35.45	< 33.41	< 84.94
	(b)	05/07/19	1344	734.2	< 50.26	< 128.8	< 57.66	< 62.76	< 122.6
	(a)	11/13/19	1624	784.9	< 64.66	< 115.6	< 74.93	< 88.45	< 115.0
	(b)	11/13/19	1299	620.0	< 41.12	< 107.4	< 45.34	< 46.44	< 102.7
25**	(a)	05/09/19	1029	648.7	< 39.81	< 94.99	< 46.66	< 38.77	< 92.26
	(b)	05/23/19	1129	1019	< 54.82	< 206.0	< 53.49	< 61.24	< 119.9
	(a)	11/22/19	966.6	563.0	< 45.72	< 116.7	< 45.55	< 37.69	< 78.64
	(b)	11/22/19	1774	736.1	< 69.80	< 169.3	< 65.16	< 75.88	< 123.3
		Mean	1281	700.4	-	-	-	-	-
		Indicator Mean	1337	659.2	-	-	-	-	-
		Control Mean	1225	741.7	-	-	-	-	-

LOCATION		COLLECTION DATE	Cs-134*	Cs-137*
08	(a)	05/07/19	< 37.77	< 36.60
	(b)	05/07/19	< 54.65	< 56.94
	(a)	11/13/19	< 66.52	< 70.46
	(b)	11/13/19	< 42.86	< 45.67
25**	(a)	05/09/19	< 48.92	< 47.19
	(b)	05/23/19	< 70.54	< 70.24
	(a)	11/22/19	< 53.64	< 49.08
	(b)	11/22/19	< 58.73	< 60.78
		Mean	-	-
		Indicator Mean	-	-
		Control Mean	-	-

* LLD identified in ODCM
**Control Station
(a) Non-bottom dwelling species of gamefish.
(b) Bottom dwelling species of fish.

4. DISCUSSION OF RESULTS

Data from the radiological analyses of environmental media collected during 2019 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 2019 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. Cs-137, a plant related nuclide, was detected in soil and aquatic sediment samples at levels corresponding to levels associated with fallout from nuclear weapons tests.

The following is a discussion and summary of the results of the environmental measurements taken during the 2019 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.

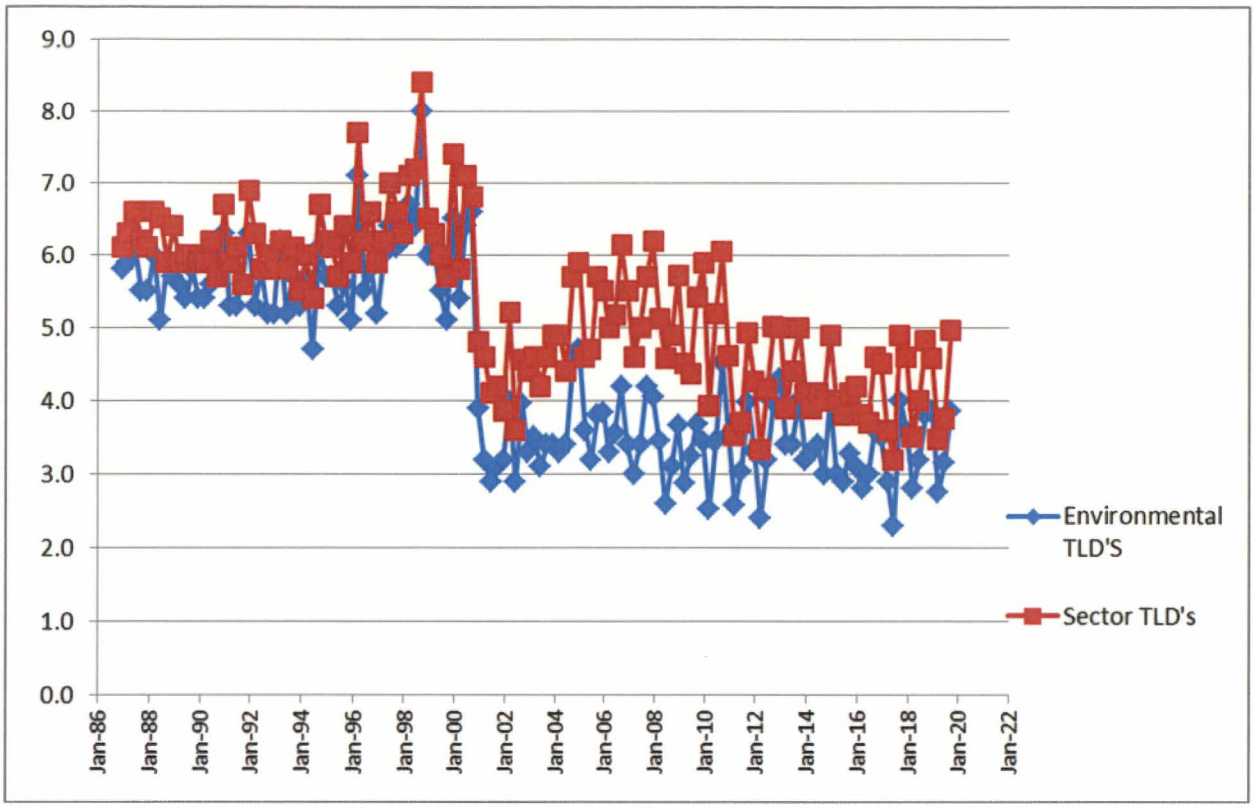

Figure 4-1 TLD (mrem/Standard Month)

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 4.2 mR/standard month with a range of 1.3 to 8.8 mR/standard month. The highest quarterly average reading for any single location was obtained at location NW-29/61. This value was 7.3 mR/standard month. This location is on site on the Laydown Area north gate. 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 3.4 mR/standard month with a range of 1.3 to 5.9 mR/standard month. The average annual reading for these locations was 3.2 mR/standard month with a range from 1.8 to 4.9 mR/standard month. The control location showed a quarterly average of 3.2 mR/standard month with a range of 2.5 to 3.7 mR/standard month. Its annual reading was 3.4 mR/standard month. 10 emergency sector TLDs, which are all located onsite had a quarterly average of 5.0 mR/standard month with EPSP-9/10 having the highest quarterly average of 7.1 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 3.3 mR/ standard month, while Station C-1/2 and C-5/6 had a quarterly average of 2.6 mR/standard month with a range of 1.3 to 3.8 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.

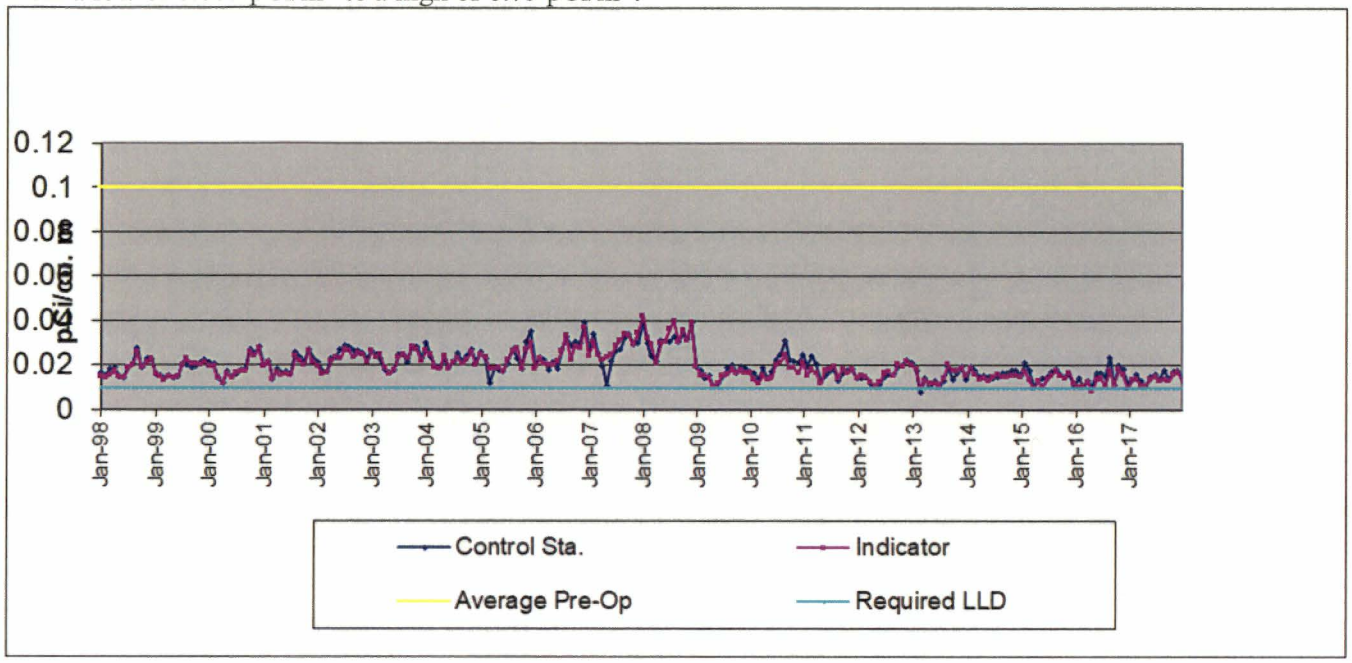

Figure 4-2 Historical Gross Beta in Air Particulates

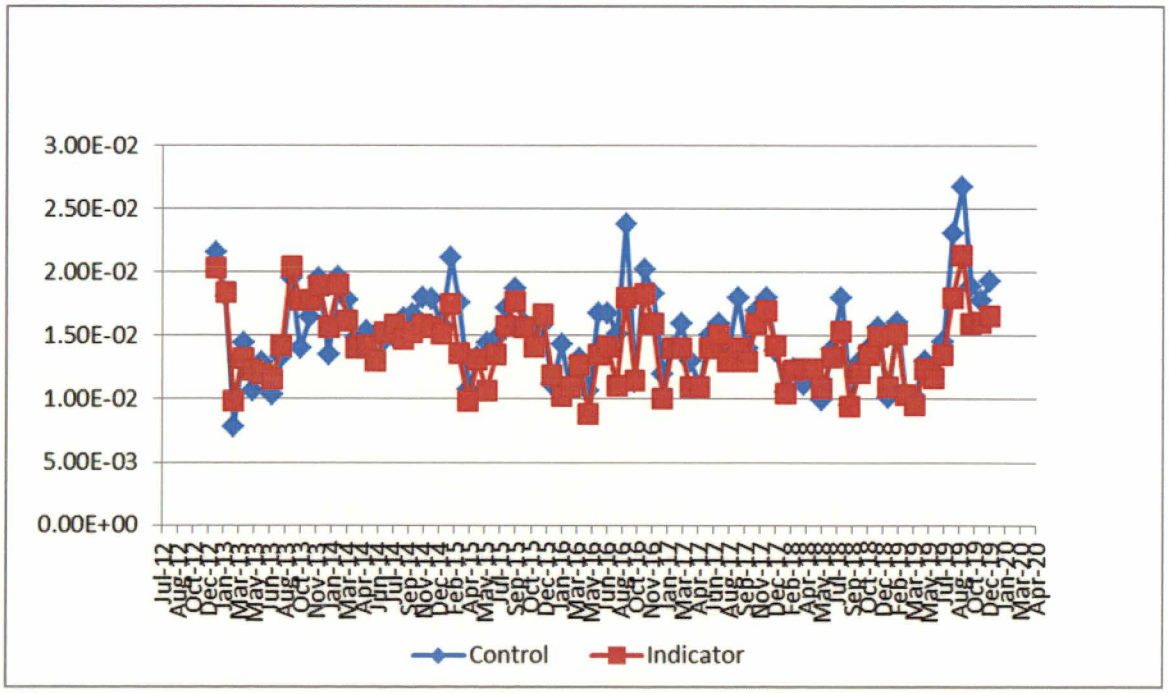

Figure 4-3 2019 Gross Beta in Air Particulates (pCi/m^3)

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 2019. Cs-137 was identified in 6 of 11 indicator samples. The average for indicator stations was 285.88 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 2019.

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 2019. 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 not 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 2019 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

Milk samples were unavailable during the reporting period due to the closure of the final operating dairy within the sampling area on 1/1/18.

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 Ra-226 and Ac-228, were detected in some samples. No plant related isotopes were identified in any vegetation sample during 2019.

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 3220 pCi/liter and a range of 2110 to 4150 pCi/liter , see Figure 4-4. No river water samples were collected during the pre-operational period.

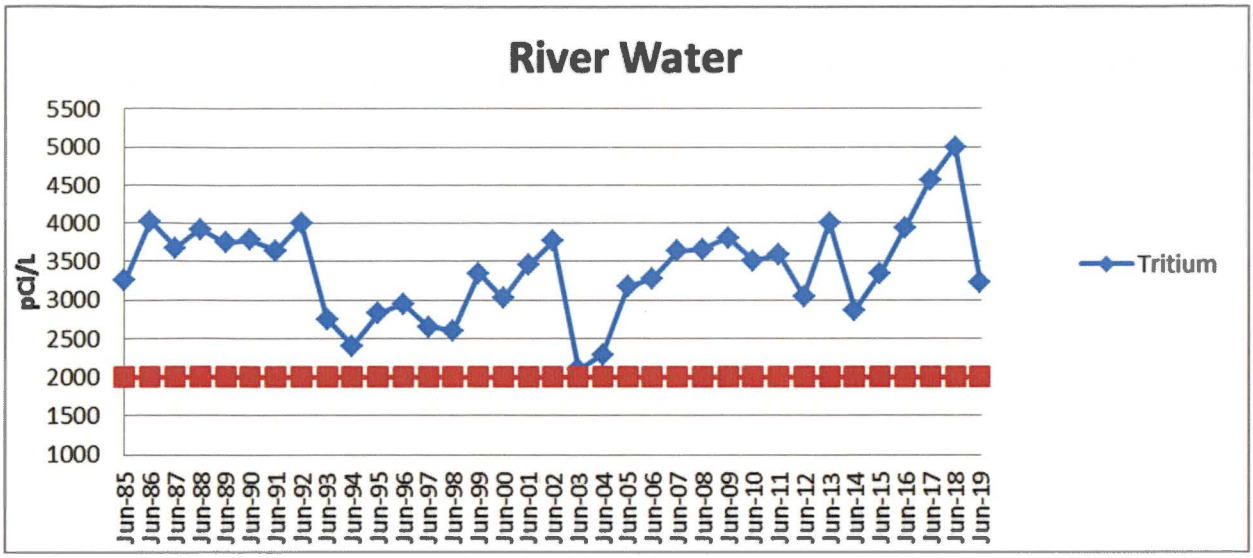

Figure 4-4 Tritium in River water

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 2938pCi/liter with a range of 2070 to 4000 pCi/liter.

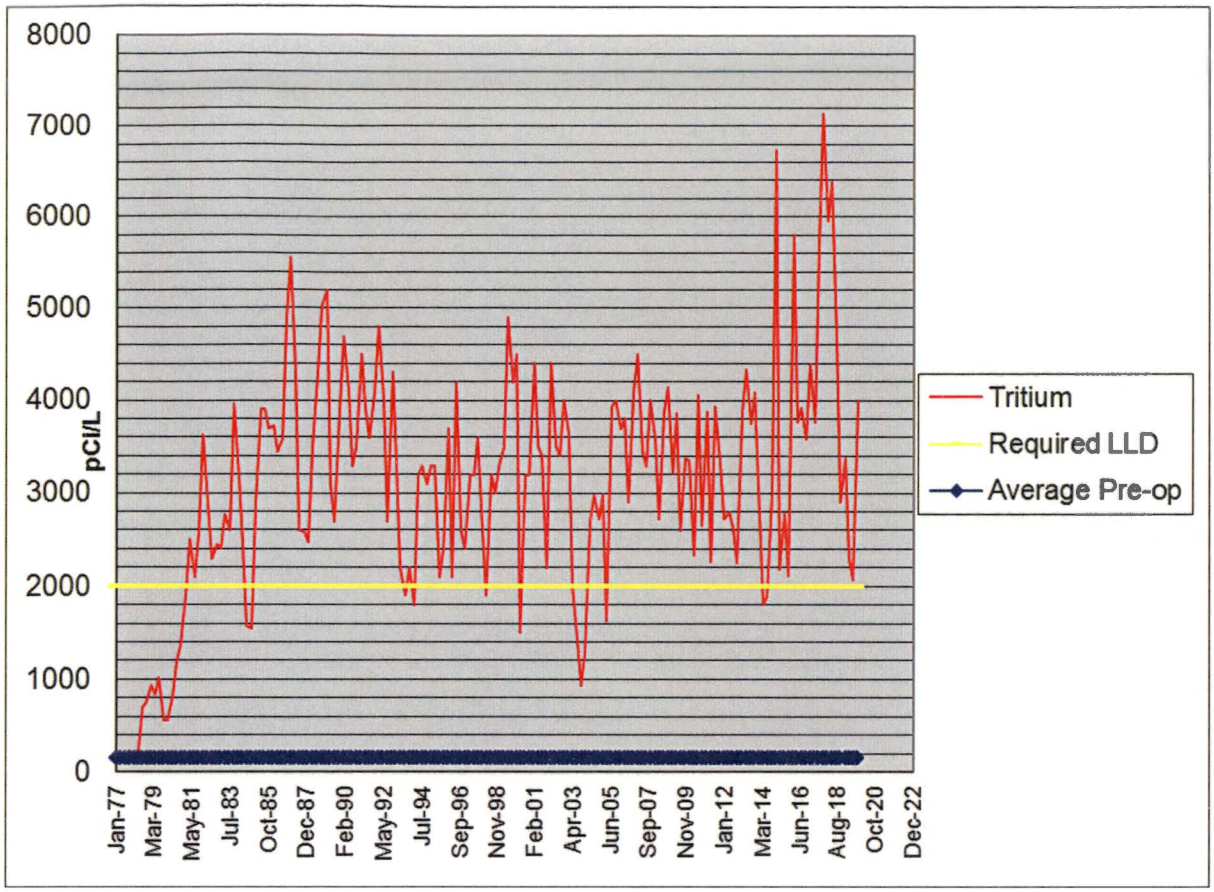

Figure 4.5 Tritium in Surface Water

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 April 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.

Plant related isotope, Cs-137 was detected in one indicator sample during 2019. 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 2019. 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.

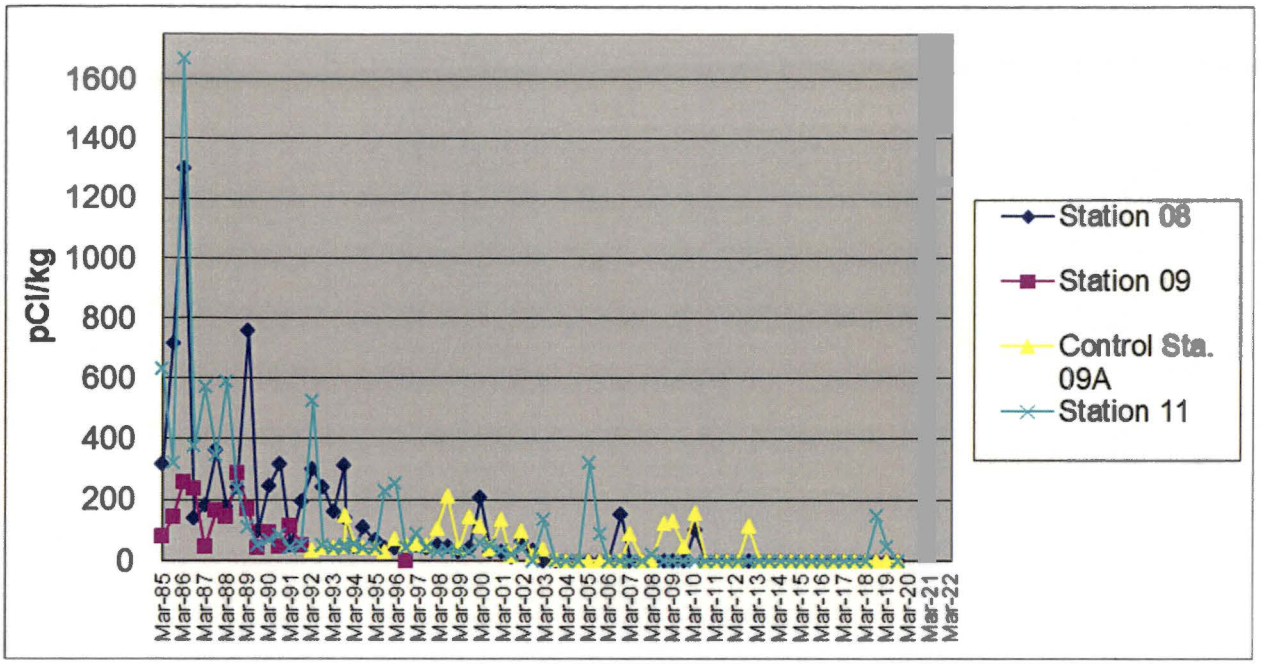

Figure 4-6 Cs-137 in Sediment/Silt

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 2019 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 2019 – North Anna

Location	Description	Date of Sampling	Reason(s) for Loss/Exception
14B,15,16,23,26	Vegetation	01/08/19	Seasonal unavailability
24	AP/ Char	01/29/19	Sampler not running Sufficient sample volume collected
14B,15,16,23,26	Vegetation	02/12/19	Seasonal unavailability
04	AP/ Char	02/26/19	Sampler not running Insufficient sample volume
14B,15,16,23,26	Vegetation	03/13/19	Seasonal unavailability
14B,15,16,23,26	Vegetation	04/19/19	Seasonal unavailability
14B,15,16,23,26	Vegetation	11/13/19	Seasonal unavailability
14B,15,16,23,26	Vegetation	12/10/19	Seasonal unavailability

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 2019

LAND USE CENSUS

North Anna Power Station

Louisa County, Virginia

January 1 to December 31, 2019

Direction	*Distance (miles)*					
	Nearest Site Boundary	*Nearest Resident*	*Nearest Garden (> 50m^2)*	*Nearest Meat Animal*	*Nearest Milch Cow*	*Nearest Milch Goat*
N	0.87	1.3	2.75	4.03	*NONE*	*NONE*
NNE	0.85	0.9	1.66	1.6	*NONE*	*NONE*
NE	0.82	0.9	1.6	1.6	*NONE*	*NONE*
ENE	0.81	2.37	2.4	2.49	*NONE*	*NONE*
E	0.83	1.25	1.75	3.5	*NONE*	*NONE*
ESE	0.85	1.7	1.71	NONE	*NONE*	*NONE*
SE	0.88	1.4	1.4	1.4	*NONE*	*NONE*
SSE	0.91	1.0	1.0	1.6	*NONE*	*NONE*
S	0.94	1.03	1.49	2.0	*NONE*	*NONE*
SSW	1.01	1.27	2.37	2.0	*NONE*	*NONE*
SW	1.06	1.65	1.65	NONE	*NONE*	*NONE*
WSW	1.09	1.62	1.77	NONE	*NONE*	*NONE*
W	1.06	1.5	1.93	NONE	*NONE*	*NONE*
WNW	1.02	1.1	2.67	4.98	*NONE*	*NONE*
NW	0.97	0.98	1.09	NONE	*NONE*	*NONE*
NNW	0.90	1.0	1.33	2.3	*NONE*	*NONE*

2018 to 2019 Land Use Census Changes			
		2018	2019
Nearest Resident	Direction NONE	Distance	Distance
Site Boundary	NONE		
Garden			
	ESE	1.49	1.71
	SSE	0.98	1.00
	WSW	2.22	1.77
Meat Animal	NONE		
Milch Cow	NONE		
Milch Goat	NONE		

APPENDIX B: SUMMARY OF INTERLABORATORY COMPARISONS

YEAR 2019

The TBE Laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation, and water matrices for various analytes. The PE samples supplied by Analytics Inc., Environmental Resource Associates (ERA) and Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

A. Analytics Evaluation Criteria

Analytics' evaluation report provides a ratio of TBE's result and Analytics' known value. Since flag values are not assigned by Analytics, TBE evaluates the reported ratios based on internal QC requirements based on the DOE MAPEP criteria.

B. ERA Evaluation Criteria

ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the US EPA, National Environmental Laboratory Accreditation Conference (NELAC), state-specific Performance Testing (PT) program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

C. DOE Evaluation Criteria

MAPEP's evaluation report provides an acceptance range with associated flag values. MAPEP defines three levels of performance:

- Acceptable (flag = "A") - result within ± 20% of the reference value
- Acceptable with Warning (flag = "W") - result falls in the ± 20% to ± 30% of the reference value
- Not Acceptable (flag = "N") - bias is greater than 30% of the reference value

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.

For the TBE laboratory, 119 out of 129 analyses performed met the specified acceptance criteria. Ten analyses did not meet the specified acceptance criteria for the following reasons and were addressed through the TBE Corrective Action Program. A summary is found below:

1. The ERA April 2019 water Cs-134 result was evaluated as *Not Acceptable*. The reported value was 15.2 pCi/L (error 2.82 pCi/L) and the known result was 12.1 pCi/L (acceptance range of 8.39 - 14.4 pCi/L). With the error, the reported result overlaps the acceptable range. This sample was run as the workgroup duplicate on a different detector with a result of 10.7 pCi/L (within acceptable range). (NCR 19-10)

2. The ERA April 2019 water Sr-89 result was evaluated as *Not Acceptable*. The reported value was 44.9 pCi/L and the known result was 33.3 pCi/L (acceptance range of 24.5 - 40.1 pCi/L). The sample was only counted for 15 minutes instead of 200 minutes. The sample was re-prepped in duplicate and counted for 200 minutes with results of 30.7 ± 5.37 pCi/L and 33.0 ± 8.71 pCi/L. This was the 1st "high" failure for Sr-89 in 5 years. (NCR 19-11)

3. The MAPEP February 2019 soil Sr-90 result was not submitted and therefore evaluated as *Not Acceptable*. The sample was run in duplicate, with results of -1.32 ± 4.09 Bq/kg (<6.87) and -1.030 ± 3.55 Bq/kg (<5.97). The known result was a false positive test (no significant activity). TBE did not submit a result because it appeared that the results may not be accurate. TBE analyzed a substitute soil Sr-90 sample from another vendor, with a result within the acceptable range. (NCR 19-12)

4. The MAPEP February 2019 water Am-241 result was evaluated as *Not Acceptable*. The reported value was 0.764 ± 0.00725 Bq/L with a known result of 0.582 Bq/L (acceptable range 0.407 - 0.757 Bq/L). TBE's result falls within the upper acceptable range with the error. It appeared that a non-radiological interference was added and lead to an increased mass and higher result. (NCR 19-13)

5. The MAPEP February 2019 vegetation Sr-90 result was evaluated as *Not Acceptable*. The reported result was -0.1060 ± 0.0328 Bq/kg and the known result was a false positive test (no significant activity). TBE's result was correct in that there was no activity. MAPEP's evaluation was a "statistical failure" at 3 standard deviations. (NCR 19-14)

6. The ERA October 2019 water Gross Alpha result was evaluated as *Not Acceptable*. TBE's reported result was 40.5 ± 10.3 pCi/L and the known result was 27.6 pCi/L (ratio of TBE to known result at 135%). With the associated error, the result falls within the acceptable range (14.0 - 36.3 pCi/L). The sample was run as the workgroup duplicate on a different detector with a result of 30.8 ± 9.17 pCi/L (within the acceptable range). This was the first failure for drinking water Gr-A since 2012. (NCR 19-23)

7. The ERA October 2019 water Sr-90 result was evaluated as *Not Acceptable*. TBE's reported result was 32.5 ± 2.12 pCi/L and the known result was 26.5 pCi/L (ratio of TBE to known result at 123%). With the

associated error, the result falls within the acceptable range (19.2 - 30.9 pCi/L). The sample was run as the workgroup duplicate on a different detector with a result of 20.0 ± 1.91 pCi/L (within the acceptable range). Both TBE results are within internal QC limits. A substitute "quick response" sample was analyzed with an acceptable result of 18.6 pCi/L (known range of 13.2 - 22.1 pCi/L). (NCR 19-24)

8. The MAPEP August 2019 soil Ni-63 result of 436 ± 22.8 Bq/kg was evaluated as Not Acceptable. The known result was 629 Bq/kg (acceptable range 440 - 818 Bq/sample). With the associated error, the TBE result falls within the lower acceptance range. All associated QC was acceptable. No reason for failure could be found. This is the first failure for soil Ni-63 since 2012. (NCR 19-25).

9. The MAPEP August 2019 water Am-241 result was not reported and therefore evaluated as *Not Acceptable*. Initial review of the results showed a large peak where Am-241 should be (same as the February, 2019 sample results). It is believed that Th-228 was intentionally added as an interference. The sample was re-prepped and analyzed using a smaller sample aliquot. The unusual large peak (Th-228) was seen again and also this time a smaller peak (Am-241). The result was 436 ± 22.8 Bq/L (acceptable range 0.365 ± 0.679 Bq/L). Th-228 is not a typical nuclide requested by clients, so there is no analytical purpose to take samples through an additional separation step. TBE will pursue using another vendor for Am-241 water cross-checks that more closely reflects actual customer samples. (NCR 19-26)

10. The Analytics September 2019 soil Cr-51 sample was evaluated as *Not Acceptable*. TBE's reported result of 0.765 ± 0.135 pCi/g exceeded the upper acceptance range (140% of the known result of 0.547 pCi/g). The TBE result was within the acceptable range (0.63 - 0.90 pCi/g) with the associated error. The Cr-51 result is very close to TBE's normal detection limit. In order to get a reportable result, the sample must be counted for 15 hours (10x longer than client samples). There is no client or regulatory requirement for this nuclide and TBE will remove Cr-51 from the reported gamma nuclides going forward. (NCR 19-27)

The Inter-Laboratory Comparison Program provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

A.1 Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
March 2019	E12468A	Milk	Sr-89	pCi/L	87.1	96	0.91	A
			Sr-90	pCi/L	12.6	12.6	1.00	A
	E12469A	Milk	Ce-141	pCi/L	113	117	0.97	A
			Co-58	pCi/L	153	143	1.07	A
			Co-60	pCi/L	289	299	0.97	A
			Cr-51	pCi/L	233	293	0.80	A
			Cs-134	pCi/L	147	160	0.92	A
			Cs-137	pCi/L	193	196	0.98	A
			Fe-59	pCi/L	153	159	0.96	A
			I-131	pCi/L	91.5	89.5	1.02	A
			Mn-54	pCi/L	149	143	1.04	A
			Zn-65	pCi/L	209	220	0.95	A
	E12470	Charcoal	I-131	pCi	77.5	75.2	1.03	A
	E12471	AP	Ce-141	pCi	60.7	70.2	0.87	A
			Co-58	pCi	87.9	85.8	1.02	A
			Co-60	pCi	175	179	0.98	A
			Cr-51	pCi	165	176	0.94	A
			Cs-134	pCi	91.2	95.9	0.95	A
			Cs-137	pCi	120	118	1.02	A
			Fe-59	pCi	108	95.3	1.13	A
			Mn-54	pCi	94.2	85.7	1.10	A
			Zn-65	pCi	102	132	0.77	W
	E12472	Water	Fe-55	pCi/L	2230	1920	1.16	A
	E12473	Soil	Ce-141	pCi/g	0.189	0.183	1.03	A
			Co-58	pCi/g	0.209	0.224	0.93	A
			Co-60	pCi/g	0.481	0.466	1.03	A
			Cr-51	pCi/g	0.522	0.457	1.14	A
			Cs-134	pCi/g	0.218	0.250	0.87	A
			Cs-137	pCi/g	0.370	0.381	0.97	A
			Fe-59	pCi/g	0.263	0.248	1.06	A
			Mn-54	pCi/g	0.248	0.223	1.11	A
			Zn-65	pCi/g	0.371	0.344	1.08	A
	E12474	AP	Sr-89	pCi	88.3	95.2	0.93	A
			Sr-90	pCi	11.7	12.5	0.94	A
August 2019	E12562	Soil	Sr-90	pCi/g	4.710	6.710	0.70	W

(a) 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

(b) 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

A.1 Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
September 2019	E12475	Milk	Sr-89	pCi/L	70.0	93.9	0.75	W
			Sr-90	pCi/L	12.0	12.9	0.93	A
	E12476	Milk	Ce-141	pCi/L	150	167	0.90	A
			Co-58	pCi/L	170	175	0.97	A
			Co-60	pCi/L	211	211	1.00	A
			Cr-51	pCi/L	323	331	0.98	A
			Cs-134	pCi/L	180	207	0.87	A
			Cs-137	pCi/L	147	151	0.97	A
			Fe-59	pCi/L	156	148	1.05	A
			I-131	pCi/L	81.1	92.1	0.88	A
			Mn-54	pCi/L	160	154	1.04	A
			Zn-65	pCi/L	303	293	1.03	A
	E12477	Charcoal	I-131	pCi	95.9	95.1	1.01	A
	E12478	AP	Ce-141	pCi	129	138	0.93	A
			Co-58	pCi	128	145	0.88	A
			Co-60	pCi	181	174	1.04	A
			Cr-51	pCi	292	274	1.07	A
			Cs-134	pCi	166	171	0.97	A
			Cs-137	pCi	115	125	0.92	A
			Fe-59	pCi	119	123	0.97	A
			Mn-54	pCi	129	128	1.01	A
			Zn-65	pCi	230	242	0.95	A
	E12479	Water	Fe-55	pCi/L	1810	1850	0.98	A
	E12480	Soil	Ce-141	pCi/g	0.305	0.276	1.10	A
			Co-58	pCi/g	0.270	0.289	0.93	A
			Co-60	pCi/g	0.358	0.348	1.03	A
			Cr-51	pCi/g	0.765	0.547	1.40	N[1]
			Cs-134	pCi/g	0.327	0.343	0.95	A
			Cs-137	pCi/g	0.308	0.321	0.96	A
			Fe-59	pCi/g	0.257	0.245	1.05	A
			Mn-54	pCi/g	0.274	0.255	1.07	A
			Zn-65	pCi/g	0.536	0.485	1.11	A
	E12481	AP	Sr-89	pCi	95.9	91.9	1.04	A
			Sr-90	pCi	12.3	12.6	0.97	A
	E12563	Soil	Sr-90	pCi/g	0.392	0.360	1.09	A

(a) 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

(b) 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

(1) See NCR 19-27

A.2 DOE's Mixed Analyte Performance Evaluation Program (MAPEP)
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Range	Evaluation [b]
February 2019	19-GrF40	AP	Gross Alpha	Bq/sample	0.184	0.528	0.158 - 0.898	A
			Gross Beta	Bq/sample	0.785	0.948	0.474 - 1.422	A
	19-MaS40	Soil	Ni-63	Bq/kg	420	519.0	363 - 675	A
			Sr-90	Bq/kg			*(1)*	NR[3]
	19-MaW40	Water	Am-241	Bq/L	0.764	0.582	0.407 - 0.757	N[4]
			Ni-63	Bq/L	4.72	5.8	4.1 - 7.5	A
			Pu-238	Bq/L	0.443	0.451	0.316 - 0.586	A
			Pu-239/240	Bq/L	-0.00161	0.0045	*(2)*	A
	19-RdF40	AP	U-234/233	Bq/sample	0.1138	0.106	0.074 - 0.138	A
			U-238	Bq/sample	0.107	0.110	0.077 - 0.143	A
	19-RdV40	Vegetation	Cs-134	Bq/sample	2.14	2.44	1.71 - 3.17	A
			Cs-137	Bq/sample	2.22	2.30	1.61 - 2.99	A
			Co-57	Bq/sample	2.16	2.07	1.45 - 2.69	A
			Co-60	Bq/sample	0.02382		*(1)*	A
			Mn-54	Bq/sample	-0.03607		*(1)*	A
			Sr-90	Bq/sample	-0.1060		*(1)*	N[5]
			Zn-65	Bq/sample	1.35	1.71	1.20 - 2.22	W
August 2019	19-GrF41	AP	Gross Alpha	Bq/sample	0.192	0.528	0.158 - 0.898	W
			Gross Beta	Bq/sample	0.722	0.937	0.469 - 1.406	A
	19-MaS41	Soil	Ni-63	Bq/kg	436	629	440 - 818	N[6]
			Sr-90	Bq/kg	444	572	400 - 744	W
	19-MaW41	Water	Am-241	Bq/L				NR[7]
			Ni-63	Bq/L	7.28	9.7	6.8 - 12.6	W
			Pu-238	Bq/L	0.0207	0.0063	*(2)*	A
			Pu-239/240	Bq/L	0.741	0.727	0.509 - 0.945	A
	19-RdF41	AP	U-234/233	Bq/sample	0.0966	0.093	0.065 - 0.121	A
			U-238	Bq/sample	0.0852	0.096	0.067-0.125	A
	19-RdV41	Vegetation	Cs-134	Bq/sample	0.0197		*(1)*	A
			Cs-137	Bq/sample	3.21	3.28	2.30 - 4.26	A
			Co-57	Bq/sample	4.62	4.57	3.20 - 5.94	A
			Co-60	Bq/sample	4.88	5.30	3.71 - 6.89	A
			Mn-54	Bq/sample	4.54	4.49	3.14 - 5.84	A
			Sr-90	Bq/sample	0.889	1.00	0.70 - 1.30	A
			Zn-65	Bq/sample	2.78	2.85	2.00 - 3.71	A

(a) 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

(b) DOE/MAPEP evaluation:
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
NR = Not Reported

(1) False positive test
(2) Sensitivity evaluation
*(3) See **NCR 19-12***
*(4) See **NCR 19-13***
*(5) See **NCR 19-14***
*(6) See **NCR 19-25***
*(7) See **NCR 19-26***

A.3 ERA Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Limits	Evaluation [b]
April 2019	Rad-117	Water	Ba-133	pCi/L	26.3	24.1	18.6 - 27.8	A
			Cs-134	pCi/L	15.2	12.1	8.39 - 14.4	N[1]
			Cs-137	pCi/L	33.6	33.1	28.8 - 39.4	A
			Co-60	pCi/L	11.9	11.5	8.67 - 15.5	A
			Zn-65	pCi/L	87.1	89.2	80.3 - 107	A
			GR-A	pCi/L	19	19.3	9.56 - 26.5	A
			GR-B	pCi/L	20.2	29.9	19.1 - 37.7	A
			U-Nat	pCi/L	55.5	55.9	45.6 - 61.5	A
			H-3	pCi/L	21500	21400	18700 - 23500	A
			Sr-89	pCi/L	44.9	33.3	24.5 - 40.1	N[2]
			Sr-90	pCi/L	24.5	26.3	19.0 - 30.7	A
			I-131	pCi/L	28.9	28.4	23.6 - 33.3	A
October 2019	Rad-119	Water	Ba-133	pCi/L	42.7	43.8	35.7 - 48.8	A
			Cs-134	pCi/L	53.5	55.9	45.2 - 61.5	A
			Cs-137	pCi/L	77.7	78.7	70.8 - 89.2	A
			Co-60	pCi/L	51.5	53.4	48.1 - 61.3	A
			Zn-65	pCi/L	36.6	34.0	28.5 - 43.1	A
			GR-A	pCi/L	40.5	27.6	14.0 - 36.3	N[3]
			GR-B	pCi/L	36.3	39.8	26.4 - 47.3	A
			U-Nat	pCi/L	27.66	28.0	22.6 - 31.1	A
			H-3	pCi/L	22600	23400	20500 - 25700	A
			Sr-89	pCi/L	47.1	45.5	35.4 - 52.7	A
			Sr-90	pCi/L	32.5	26.5	19.2 - 30.9	N[4]
			I-131	pCi/L	26.0	23.9	19.8 - 28.4	A
December 2019	QR 120419D	Water	Sr-90	pCi/L	20.1	18.6	13.2 - 22.1	A

(a) 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.

(b) ERA evaluation:

A = Acceptable - Reported value falls within the Acceptance Limits

N = Not Acceptable - Reported value falls outside of the Acceptance Limits

*(1) See **NCR 19-10***

*(2) See **NCR 19-11***

*(3) See **NCR 19-23***

*(4) See **NCR 19-24***