

Dominion Energy
North Anna Power Station
Radiological Environmental Monitoring Program
January 1, 2020 to December 31, 2020



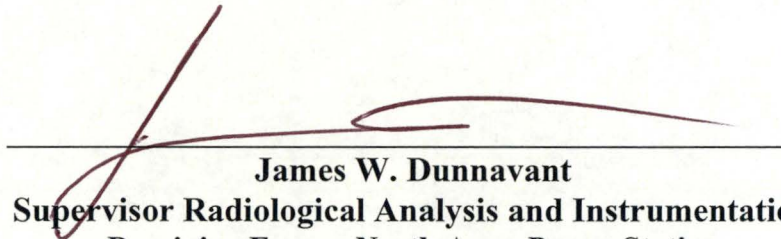
Prepared by
Dominion Energy, North Anna Power Station

Annual Radiological Environmental Operating Report

North Anna Power Station

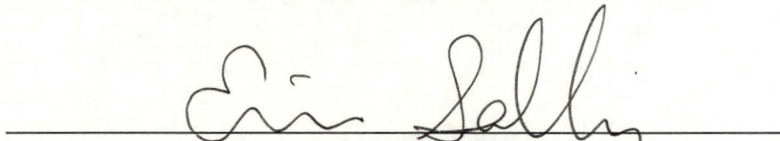
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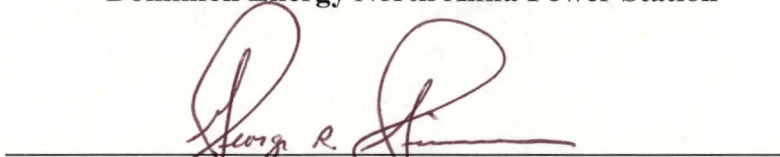
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1. EXECUTIVE SUMMARY

This document is a detailed report of the 2020 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, 2020, 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 2020 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 2020 was 2793 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 2858 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 not identified in any indicator sample during the reporting period. 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 not collected in 2020. 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 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 2020, 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 2020 was 0.644 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 2020 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 2020 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 2020 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 2020.

TABLE 2-1
 North Anna Power Station – 2020
 RADIOLOGICAL SAMPLING STATION
 DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance	Direction	Degrees	Collection	Remarks
						Frequency	
Environmental	NAPS Sewage Treatment Plant	01	0.20	NE	42°	Quarterly & Annually	
	Dosimetry (TLD)	Fredericks Hall	02	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 – 2020
 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 Dosimetry (TLD)	NAPS Access Rd.	SSW-19/51	0.24	SSW	197°	Quarterly	
	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 and Radioiodine	NAPS Sewage Treatment Plant	01	0.20	NE	42°	Weekly	
	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 – 2020
 RADIOLOGICAL SAMPLING STATION
 DISTANCE AND DIRECTION FROM UNIT NO. 1

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

TABLE 2-1
 North Anna Power Station – 2020
 RADIOLOGICAL SAMPLING STATION
 DISTANCE AND DIRECTION FROM UNIT NO. 1

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

*LLDs indicate those levels to which environmental samples are required to be analyzed. Actual analysis of samples may be lower than the 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
River Water	Quarterly(a)	Tritium (H-3)	2000	pCi/L
	2 nd Quarter	Sr-89	(b)	pCi/L
	Composite	Sr-90	(b)	
Ground Water (Well Water)	Quarterly	Gamma Isotopic		pCi/L
		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		I-131	10(c)	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
	Quarterly(a)	Tritium (H-3)	2000	pCi/L
	2 nd Quarter	Sr-89	(b)	pCi/L
	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 Composite	Gamma Isotopic		pCi/L
		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		I-131	(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	
	Annually	Sr-89	(b)	pCi/kg (dry)
		Sr-90	(b)	

*LLDs indicate those levels to which environmental samples are required to be analyzed. Actual analysis of samples may be lower than the 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	
Soil	Once per 3 years	Gamma Isotopic		pCi/kg (dry)	
		Cs-134	150		
		Cs-137	180		
		Sr-89	(b)		
		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		

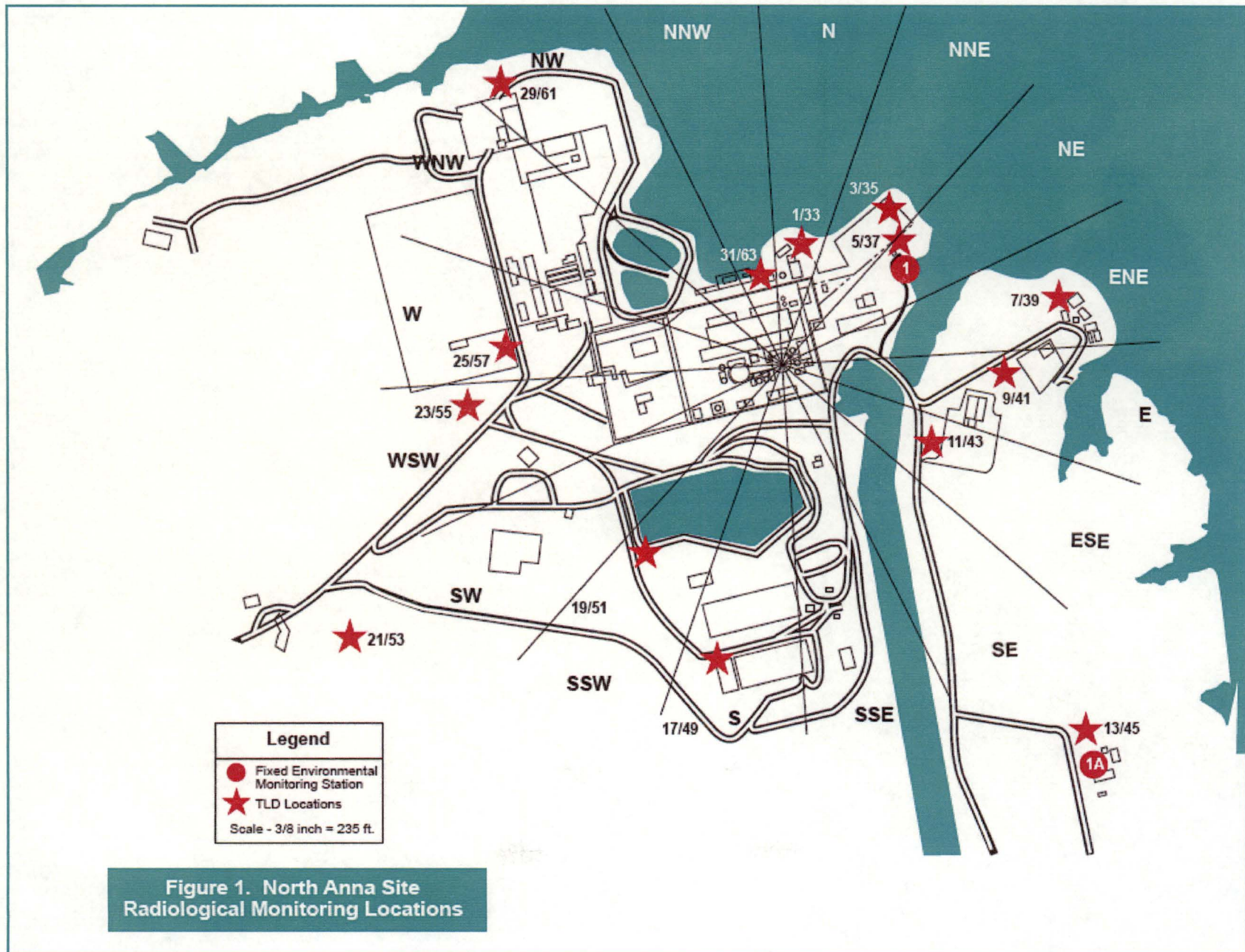
*LLDs indicate those levels to which environmental samples are required to be analyzed. Actual analysis of samples may be lower than the listed values.

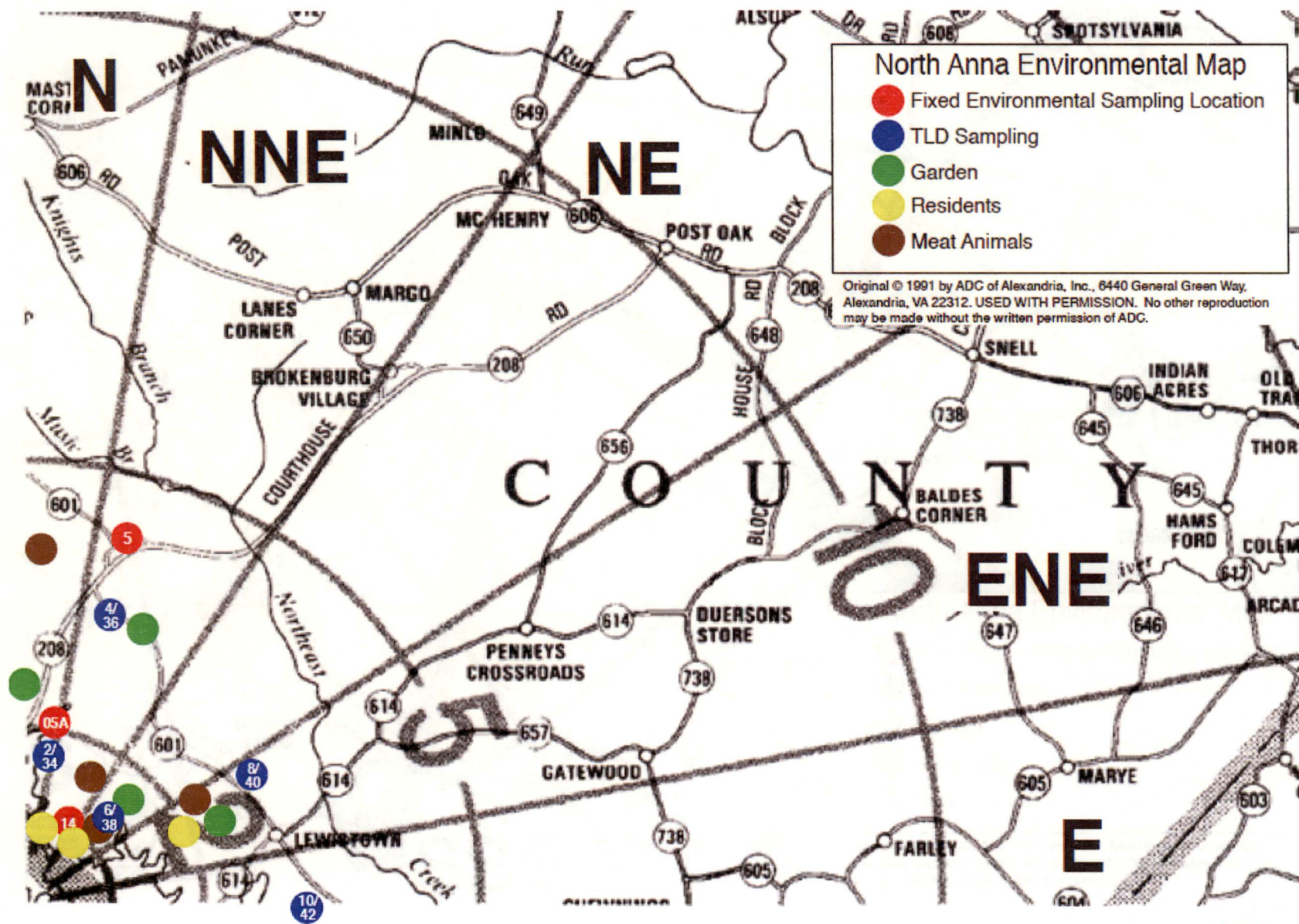
- (a) Quarterly composite of each location's samples are used for the required analysis
- (b) There are no required LLDs for Sr-89/90
- (c) LLD for non-drinking water is 10 pCi/liter
- (d) LLD applied are those for water samples. However, since this is a semi-annual composite no LLD is applied for these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

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

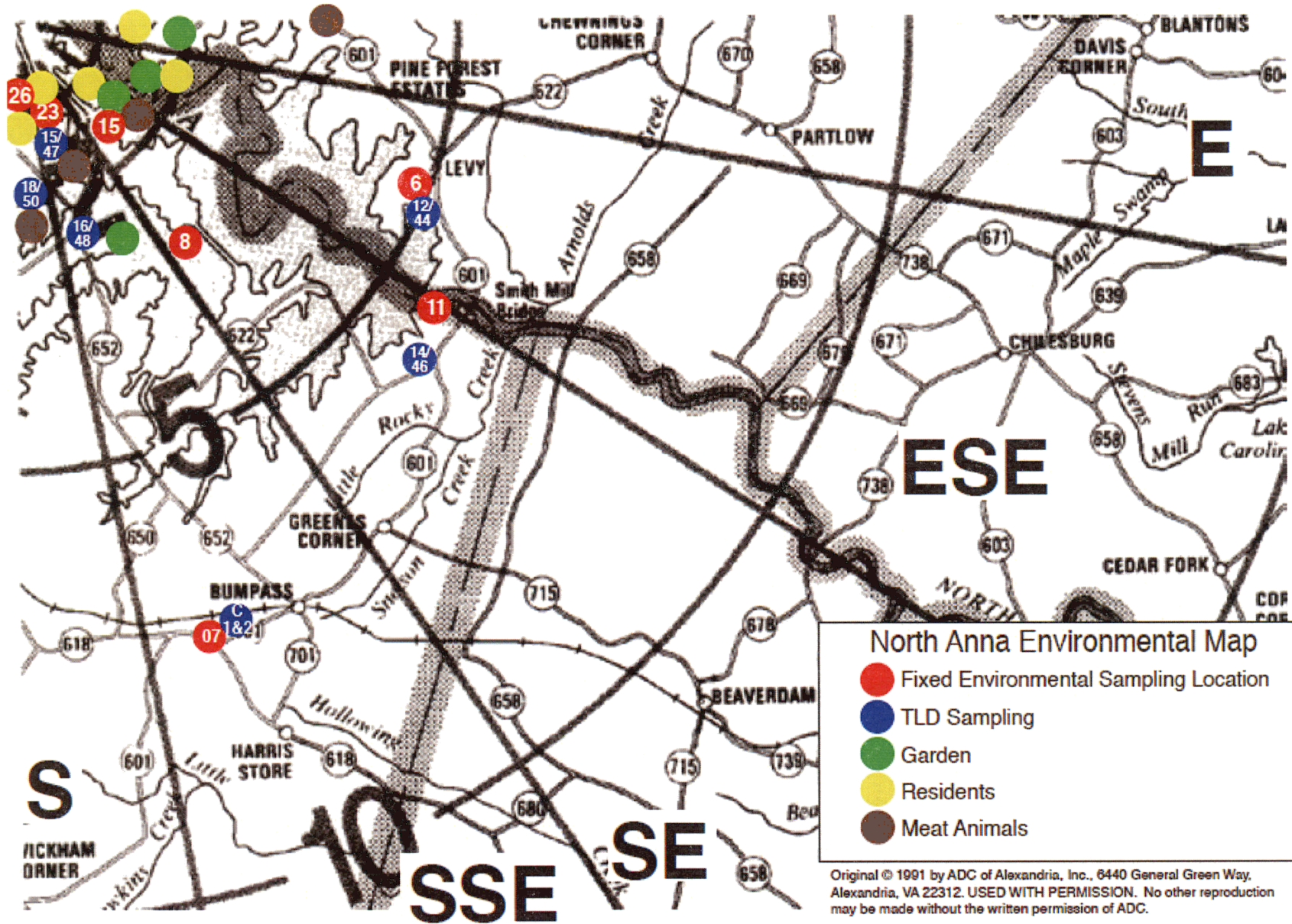
Map Designation	Environmental Station Identification	Map Designation	Environmental Station Identification
1 (a)	01,NE-5/37	7/8	C-7/8
1A	01A,SE-13/45	1/33	N-1/33
2 (a)	02,SSW-20/52	31/63	NNW-31/63
3 (a)	03,C-5/6	29/61	NW-29/61
4 (a)	04	3/35	NNE-3/35
5 (a)	05	7/39	ENE-7/39
5A (a)	05A,N-2/34	9/41	E-9/41
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, Shoreline Soil	19/51 21/53	SSW-19/51 SW-21/53
9A	09A-Water sample, Sediment	23/55	WSW-23/55
11	11-River Water, Sediment		
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

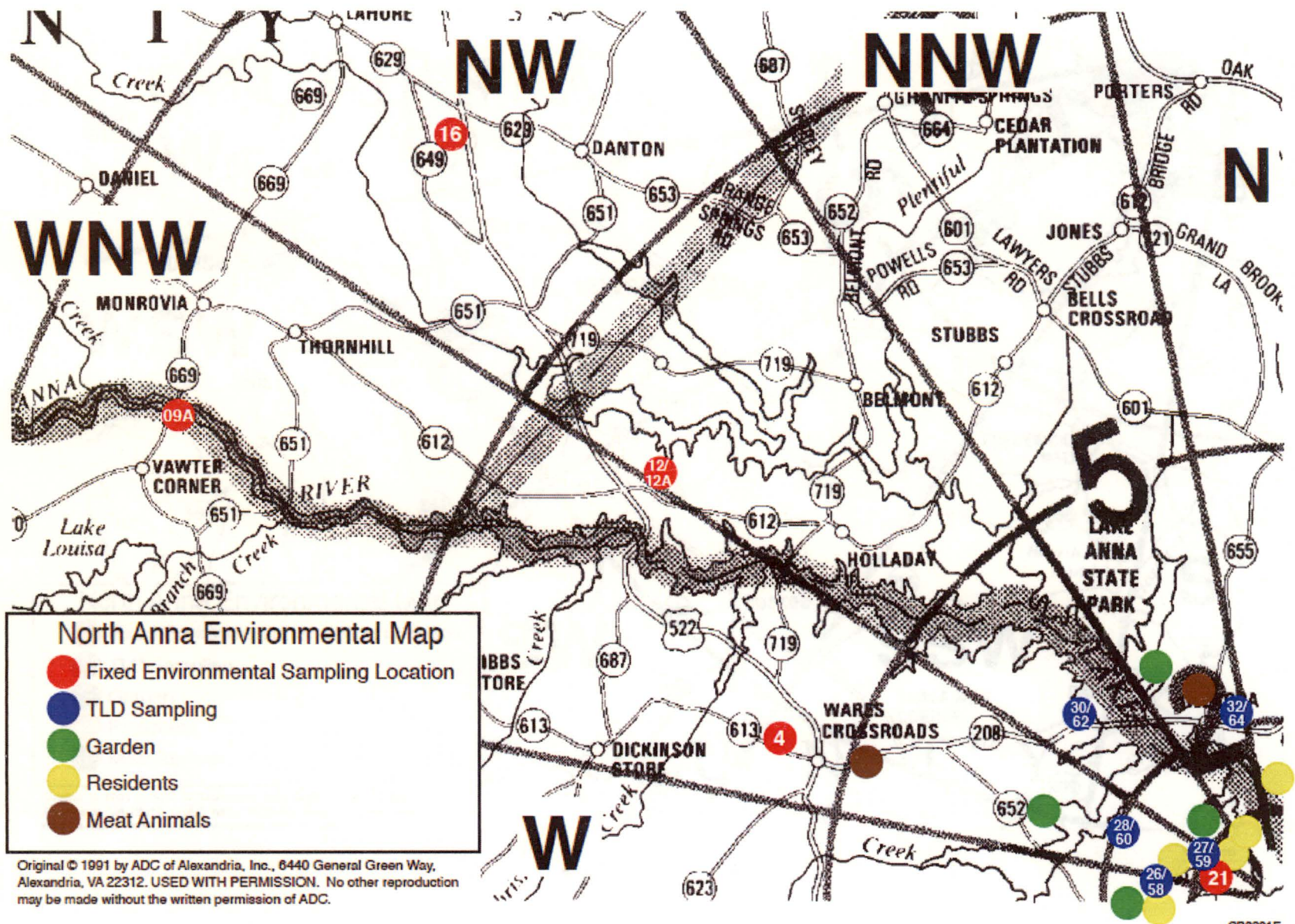




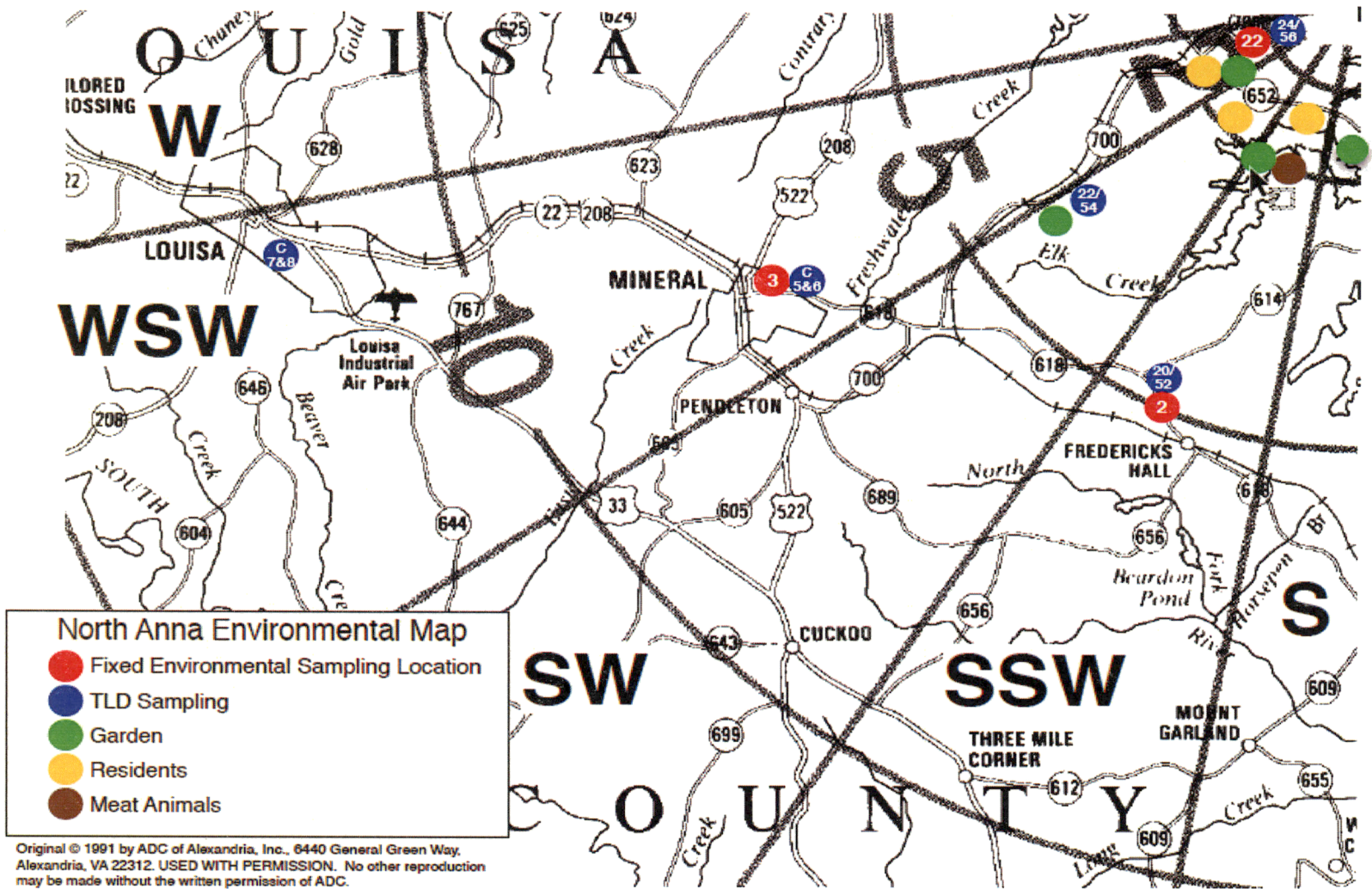
CB3280G



CB3282F



CB3281E



CB3283D

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	254	2	4.1 (252/254) (1.4-8.7)	29/61	0.52 Mi. NW	7.1 (7/8) (6.3-8.7)	3.7 (16/16) (2.6-4.8)	0
<i>** C3/4, -7/8 used for control locations</i>									
Direct Radiation (mR.std. Month) (Pre-operational TLDs)	Gamma Dose	32	2	2.9 (16/16) (1.5-6.8)	C-1/2	7.3 Mi. SSE	3.7 (8/8) (2.5-6.8)	3.7 (16/16) (2.6-4.8)	0
<i>** C3/4, -7/8 used for control locations</i>									
Direct Radiation (mR.std. Month) (Emergency Sector TLDs)	Gamma Dose	40	2	5.0 (40/40) (2.9-8.1)	EPSP 9/10	0.37 Mi. ENE	7.1 (8/8) (5.9-8.1)	3.7 (16/16) (2.6-4.8)	0
<i>** C3/4, -7/8 used for control locations</i>									
Direct Radiation (mR.std. Month) (Environmental TLDs)	Gamma Dose	48	2	3.6 (44/44) (1.7-5.9)	STA-23	0.93 Mi. SSE	5.1 (4/4) (5.1)	3.1 (4/4) (2.5-3.8)	0
Direct Radiation (mR.std. Month) (Annual TLDs)	Gamma Dose	12	2	5.5 (11/11) (4.3-6.8)	STA-23	0.93 Mi. SSE	6.8 (1/1) (6.8)	5.1 (1/1) (5.1)	0
Air Particulate (10e ⁻³ pCi/m ³)	GR-B	676	0.01	12.9 (623/624) (5.2-35.2)	04	5.10 Mi. WNW	14.7 (52/52) (7.3-34.1)	14.7 (52/52) (5.9-35.3)	0
	GAMMA BE-7	52	-	122.4 (48/48) (89.9-150.5)	04	5.10 Mi. WNW	133.0 (4/4) (114.5-149.5)	135.6 (4/4) (128.5-154.2)	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	(0/48)	N/A	N/A	N/A	(0/4)	0
	Sr-90	13	0.01	(0/48)	N/A	N/A	N/A	(0/4)	0
Air Iodine (10e ⁻³ pCi/m ³)	I-131	676	0.07	(0/624)	N/A	N/A	N/A	(0/52)	0

* LLD identified in ODCM

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

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Soil*** (pCi/kg dry wt.)	GAMMA	0							
	K-40	0	-	N/A	N/A	N/A	N/A	N/A	0
	CS-134	0	150	N/A	N/A	N/A	N/A	N/A	0
	CS-137	0	180	N/A	N/A	N/A	N/A	N/A	0
	Ra-226	0	-	N/A	N/A	N/A	N/A	N/A	0
	Th-228	0	-	N/A	N/A	N/A	N/A	N/A	0
	Th-232	0	-	N/A	N/A	N/A	N/A	N/A	0
	Sr-89	0	-	N/A	N/A	N/A	N/A	N/A	0
	Sr-90	0	-	N/A	N/A	N/A	N/A	N/A	0
***Soil samples are obtained triennially.									
Precipitation (pCi/liter)	GR-B	12	4	3.4 (12/12) (1.5-7.5)	01A	0.64 MI. SE	3.4 (12/12) (1.5-7.5)	N/A	0
	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

* LLD identified in ODCM

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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	-	2097 (21/24) (518.2-5896)	23	0.93 Mi. SSE	2414 (6/6) (759.3-5896)	1457 (5/6) (940.1-2114)	0
	K-40	30	-	5259 (24/24) (3288-12150)	23	0.93 Mi. SSE	5641 (6/6) (3508-12150)	4238 (6/6) (3433-5431)	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	-	1018 (1/24) (1018)	23	0.93 Mi. SSE	1018 (1/6) (1018)	(0/6)	0

* LLD identified in ODCM

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Fruits & Vegetables (cont'd) (pCi/kg wet wt.)	Th-228	30	-	121.7 (7/24) (32.47-229.3)	23	0.93 Mi. SSE	187.7 (3/6) (145.6-229.3)	(0/6)	0
	Th-232	30	-	351.0 (2/24) (236.3-465.7)	23	0.93 Mi. SSE	351.0 (2/6) (236.3-465.7)	(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

* LLD identified in ODCM

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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	2858 (4/4) (1390-3960)	11	5.80 Mi. SE	2858 (4/4) (1390-3960)	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

* LLD identified in ODCM

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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)	N/A	N/A	N/A	N/A	0
Surface Water (pCi/liter)	H-3	8	2000	2793 (4/4) (2030-4030)	08	3.37 Mi. SSE	2793 (4/4) (2030-4030)	(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	

* LLD identified in ODCM

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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 (pCi/kg dry wt.)	GAMMA	6	-						
	K-40	6	-	10900 (4/4) (762.2-20790)	11	5.80 Mi. SE	20710 (2/2) (20630-20790)	12945 (2/2) (12930-12960)	0
	Cs-134	6	150	(0/4)	N/A	N/A	N/A	(0/2)	0
	Cs-137	6	180	(0/4)	N/A	N/A	N/A	(0/2)	0
	Ra-226	6	-	(0/4)	N/A	N/A	N/A	(0/2)	0
	Th-228	6	-	665.0 (3/4) (161-1071)	11	5.80 Mi. SE	917.0 (2/2) (763-1071)	436.4 (2/2) (165.1-707.6)	0
	Th-232	6	-	713.4 (2/4) (685.5-741.2)	11	5.80 Mi. SE	713.4 (2/2) (685.5-741.2)	734.2 (1/2) (734.2)	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 (pCi/kg dry wt.)	GAMMA	2	-						
	K-40	2	-	1062 (1/2) (1062)	08	3.37 Mi. SSE	1062 (1/2) (1062)	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	-	(0/2)	N/A	N/A	N/A	N/A	0

* LLD identified in ODCM

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				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
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 (pCi/kg wet wt.)	GAMMA	8	-						
	K-40	8	-	1370 (4/4) (872.4-1566)	08	3.37 Mi. SSE	1370 (4/4) (872.4-1566)	1468 (4/4) (892.8-1951)	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

* LLD identified in ODCM

3.2 Analytical Results of 2020 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 data¹. 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) \pm 2 Sigma

Station	First Quarter 12/30/2019- 3/31/2020	Second Quarter 3/31/2020- 6/30/2020	Third Quarter 6/30/2020- 9/30/2020	Fourth Quarter 9/30/2020- 12/29/2020	Quarterly Average* (\pm) 2 S.D.
N-1	5.8	3.5	4.3	4.7	4.6 (\pm) 1.4
N-33	5.1	4.2	4.2	5.0	
N-2	3.5	2.0	2.5	3.1	2.8 (\pm) 1.0
N-34	3.3	2.6	2.6	3.2	
NNE-3	7.8	4.7	5.4	6.2	6.1 (\pm) 2.1
NNE-35	7.2	5.3	5.6	6.5	
NNE-4	4.9	3.4	4.6	4.3	4.2 (\pm) 1.2
NNE-36	5.0	3.8	3.5	4.4	
NE-5	6.3	2.8	3.8	5.5	4.6 (\pm) 2.3
NE-37	5.4	3.8	4.2	4.9	
NE-6	4.1	2.1	2.8	3.4	3.3 (\pm) 1.4
NE-38	4.0	3.2	2.7	3.7	
ENE-7	6.5	4.4	5.2	5.7	5.4 (\pm) 1.7
ENE-39	6.6	4.6	4.8	5.6	
ENE-8	3.2	1.5	1.7	2.0	2.1 (\pm) 1.2
ENE-40	2.5	1.8	2.2	2.1	
E-9	6.0	3.9	4.2	4.8	4.8 (\pm) 1.4
E-41	5.6	4.2	4.5	5.0	
E-10	5.5	2.7	3.7	3.8	3.8 (\pm) 1.8
E-42	4.6	3.3	3.0	3.9	
ESE-11	5.5	3.5	4.0	4.6	4.4 (\pm) 1.5
ESE-43	5.2	3.8	3.7	4.6	
ESE-12	5.5	3.1	4.0	4.4	4.5 (\pm) 2.0
ESE-44	4.8	4.0	4.1	6.2	
SE-13	6.0	3.2	4.2	4.7	4.4 (\pm) 2.0
SE-45	5.5	3.4	3.7	4.6	
SE-14	7.7	5.5	5.8	5.9	6.3 (\pm) 1.6
SE-46	7.0	5.9	6.0	7.0	
SSE-15	5.6	3.8	4.4	4.6	4.6 (\pm) 1.5
SSE-47	5.6	4.1	3.8	5.1	
SSE-16	3.9	1.8	2.9	3.1	2.8 (\pm) 1.4
SSE-48	3.5	2.0	2.5	3.0	
S-17	5.8	2.9	4.7	5.3	4.6 (\pm) 2.0
S-49	5.4	3.9	3.9	5.3	

*Average of collocated TLDs

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

Station	First Quarter 12/30/2019- 3/31/2020	Second Quarter 3/31/2020- 6/30/2020	Third Quarter 6/30/2020- 9/30/2020	Fourth Quarter 9/30/2020- 12/29/2020	Quarterly Average* (+/-) 2 S.D.
S-18	3.2	1.4	2.3	2.5	2.3 (+/-) 1.1
S-50	2.9	1.9	2.2	2.4	
SSW-19	7.9	5.8	5.7	6.1	6.3 (+/-) 1.7
SSW-51	6.9	5.6	5.6	6.6	
SSW-20	3.0	1.6	2.1	2.6	2.2 (+/-) 1.0
SSW-52	2.6	1.8	1.7	2.4	
SW-21	4.3	3.1	3.4	3.9	3.6 (+/-) 0.9
SW-53	4.1	3.0	3.7	3.6	
SW-22	5.5	3.9	3.5	5.0	4.3 (+/-) 1.4
SW-54	5.0	3.6	4.1	4.1	
WSW-23	5.1	3.4	(a)	4.5	4.5 (+/-) 1.2
WSW-55	5.2	4.3	4.5	4.4	
WSW-24	5.3	3.3	3.4	4.3	4.2 (+/-) 1.8
WSW-56	5.9	4.0	4.1	3.6	
W-25	8.4	6.1	5.7	7.3	6.8 (+/-) 1.9
W-57	7.8	6.3	6.2	6.6	
W-26	3.7	2.4	2.6	2.8	2.7 (+/-) 1.3
W-58	3.5	2.3	2.4	1.8	
WNW-27	3.8	2.2	2.6	3.1	3.0 (+/-) 1.2
WNW-59	3.9	2.3	2.8	3.0	
WNW-28	3.4	2.2	2.8	3.0	2.9 (+/-) 1.0
WNW-60	3.6	2.5	2.5	3.2	
NW-29	8.7	6.3	6.5	7.2	7.1 (+/-) 1.7
NW-61	7.7	6.5	6.9	(a)	
NW-30	2.7	1.5	1.5	1.9	1.9 (+/-) 1.0
NW-62	2.6	1.7	1.6	1.7	
NNW-31	5.6	3.0	3.4	4.5	4.0 (+/-) 1.9
NNW-63	5.0	3.3	3.2	4.2	
NNW-32	4.7	2.8	3.2	3.6	3.7 (+/-) 1.4
NNW-64	4.6	3.0	3.5	3.8	
				Mean	4.1 (+/-) 3.0

(a) TLD was missing and unable to be analyzed.

*Average of collocated TLDs

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

Station	First Quarter 12/30/2019- 3/31/2020	Second Quarter 3/31/2020- 6/30/2020	Third Quarter 6/30/2020- 9/30/2020	Fourth Quarter 9/30/2020- 12/29/2020	Quarterly Average* (+/-) 2 S.D.
C-1	3.8	2.5	6.8	4.0	3.7 (+/-) 2.8
C-2	4.2	2.5	2.8	3.2	
C-3**	4.5	2.6	3.0	3.7	3.5 (+/-) 1.4
C-4**	4.4	2.7	3.5	3.6	
C-5	2.9	1.7	1.9	2.2	2.2 (+/-) 1.0
C-6	2.7	1.5	2.0	2.3	
C-7**	4.2	3.1	3.3	4.2	3.8 (+/-) 1.2
C-8**	4.1	3.2	3.5	4.8	
				Indicator Mean	2.9 (+/-) 2.6
				Control Mean	3.7 (+/-) 1.3
EP5A-01***	5.6	3.7	3.9	5.3	4.6 (+/-) 1.6
EP5A-02***	5.5	3.8	4.2	4.9	
EP5F-03***	4.9	3.7	3.5	3.9	4.1 (+/-) 1.1
EP5F-04***	5.0	3.7	4.1	4.2	
EP5R-05***	6.8	4.9	4.6	5.4	5.5 (+/-) 1.6
EP5R-06***	6.6	5.2	5.0	5.1	
EP5J-07***	5.0	2.9	3.0	4.4	3.9 (+/-) 1.6
EP5J-08***	4.4	2.9	3.9	4.3	
EP5P-09***	8.1	6.2	6.0	7.6	7.1 (+/-) 2.0
EP5P-10***	8.1	6.6	5.9	8.0	
				Mean	5.0 (+/-) 2.8

*Average of collocated TLDs

** Control Location

***Emergency Plan TLDs.

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

Station	First Quarter 12/30/2019- 3/31/2020	Second Quarter 3/31/2020- 6/30/2020	Third Quarter 6/30/2020- 9/30/2020	Fourth Quarter 9/30/2020- 12/29/2020	Quarterly Average* (+/-) 2 S.D.	Annual TLD
STA-01	5.3	3.2	3.8	4.8	4.3 (+/-) 1.9	6.5
STA-02	3.4	1.8	1.8	3.0	2.5 (+/-) 1.6	4.6
STA-03	3.5	1.7	2.0	3.1	2.6 (+/-) 1.7	4.3
STA-04	3.4	1.7	1.9	3.4	2.6 (+/-) 1.9	4.5
STA-05	3.7	3.0	2.7	3.8	3.3 (+/-) 1.0	5.3
STA-05A	3.8	4.4	2.5	3.8	3.7 (+/-) 1.6	5.0
STA-06	5.3	4.0	4.4	5.2	4.7 (+/-) 1.3	6.3
STA-07	4.0	2.4	2.7	4.5	3.4 (+/-) 2.1	5.5
STA-21	3.7	2.8	2.7	2.9	3.0 (+/-) 0.9	5.2
STA-22	4.5	3.6	3.4	4.3	4.0 (+/-) 1.0	6.4
STA-23	5.9	4.4	4.7	5.5	5.1 (+/-) 1.3	6.8
STA-24**	3.8	2.5	2.9	3.4	3.1 (+/-) 1.2	5.1
				Mean Indicator Locations	3.6 (+/-) 1.8	5.5 (+/-) 1.8

*Average of collocated TLDs

** Control

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(10⁻³ pCi/m³)

PERIOD ENDING	LOCATIONS															
	01		02		03		04		05		06		07		21	
	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	
01/08/20	11.50	2.030	10.90	2.000	11.90	2.080	10.90	2.010	10.10	1.960	8.420	1.850	10.70	1.990	9.330	1.910
01/14/20	9.020	2.510	9.680	2.550	9.940	2.570	9.640	2.580	10.10	2.570	8.430	2.480	8.140	2.450	11.30	2.660
01/21/20	17.70	2.750	17.30	2.730	20.00	2.880	14.20	2.560	21.00	2.940	16.90	2.720	18.50	2.800	19.20	2.840
01/28/20	10.40	2.620	13.70	2.810	11.80	2.700	13.00	2.770	11.60	2.680	10.20	2.600	11.70	2.680	12.60	2.740
02/04/20	6.080	2.410	7.990	2.520	7.490	2.480	8.820	2.570	7.560	2.500	7.100	2.470	8.800	2.570	10.40	2.660
02/11/20	7.770	2.190	7.900	2.200	7.830	2.190	7.670	2.180	6.380	2.080	7.920	2.190	8.050	2.210	10.20	2.340
02/19/20	7.770	2.020	11.90	2.270	14.10	2.420	15.90	2.490	8.960	2.100	12.20	2.290	10.30	2.180	10.50	2.190
02/26/20	14.80	2.870	16.10	2.940	16.90	2.990	19.70	3.130	15.60	2.920	15.40	2.910	18.50	3.070	13.00	2.780
03/03/20	10.50	2.860	11.00	2.900	11.80	2.890	15.60	3.140	9.940	2.820	12.50	2.980	14.70	3.110	16.20	3.200
03/10/20	7.630	2.140	8.900	2.220	6.570	2.100	9.410	2.280	9.760	2.290	9.670	2.280	12.00	2.430	7.330	2.120
03/17/20	11.70	2.610	9.530	2.480	10.50	2.540	12.90	2.680	13.70	2.710	11.40	2.580	13.30	2.700	12.30	2.640
03/24/20	8.880	2.400	10.50	2.500	11.10	2.540	12.60	2.620	10.90	2.530	9.810	2.460	10.80	2.510	10.50	2.500
03/31/20	7.910	2.330	10.50	2.470	12.50	2.550	12.30	2.550	8.130	2.330	8.220	2.340	9.030	2.390	12.30	2.580
04/07/20	7.100	2.460	7.000	2.460	10.80	2.740	10.10	2.680	8.320	2.550	6.540	2.440	8.980	2.580	8.220	2.540
04/14/20	12.50	2.670	12.70	2.670	11.80	2.620	15.70	2.830	10.90	2.550	13.60	2.710	14.50	2.760	14.60	2.770
04/21/20	15.10	2.770	16.40	2.850	11.20	2.560	20.00	3.040	17.80	2.940	17.60	2.930	14.60	2.750	18.20	2.940
04/28/20	7.630	2.470	6.650	2.410	9.140	2.560	8.990	2.550	< 3.040		8.910	2.550	8.160	2.500	8.680	2.530
05/05/20	7.640	2.230	8.510	2.300	8.010	2.250	11.90	2.490	10.20	2.390	9.990	2.380	8.740	2.300	10.60	2.410
05/12/20	7.930	2.260	5.460	2.090	9.290	2.340	7.300	2.210	8.920	2.300	7.770	2.230	8.630	2.300	9.510	2.350
05/20/20	8.860	2.210	11.50	2.370	14.50	2.520	14.80	2.540	9.610	2.270	14.10	2.510	13.40	2.470	9.290	2.240
05/26/20	9.330	2.480	8.980	2.460	7.600	2.360	9.500	2.490	10.00	2.530	8.310	2.410	6.910	2.310	11.10	2.600
06/02/20	6.690	2.380	7.550	2.440	8.250	2.480	9.500	2.560	8.640	2.510	8.020	2.470	8.870	2.520	6.300	2.360
06/09/20	15.80	2.910	13.40	2.780	16.80	2.960	17.40	2.990	20.20	3.130	14.50	2.840	17.80	3.010	16.30	2.940
06/16/20	8.120	2.420	7.400	2.380	9.400	2.500	10.00	2.530	9.150	2.480	8.760	2.450	8.660	2.460	9.550	2.510
06/23/20	6.760	2.500	6.990	2.510	8.850	2.630	8.230	2.590	9.450	2.670	6.790	2.510	5.590	2.430	8.930	2.630
06/30/20	13.00	2.800	12.40	2.750	12.40	2.760	13.20	2.800	12.90	2.770	14.40	2.870	11.70	2.710	15.00	2.980

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(10⁻³ pCi/m³)

PERIOD ENDING	LOCATIONS															
	01		02		03		04		05		06		07		21	
	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	
07/07/20	13.90	2.860	17.00	3.040	16.60	3.020	19.70	3.170	9.100	2.600	13.70	2.860	15.20	2.940	16.80	3.020
07/15/20	12.30	2.280	9.410	2.110	12.20	2.230	13.50	2.320	13.10	2.310	10.20	2.150	15.60	2.460	12.50	2.290
07/21/20	16.40	3.040	15.30	3.040	17.50	3.250	23.10	3.510	18.10	3.220	20.20	3.330	22.40	3.420	19.60	3.240
07/28/20	13.60	3.110	14.20	3.100	14.20	3.120	17.20	3.240	16.90	3.230	11.80	2.970	14.80	3.130	16.00	3.220
08/05/20	12.80	2.390	14.10	2.450	13.00	2.390	15.40	2.520	12.60	2.380	11.80	2.330	16.20	2.560	10.50	2.260
08/12/20	16.80	2.920	16.90	2.910	20.40	3.100	19.50	3.050	19.00	3.010	17.50	2.930	12.00	2.640	17.90	2.970
08/19/20	14.80	2.580	12.40	2.450	15.50	2.630	16.60	2.690	13.00	2.490	14.60	2.580	16.20	2.670	14.90	2.590
08/26/20	11.30	2.550	17.80	2.910	16.90	2.870	21.00	3.080	21.30	3.090	17.50	2.900	17.10	2.880	19.80	3.030
09/02/20	9.780	2.420	11.10	2.560	12.60	2.650	14.60	2.760	12.30	2.630	13.60	2.700	11.20	2.560	10.50	2.520
09/08/20	10.20	2.440	12.50	2.530	16.70	2.800	14.70	2.680	13.80	2.610	12.80	2.550	11.40	2.460	11.80	2.490
09/16/20	11.90	2.440	12.40	2.470	15.10	2.620	15.60	2.640	12.40	2.470	11.00	2.390	13.90	2.550	12.40	2.470
09/22/20	9.150	2.970	14.00	3.250	17.30	3.530	20.20	3.580	17.30	3.440	12.40	3.170	13.00	3.190	15.10	3.310
09/30/20	19.60	2.830	20.40	2.860	22.20	2.950	21.90	2.930	21.00	2.890	21.60	2.910	22.80	2.970	18.50	2.770
10/06/20	11.80	2.850	11.90	2.860	14.40	3.010	13.20	2.940	13.00	2.930	11.40	2.830	13.40	2.960	13.40	2.950
10/13/20	12.60	2.700	8.330	2.440	12.00	2.650	14.90	2.810	12.80	2.690	10.10	2.530	12.80	2.690	12.80	2.700
10/20/20	16.10	3.000	12.10	2.800	19.50	3.180	14.60	2.940	15.00	2.970	15.90	3.010	17.70	3.090	18.40	3.120
10/27/20	8.170	2.490	12.40	2.780	6.750	2.360	12.90	2.730	8.930	2.530	6.660	2.390	7.640	2.450	8.320	2.500
11/03/20	12.90	2.690	12.20	2.650	15.40	2.870	15.20	2.840	11.50	2.600	12.60	2.670	13.80	2.740	13.40	2.720
11/10/20	17.50	2.830	13.30	2.600	16.10	2.750	17.50	2.830	16.30	2.770	19.30	2.930	20.70	3.000	11.70	2.500
11/17/20	13.50	2.750	13.80	2.770	14.90	2.830	16.70	2.920	16.90	2.910	13.40	2.730	15.50	2.860	14.50	2.810
11/24/20	16.60	3.140	13.80	3.000	14.00	3.010	20.00	3.300	14.90	3.070	21.10	3.370	17.80	3.200	16.20	3.120
12/02/20	19.80	2.720	16.20	2.540	22.50	2.850	15.60	2.510	18.00	2.630	18.30	2.650	19.90	2.730	21.10	2.790
12/09/20	8.780	2.240	7.290	2.140	5.370	2.000	7.300	2.140	8.720	2.240	8.350	2.210	8.180	2.200	8.470	2.210
12/15/20	22.40	3.520	27.50	3.760	26.40	3.710	34.10	4.050	27.80	3.760	23.40	3.560	33.80	4.040	28.90	3.830
12/22/20	13.70	2.570	9.470	2.310	16.60	2.730	14.70	2.630	11.90	2.500	12.00	2.480	10.40	2.370	11.90	2.460
12/29/20	12.90	2.630	10.70	2.480	13.70	2.600	16.30	2.760	16.80	2.800	9.590	2.400	12.50	2.580	13.80	2.660
Mean	11.87	2.601	12.06	2.613	13.43	2.691	14.72	2.758	13.18	2.673	12.47	2.634	13.40	2.68	13.28	2.683

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(10⁻³ pCi/m³)

PERIOD ENDING	LOCATIONS									
	22		23		24*		01A		05A	
	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)
01/08/20	9.110	1.890	9.930	1.950	13.80	2.170	10.20	1.960	12.10	2.070
01/14/20	9.370	2.540	11.20	2.660	12.30	2.710	8.590	2.480	9.460	2.540
01/21/20	17.60	2.750	19.70	2.860	19.40	2.860	14.30	2.560	16.30	2.690
01/28/20	12.40	2.730	12.90	2.760	13.00	2.760	9.470	2.560	16.70	2.970
02/04/20	6.820	2.450	9.560	2.610	10.40	2.660	8.230	2.540	6.670	2.440
02/11/20	8.140	2.210	5.760	2.050	9.010	2.250	8.600	2.250	8.210	2.210
02/19/20	14.20	2.400	10.80	2.200	13.90	2.390	10.60	2.190	12.20	2.300
02/26/20	10.70	2.640	19.30	3.110	17.00	2.990	14.40	2.850	16.20	2.950
03/03/20	10.70	2.870	11.80	2.940	10.30	2.830	9.740	2.800	13.40	3.030
03/10/20	7.940	2.160	10.00	2.300	9.370	2.260	10.40	2.330	10.10	2.310
03/17/20	14.00	2.740	13.60	2.720	12.90	2.670	10.60	2.550	12.50	2.640
03/24/20	11.10	2.530	10.50	2.500	13.00	2.650	10.60	2.500	12.20	2.600
03/31/20	9.400	2.410	10.90	2.500	11.70	2.540	9.130	2.400	11.80	2.550
04/07/20	7.760	2.510	9.990	2.650	8.050	2.540	6.360	2.410	5.800	2.400
04/14/20	13.60	2.720	12.30	2.650	9.860	2.500	11.70	2.620	13.10	2.680
04/21/20	17.70	2.910	13.50	2.690	18.00	2.950	13.10	2.660	12.90	2.670
04/28/20	8.050	2.500	8.080	2.500	7.460	2.450	5.510	2.340	8.160	2.500
05/05/20	8.600	2.290	7.490	2.220	10.40	2.410	8.450	2.280	10.10	2.390
05/12/20	8.380	2.290	8.360	2.290	9.120	2.310	8.000	2.270	10.70	2.410
05/20/20	10.40	2.300	7.540	2.140	12.70	2.440	12.70	2.420	12.90	2.450
05/26/20	5.620	2.210	8.290	2.410	7.620	2.360	8.230	2.410	8.230	2.410
06/02/20	5.600	2.310	7.390	2.430	8.100	2.470	5.920	2.330	8.170	2.480
06/09/20	14.40	2.840	17.70	3.010	16.70	2.950	17.80	3.020	15.20	2.880
06/16/20	9.670	2.510	8.940	2.470	11.70	2.630	5.240	2.230	7.230	2.360
06/23/20	7.440	2.540	7.360	2.530	5.940	2.460	7.690	2.560	6.870	2.520
06/30/20	11.30	2.700	13.00	2.790	15.20	2.890	15.10	2.910	17.90	3.030

*Control Station

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
(10⁻³ pCi/m³)

LOCATIONS

PERIOD ENDING	22		23		24*		01A		05A	
		(+/-)		(+/-)		(+/-)		(+/-)		(+/-)
07/07/20	13.60	2.840	18.80	3.120	16.10	3.000	14.90	2.910	16.80	3.030
07/15/20	13.00	2.320	12.80	2.300	13.80	2.340	11.10	2.210	9.930	2.130
07/21/20	16.30	3.110	19.30	3.230	18.80	3.320	16.40	3.050	16.90	3.150
07/28/20	11.80	3.010	12.60	3.050	14.70	3.080	10.20	2.940	18.70	3.310
08/05/20	11.10	2.290	11.70	2.320	12.90	2.390	10.70	2.270	10.70	2.270
08/12/20	13.40	2.740	17.80	2.970	26.50	3.370	12.30	2.670	18.20	2.970
08/19/20	11.30	2.370	15.30	2.610	17.80	2.780	14.10	2.540	18.00	2.780
08/26/20	16.40	2.840	20.90	3.080	20.30	3.040	19.80	3.030	20.60	3.060
09/02/20	6.940	2.250	13.50	2.700	14.10	2.740	11.00	2.490	11.90	2.610
09/08/20	11.60	2.530	13.00	2.570	9.570	2.320	11.20	2.510	15.30	2.710
09/16/20	9.080	2.280	14.90	2.600	15.00	2.610	9.370	2.300	11.00	2.390
09/22/20	11.80	3.120	13.10	3.200	18.50	3.510	15.30	3.330	16.00	3.370
09/30/20	20.20	2.850	22.30	2.950	21.70	2.910	16.30	2.660	20.70	2.870
10/06/20	12.50	2.890	12.50	2.890	15.80	3.080	11.00	2.800	11.70	2.850
10/13/20	10.80	2.600	11.90	2.640	14.10	2.760	13.50	2.750	14.20	2.760
10/20/20	14.90	2.940	12.30	2.810	16.20	3.040	15.50	2.970	18.40	3.140
10/27/20	9.210	2.550	9.800	2.580	15.30	2.890	8.140	2.480	7.940	2.470
11/03/20	10.40	2.540	12.10	2.650	14.90	2.800	10.40	2.550	15.30	2.820
11/10/20	15.50	2.720	14.50	2.660	21.00	3.020	11.50	2.490	16.20	2.760
11/17/20	15.40	2.860	14.50	2.810	19.10	3.030	15.10	2.840	13.00	2.710
11/24/20	17.00	3.160	17.00	3.160	18.70	3.250	17.70	3.190	17.50	3.200
12/02/20	16.20	2.540	24.20	2.930	23.60	2.900	20.30	2.750	19.30	2.700
12/09/20	7.590	2.160	7.200	2.130	10.80	2.380	9.080	2.260	8.200	2.200
12/15/20	26.30	3.710	33.30	4.020	35.30	4.080	27.50	3.760	35.20	4.070
12/22/20	10.60	2.380	15.20	2.660	16.00	2.710	15.00	2.640	13.90	2.590
12/29/20	12.30	2.570	14.90	2.710	15.90	2.770	16.30	2.800	12.80	2.590
Mean	11.83	2.598	13.29	2.679	14.68	2.754	12.01	2.608	13.53	2.692
							Mean all Indicator locations		12.92	2.659

*Control Station

TABLE 3-4
AIRBORNE IODINE
(10⁻³ pCi/m³)

PERIOD ENDING	LOCATIONS							
	01	02	03	04	05	06	07	21
01/08/20	< 17.88	< 17.91	< 15.28	< 18.05	< 17.93	< 27.51	< 27.51	< 27.47
01/14/20	< 18.90	< 18.82	< 18.82	< 11.41	< 14.36	< 14.54	< 14.48	< 14.48
01/21/20	< 8.687	< 8.702	< 8.702	< 8.702	< 6.820	< 5.309	< 11.30	< 11.30
01/28/20	< 19.77	< 19.77	< 19.77	< 9.238	< 19.77	< 27.66	< 27.66	< 27.66
02/04/20	< 10.56	< 25.14	< 25.18	< 25.18	< 25.18	< 12.74	< 12.74	< 12.76
02/11/20	< 15.28	< 18.21	< 18.21	< 18.17	< 18.08	< 20.09	< 20.23	< 20.23
02/19/20	< 30.77	< 30.91	< 13.13	< 30.87	< 31.06	< 6.144	< 13.09	< 13.07
02/26/20	< 18.17	< 27.12	< 27.12	< 27.17	< 27.17	< 24.30	< 11.36	< 24.34
03/03/20	< 18.42	< 9.429	< 17.99	< 18.20	< 18.42	< 15.33	< 15.37	< 15.37
03/10/20	< 15.90	< 15.90	< 13.61	< 16.12	< 15.95	< 30.55	< 30.50	< 12.79
03/17/20	< 11.18	< 13.34	< 13.34	< 13.34	< 13.25	< 20.69	< 20.83	< 20.83
03/24/20	< 17.70	< 17.70	< 17.70	< 17.70	< 8.595	< 9.587	< 18.71	< 18.71
03/31/20	< 15.65	< 36.98	< 36.17	< 36.48	< 36.98	< 21.47	< 25.66	< 25.66
04/07/20	< 38.31	< 38.58	< 16.56	< 39.20	< 38.72	< 19.66	< 19.66	< 19.66
04/14/20	< 7.566	< 17.95	< 17.95	< 17.95	< 17.82	< 13.29	< 13.34	< 13.36
04/21/20	< 24.34	< 24.52	< 24.52	< 26.64	< 12.54	< 26.83	< 26.64	< 26.64
04/28/20	< 17.05	< 21.90	< 21.90	< 21.90	< 21.90	< 25.46	< 25.46	< 25.46
05/05/20	< 43.05	< 18.18	< 43.05	< 43.05	< 43.05	< 18.32	< 10.33	< 18.32
05/12/20	< 18.03	< 17.94	< 17.94	< 11.49	< 22.31	< 22.38	< 22.50	< 22.50
05/20/20	< 34.93	< 35.09	< 35.09	< 38.83	< 16.39	< 39.01	< 38.89	< 38.83
05/26/20	< 12.14	< 28.94	< 28.94	< 28.94	< 29.00	< 21.02	< 20.98	< 20.98
06/02/20	< 19.37	< 19.37	< 19.37	< 19.37	< 19.37	< 21.66	< 27.83	< 27.83
06/09/20	< 10.35	< 24.60	< 24.60	< 24.60	< 24.56	< 13.93	< 13.93	< 13.93
06/16/20	< 33.97	< 14.30	< 34.09	< 34.09	< 33.97	< 19.87	< 11.26	< 19.97
06/23/20	< 18.21	< 18.21	< 18.21	< 19.09	< 19.19	< 9.282	< 19.09	< 19.09
06/30/20	< 6.406	< 11.32	< 11.32	< 11.32	< 11.28	< 15.55	< 15.44	< 6.746

TABLE 3-4
AIRBORNE IODINE
(10⁻³ pCi/m³)

PERIOD ENDING	LOCATIONS							
	01	02	03	04	05	06	07	21
07/07/20	< 34.07	< 14.36	< 34.25	< 34.19	< 34.25	< 34.09	< 14.30	< 33.97
07/15/20	< 34.19	< 34.03	< 33.07	< 20.84	< 21.07	< 21.10	< 21.23	< 11.98
07/21/20	< 25.01	< 25.73	< 26.71	< 15.60	< 36.73	< 36.73	< 36.36	< 35.77
07/28/20	< 16.44	< 19.28	< 19.45	< 19.24	< 19.28	< 20.50	< 20.54	< 20.83
08/05/20	< 7.847	< 18.68	< 18.68	< 18.68	< 18.68	< 21.26	< 21.26	< 21.29
08/12/20	< 20.09	< 23.85	< 23.94	< 23.89	< 23.68	< 22.90	< 23.03	< 23.07
08/19/20	< 33.47	< 33.71	< 33.77	< 33.65	< 14.24	< 10.42	< 24.71	< 24.67
08/26/20	< 16.27	< 38.73	< 38.79	< 38.73	< 38.66	< 36.11	< 36.17	< 36.17
09/02/20	< 34.76	< 35.81	< 35.81	< 35.74	< 15.04	< 17.97	< 42.77	< 42.69
09/08/20	< 33.75	< 32.52	< 32.52	< 16.52	< 39.24	< 39.32	< 39.40	< 39.40
09/16/20	< 22.33	< 10.19	< 22.40	< 22.40	< 22.37	< 20.06	< 10.26	< 20.09
09/22/20	< 28.44	< 28.32	< 12.39	< 28.38	< 28.50	< 15.75	< 37.41	< 37.41
09/30/20	< 36.15	< 36.09	< 36.09	< 29.87	< 29.78	< 29.82	< 29.82	< 14.45
10/06/20	< 19.87	< 23.90	< 23.85	< 23.85	< 23.95	< 19.54	< 13.10	< 19.46
10/13/20	< 10.83	< 25.65	< 25.65	< 25.74	< 25.51	< 20.37	< 20.41	< 20.51
10/20/20	< 25.29	< 25.51	< 25.51	< 25.51	< 11.67	< 14.45	< 14.40	< 14.33
10/27/20	< 19.59	< 16.80	< 19.22	< 19.36	< 19.59	< 9.677	< 20.01	< 20.01
11/03/20	< 16.18	< 16.12	< 13.77	< 16.32	< 16.09	< 13.33	< 13.35	< 13.38
11/10/20	< 22.36	< 22.36	< 22.36	< 22.36	< 11.46	< 13.16	< 31.31	< 31.31
11/17/20	< 29.45	< 12.37	< 29.51	< 29.51	< 29.25	< 10.23	< 24.56	< 24.56
11/24/20	< 29.56	< 29.51	< 29.46	< 29.46	< 12.44	< 17.22	< 17.10	< 17.07
12/02/20	< 42.17	< 42.17	< 42.17	< 29.59	< 29.63	< 29.59	< 29.63	< 12.45
12/09/20	< 37.29	< 37.29	< 37.35	< 37.35	< 15.67	< 28.47	< 28.43	< 28.38
12/15/20	< 19.30	< 8.111	< 19.34	< 19.34	< 19.18	< 20.22	< 20.38	< 20.38
12/22/20	< 33.94	< 34.00	< 34.00	< 34.00	< 23.23	< 18.77	< 40.88	< 40.88
12/29/20	< 24.32	< 35.91	< 34.99	< 35.35	< 35.79	< 51.74	< 51.83	< 21.85

TABLE 3-4
AIRBORNE IODINE
(10⁻³ pCi/m³)

PERIOD ENDING	LOCATIONS				
	22	23	24*	01A	05A
01/08/20	< 27.51	< 11.55	< 17.20	< 17.16	< 17.18
01/14/20	< 23.06	< 23.06	< 10.67	< 23.06	< 23.06
01/21/20	< 11.30	< 11.30	< 7.984	< 7.915	< 7.984
01/28/20	< 27.66	< 11.60	< 14.22	< 14.22	< 14.22
02/04/20	< 12.76	< 6.517	< 32.56	< 32.56	< 32.56
02/11/20	< 16.95	< 20.23	< 15.47	< 15.66	< 15.50
02/19/20	< 13.03	< 13.05	< 4.925	< 4.872	< 4.925
02/26/20	< 24.34	< 24.34	< 20.36	< 20.36	< 20.33
03/03/20	< 15.33	< 15.30	< 22.12	< 22.16	< 22.21
03/10/20	< 30.55	< 30.55	< 28.86	< 28.86	< 28.91
03/17/20	< 20.83	< 8.736	< 15.12	< 15.15	< 15.04
03/24/20	< 18.71	< 18.71	< 15.57	< 15.46	< 15.54
03/31/20	< 25.66	< 25.62	< 24.04	< 24.29	< 24.12
04/07/20	< 19.66	< 19.69	< 21.28	< 21.02	< 21.20
04/14/20	< 13.36	< 6.462	< 13.22	< 13.38	< 13.22
04/21/20	< 24.22	< 24.26	< 24.48	< 10.96	< 24.44
04/28/20	< 11.65	< 25.46	< 21.16	< 25.34	< 25.34
05/05/20	< 18.32	< 18.32	< 16.51	< 16.51	< 16.51
05/12/20	< 17.17	< 17.14	< 16.91	< 17.17	< 9.548
05/20/20	< 33.95	< 34.01	< 34.32	< 14.22	< 34.27
05/26/20	< 11.83	< 20.98	< 33.71	< 33.71	< 33.71
06/02/20	< 27.83	< 27.83	< 26.64	< 26.64	< 26.64
06/09/20	< 7.878	< 13.95	< 27.71	< 27.91	< 27.76
06/16/20	< 19.90	< 19.94	< 35.90	< 35.84	< 35.84
06/23/20	< 17.71	< 9.047	< 17.87	< 17.75	< 17.84
06/30/20	< 15.53	< 15.50	< 5.197	< 10.28	< 10.19

*Control Station

TABLE 3-4
AIRBORNE IODINE
(10⁻³ pCi/m³)

PERIOD ENDING	LOCATIONS				
	22	23	24*	01A	05A
07/07/20	< 33.91	< 33.97	< 25.94	< 25.71	< 25.89
07/15/20	< 12.15	< 12.09	< 6.746	< 12.15	< 12.04
07/21/20	< 19.67	< 19.23	< 20.25	< 9.704	< 19.71
07/28/20	< 9.494	< 20.83	< 10.45	< 10.84	< 10.62
08/05/20	< 21.29	< 10.87	< 6.145	< 6.155	< 6.155
08/12/20	< 39.23	< 39.16	< 16.20	< 39.23	< 38.68
08/19/20	< 24.54	< 24.58	< 26.95	< 26.44	< 26.81
08/26/20	< 36.11	< 15.17	< 24.73	< 24.86	< 24.81
09/02/20	< 41.59	< 42.77	< 27.73	< 26.68	< 27.63
09/08/20	< 43.98	< 42.47	< 17.74	< 44.17	< 42.30
09/16/20	< 20.03	< 20.06	< 22.05	< 22.05	< 22.09
09/22/20	< 37.41	< 37.41	< 36.24	< 36.09	< 36.24
09/30/20	< 25.06	< 25.06	< 20.87	< 25.10	< 24.98
10/06/20	< 19.46	< 19.46	< 20.35	< 20.35	< 20.43
10/13/20	< 9.366	< 20.44	< 52.36	< 52.91	< 52.27
10/20/20	< 14.30	< 14.40	< 23.75	< 23.34	< 23.62
10/27/20	< 19.97	< 19.94	< 21.69	< 21.65	< 21.73
11/03/20	< 13.38	< 8.962	< 12.06	< 12.14	< 12.06
11/10/20	< 31.26	< 31.20	< 19.95	< 19.81	< 19.92
11/17/20	< 24.60	< 24.64	< 31.87	< 32.14	< 31.87
11/24/20	< 17.07	< 17.07	< 22.25	< 22.17	< 22.28
12/02/20	< 22.43	< 22.43	< 18.68	< 22.36	< 22.40
12/09/20	< 28.43	< 11.90	< 25.35	< 25.17	< 25.21
12/15/20	< 20.34	< 13.63	< 20.23	< 20.40	< 20.23
12/22/20	< 40.88	< 40.88	< 44.93	< 44.62	< 44.93
12/29/20	< 52.01	< 51.83	< 15.05	< 15.10	< 14.97

*Control Station

TABLE 3-5
AIR PARTICULATES
(10⁻³ pCi/m³)

GAMMA SPECTRA - QTR 1 (12/30/19 - 03/31/20)

LOCATION	Be-7		Cs-134	Cs-137
	(+/-)			
01	102.00	20.850	< 1.2740	< 1.3220
02	111.20	20.000	< 1.2510	< 1.0400
03	138.00	26.020	< 1.2460	< 1.1960
04	125.00	21.070	< 0.9146	< 0.9800
05	117.70	18.780	< 0.9537	< 1.0950
06	119.00	20.770	< 0.7340	< 0.9847
07	116.20	22.190	< 1.3610	< 1.4680
21	121.70	19.890	< 0.7541	< 0.8546
22	124.30	27.360	< 1.6840	< 1.6480
23	124.00	22.420	< 1.3330	< 1.2990
24*	130.70	24.750	< 1.4700	< 1.3800
01A	105.10	18.880	< 0.8936	< 0.6651
05A	103.70	22.130	< 0.9673	< 0.9605

GAMMA SPECTRA AND STRONTIUM 89/90- QTR 2 (03/31/20 - 06/30/20)

LOCATION	Be-7		Cs-134	Cs-137	Sr-89	Sr-90
	(+/-)					
01	108.70	18.120	< 0.9101	< 0.9516	< 6.6000	< 4.0100
02	121.90	21.080	< 1.2130	< 0.9409	< 7.6100	< 4.3600
03	150.50	26.900	< 1.2890	< 1.2090	< 7.8600	< 3.0500
04	142.80	24.050	< 1.4510	< 1.2610	< 7.2200	< 4.0800
05	120.10	19.860	< 0.9012	< 0.9184	< 8.0000	< 4.6300
06	131.30	22.250	< 1.3260	< 1.3620	< 6.0200	< 3.4100
07	131.60	27.170	< 2.0490	< 1.4630	< 7.1800	< 3.2800
21	145.40	20.090	< 1.3110	< 1.0290	< 8.0400	< 4.6000
22	131.80	22.200	< 1.1160	< 1.0070	< 6.8100	< 3.3700
23	134.50	21.200	< 0.8744	< 1.0080	< 6.8200	< 4.7900
24*	129.00	26.350	< 1.3830	< 1.2140	< 6.0900	< 4.0900
01A	126.20	21.410	< 1.3650	< 1.0820	< 7.8000	< 2.8200
05A	127.50	20.950	< 1.0920	< 0.9178	< 6.8800	< 4.8000

* Control Location

TABLE 3-5
AIR PARTICULATES
(10⁻³ pCi/m³)

GAMMA SPECTRA - QTR 3 (06/30/20 - 09/30/20)

LOCATION	Be-7		Cs-134	Cs-137
	(+/-)			
01	125.00	19.380	< 1.0940	< 1.2330
02	119.90	21.120	< 0.7736	< 0.9122
03	131.30	24.950	< 1.4400	< 1.2650
04	149.50	25.060	< 1.4240	< 1.3940
05	139.50	20.970	< 0.9697	< 0.8418
06	116.70	24.970	< 1.2860	< 1.2460
07	118.30	21.750	< 0.9714	< 0.7938
21	128.60	20.730	< 1.1660	< 1.0400
22	124.40	21.200	< 0.8065	< 0.9183
23	149.60	26.050	< 1.0790	< 1.1300
24*	154.20	26.150	< 1.7080	< 1.3440
01A	137.30	21.190	< 0.9631	< 0.7848
05A	133.40	23.930	< 1.3230	< 1.2480

GAMMA SPECTRA - QTR 4 (09/30/20 - 12/29/20)

LOCATION	Be-7		Cs-134	Cs-137	Annual Mean	
	(+/-)				Be-7	
01	116.20	21.700	< 1.7060	< 1.3800	112.98	20.013
02	89.900	19.250	< 1.1440	< 0.9657	110.73	20.363
03	91.760	21.020	< 1.4520	< 1.2150	127.89	24.723
04	114.50	19.730	< 0.9610	< 0.8878	132.95	22.478
05	117.30	18.500	< 1.1500	< 0.7789	123.65	19.528
06	96.180	23.770	< 1.2410	< 0.8490	115.80	22.940
07	105.60	20.260	< 0.7743	< 0.9161	117.93	22.843
21	112.30	20.670	< 1.0050	< 0.8490	127.00	20.345
22	111.10	22.980	< 1.1360	< 1.2710	122.90	23.435
23	114.30	21.800	< 0.6344	< 0.8491	127.18	22.868
24*	128.50	20.240	< 0.6892	< 1.0720	135.60	24.373
01A	114.80	19.160	< 1.3800	< 1.2320	120.85	20.160
05A	137.80	24.830	< 1.6730	< 1.5570	125.60	22.960

Mean of All Indicator Locations 122.41 21.888

* 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							
02							
03							
04							
05							
06							
07							
21							
22							
23							
24*							
05A							
Mean							

Soil sampled on Triennial basis. Not required in 2020

LOCATION	COLLECTION DATE	Th-228 (+/-)	Th-232 (+/-)
01			
02			
03			
04			
05			
06			
07			
21			
22			
23			
24*			
05A			
Mean			

* Control Location

TABLE 3-7
Precipitation
(pCi/L)

LOCATION 01A

<u>COLLECTION DATE</u>	<u>Gr-B</u>		<u>H-3</u>	<u>RainFall (inches)</u>
	(+/ -)			
01/28/20	2.6	1.1	< 911	2.94
02/26/20	2.4	1.2	< 711	3.08
03/31/20	3.3	1.2	< 719	1.63
04/28/20	3.2	1.1	< 764	5.19
05/26/20	7.5	1.9	< 877	2.06
06/30/20	3.0	1.3	< 726	5.80
07/28/20	2.1	1.0	< 757	3.50
08/26/20	2.2	1.2	< 677	9.75
09/30/20	5.5	1.4	< 733	5.35
10/27/20	4.9	1.3	< 935	2.88
11/24/20	1.5	1.0	< 692	8.82
12/29/20	2.3	1.1	< 912	8.80
Mean	3.4	1.2	-	Total 59.80

TABLE 3-7
Precipitation
(pCi/L)

LOCATION 01A

COLLECTION DATE	Be-7	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95
06/30/20	< 53.86	< 2.025	< 15.62	< 4.128	< 1.694	< 4.424	< 8.440
12/29/20	< 51.10	< 1.959	< 15.12	< 3.924	< 1.774	< 4.319	< 7.881
Mean	-	-	-	-	-	-	-

COLLECTION DATE	Nb-95	Cs-134	Cs-137	Ba-140	La-140	I-131	Th-228
06/30/20	< 4.960	< 1.922	< 1.747	< 1603	< 559.1	< 14150	< 3.878
12/29/20	< 5.078	< 2.009	< 1.765	< 1356	< 473.5	< 10720	< 3.434
Mean	-	-	-	-	-	-	-

TABLE 3-8
MILK
(pCi/L)

<u>LOCATION</u>	<u>COLLECTION DATE</u>	<u>K-40</u> (+/-)	<u>Sr-89</u>	<u>Sr-90</u>	<u>I-131*</u>	<u>Cs-134*</u>	<u>Cs-137*</u>	<u>Ba-140*</u>	<u>La-140*</u>
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*Milk samples could not be obtained in 2020 due the lack of dairy farms within the sampling area.

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	
	(+/-)		(+/-)					(+/-)	
05/12/20	1962	418.2	5399	805.0	< 44.70	< 40.99	< 44.64	90.23	57.49
06/09/20	1804	477.6	5290	806.8	< 39.00	< 51.30	< 48.32	89.41	63.55
07/15/20	< 416.2		6065	877.8	< 21.90	< 41.76	< 38.04	< 65.55	
08/12/20	1437	377.9	4480	665.0	< 47.70	< 35.20	< 28.48	< 58.35	
09/08/20	3135	430.1	4595	762.0	< 45.50	< 29.97	< 37.98	< 61.65	
10/13/20	1719	173.6	3624	314.5	< 51.20	< 16.17	< 16.37	< 22.24	
Mean	1971	375.5	4909	705.2	-	-	-	89.82	60.52

LOCATION 15

COLLECTION DATE	Be-7		K-40		I-131**	Cs-134**	Cs-137**	Th-228	
	(+/-)		(+/-)					(+/-)	
05/12/20	1383	387.2	4679	801.2	< 37.50	< 50.11	< 46.10	76.72	69.63
06/09/20	1542	427.8	6059	1097	< 47.70	< 58.92	< 44.41	< 67.90	
07/15/20	< 348.1		7139	841.6	< 41.00	< 29.79	< 31.03	< 48.46	
08/12/20	931.2	284.7	6139	683.0	< 35.10	< 29.84	< 21.89	< 41.38	
09/08/20	1438	357.4	5731	875.9	< 28.90	< 39.34	< 32.74	< 51.26	
10/13/20	2493	158.9	3288	263.7	< 36.30	< 15.38	< 14.09	< 22.13	
Mean	1557	323.2	5506	760.4	-	-	-	76.72	69.63

LOCATION 16*

COLLECTION DATE	Be-7		K-40		I-131**	Cs-134**	Cs-137**
	(+/-)		(+/-)				
05/12/20	940.1	347.5	4251	735.7	< 46.00	< 36.43	< 31.15
06/09/20	1060	370.7	5431	785.8	< 35.10	< 36.81	< 32.38
07/15/20	< 412.0		3433	702.7	< 49.90	< 38.25	< 46.96
08/12/20	1714	324.8	4210	631.6	< 56.50	< 25.68	< 29.49
09/08/20	1459	318.2	4083	652.6	< 36.50	< 37.10	< 33.24
10/13/20	2114	159.0	4022	296.5	< 45.90	< 12.76	< 12.44
Mean	1457	304.0	4238	634.2	-	-	-

*Control Station

** LLD identified 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	
	(+/-)	(+/-)	(+/-)	(+/-)				(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)
05/12/20	1732	456.0	4884	842.2	< 54.80	< 46.44	< 48.52	< 1383	188.1	76.84			< 246.6
06/09/20	1083	357.7	4063	813.5	< 49.40	< 52.55	< 46.01	< 1158	229.3	82.19		236.3	88.60
07/15/20	759.3	323.2	5657	563.3	< 42.50	< 35.29	< 32.16	< 706.0		< 61.13			< 142.9
08/12/20	1897	337.8	12150	1061	< 49.60	< 37.89	< 36.78	< 752.6		< 57.71			< 177.3
09/08/20	3118	444.7	3583	545.2	< 59.60	< 34.61	< 33.19	< 830.9		< 70.24			< 154.3
10/13/20	5898	319.6	3508	378.6	< 49.10	< 28.89	< 23.89	1018	533.7	145.6	38.70	465.7	200.2
Mean	2414	373.2	5641	700.6	-	-	-	1018	533.7	187.7	65.91	351.0	144.4

LOCATION 26

COLLECTION DATE	Be-7		K-40		I-131**	Cs-134**	Cs-137**	Th-228	
	(+/-)	(+/-)	(+/-)	(+/-)				(+/-)	(+/-)
05/12/20	4082	516.3	4642	740.3	< 52.40	< 31.44	< 42.38	< 84.41	
06/09/20	1911	407.5	3427	693.2	< 50.80	< 39.48	< 40.02	< 75.03	
07/15/20	< 337.5		8328	893.2	< 21.40	< 43.01	< 37.61	< 66.89	
08/12/20	518.2	196.5	4021	396.4	< 33.10	< 22.15	< 21.49	< 38.41	
09/08/20	4076	522.8	5546	821.3	< 44.10	< 39.68	< 35.38	< 63.65	
10/13/20	1315	163.7	3915	311.8	< 55.70	< 16.85	< 16.47	32.47	21.28
Mean	2380	361.4	4980	642.7	-	-	-	32.47	21.28

All Indicator Mean	Be-7		K-40		I-131**	Cs-134**	Cs-137**	Ra-226		Th-228		Th-232	
	(+/-)	(+/-)	(+/-)	(+/-)				(+/-)	(+/-)	(+/-)	(+/-)	(+/-)	(+/-)
	2097	359.0	5259	702.2	-	-	-	1018	533.7	121.7	58.53	351.0	144.4

** LLD identified 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	03/31/20	< 723	(a)	(a)	< 5.80	< 11.4	< 4.82	< 5.19	< 9.35
	06/30/20	< 727	< 3.76	< 0.880	< 5.63	< 11.2	< 5.57	< 5.25	< 9.48
	09/30/20	< 732	(a)	(a)	< 5.72	< 12.5	< 5.23	< 5.75	< 13.3
	12/29/20	< 911	(a)	(a)	< 5.19	< 11.1	< 5.42	< 6.17	< 11.3
	Mean	-	-	-	-	-	-	-	-

LOCATION	COLLECTION DATE	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
01A	03/31/20	< 8.54	< 6.20	< 9.19	< 5.36	< 4.94	< 27.5	< 8.76
	06/30/20	< 9.57	< 7.49	< 9.57	< 5.69	< 4.95	< 26.4	< 9.83
	09/30/20	< 10.4	< 8.73	< 9.64	< 6.28	< 6.15	< 26.5	< 10.2
	12/29/20	< 9.88	< 7.84	< 9.87	< 6.02	< 5.98	< 28.1	< 9.56
	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*
	(+/-)								
01/14/20	(a)		(b)	(b)	< 2.546	< 5.449	< 2.577	< 3.186	< 5.000
02/11/20	(a)		(b)	(b)	< 4.815	< 9.979	< 5.425	< 5.142	< 12.47
03/17/20	1390	554.0	(b)	(b)	< 5.562	< 14.74	< 5.726	< 6.710	< 15.26
04/14/20	(a)		(b)	(b)	< 5.158	< 12.28	< 5.468	< 6.804	< 9.546
05/12/20	(a)		(b)	(b)	< 7.339	< 16.84	< 6.632	< 7.522	< 17.33
06/16/20	2700	616.0	< 4.300	< 0.856	< 5.334	< 11.85	< 5.684	< 5.938	< 11.11
07/15/20	(a)		(b)	(b)	< 4.836	< 10.99	< 4.247	< 6.366	< 10.15
08/12/20	(a)		(b)	(b)	< 5.911	< 13.20	< 6.647	< 6.378	< 13.35
09/16/20	3960	658.0	(b)	(b)	< 6.555	< 11.87	< 6.691	< 5.715	< 10.27
10/13/20	(a)		(b)	(b)	< 3.799	< 7.892	< 4.340	< 3.618	< 9.427
11/17/20	(a)		(b)	(b)	< 5.099	< 11.58	< 4.411	< 5.697	< 12.04
12/15/20	3380	643.0	(b)	(b)	< 6.444	< 11.86	< 5.145	< 4.923	< 13.50
Mean	2858	617.8	-	-	-	-	-	-	-
	Nb-95*	Zr-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*		
01/14/20	< 2.492	< 4.158	< 0.555	< 2.466	< 2.647	< 9.439	< 2.641		
02/11/20	< 5.258	< 7.659	< 0.742	< 5.625	< 5.002	< 22.53	< 8.291		
03/17/20	< 6.297	< 13.69	< 0.602	< 5.970	< 5.299	< 24.33	< 7.055		
04/14/20	< 6.417	< 11.14	< 0.776	< 6.005	< 5.220	< 22.63	< 9.845		
05/12/20	< 7.504	< 10.77	< 0.691	< 7.785	< 7.018	< 26.28	< 11.27		
06/16/20	< 5.091	< 11.35	< 0.764	< 7.104	< 5.512	< 27.82	< 10.33		
07/15/20	< 6.264	< 8.051	< 0.647	< 5.692	< 5.912	< 22.80	< 10.61		
08/12/20	< 6.248	< 13.29	< 0.687	< 5.642	< 9.127	< 21.91	< 7.498		
09/16/20	< 5.988	< 11.49	< 0.697	< 5.465	< 7.394	< 22.72	< 7.855		
10/13/20	< 5.076	< 8.127	< 0.749	< 4.585	< 4.587	< 17.72	< 6.431		
11/17/20	< 5.807	< 8.780	< 0.798	< 4.986	< 6.510	< 27.43	< 7.905		
12/15/20	< 5.650	< 11.02	< 0.937	< 6.387	< 6.962	< 25.48	< 9.699		
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*
	(+/-)								
01/14/20	(a)		(b)	(b)	< 2.422	< 5.668	< 2.431	< 3.189	< 4.636
02/11/20	(a)		(b)	(b)	< 4.201	< 11.35	< 3.851	< 4.969	< 9.621
03/17/20	2840	613.0	(b)	(b)	< 6.249	< 11.51	< 6.071	< 4.718	< 11.72
04/14/20	(a)		(b)	(b)	< 4.127	< 8.884	< 4.226	< 3.613	< 7.665
05/12/20	(a)		(b)	(b)	< 5.252	< 9.613	< 6.139	< 6.588	< 10.21
06/16/20	2270	596.0	< 3.690	< 0.658	< 6.648	< 13.70	< 6.233	< 6.776	< 13.32
07/15/20	(a)		(b)	(b)	< 5.544	< 11.71	< 5.469	< 4.623	< 12.32
08/12/20	(a)		(b)	(b)	< 6.084	< 7.231	< 5.899	< 5.993	< 10.34
09/16/20	4030	648.0	(b)	(b)	< 5.616	< 11.80	< 4.153	< 6.061	< 11.93
10/13/20	(a)		(b)	(b)	< 4.069	< 9.895	< 4.082	< 3.969	< 8.501
11/17/20	(a)		(b)	(b)	< 4.933	< 10.37	< 4.732	< 5.607	< 10.84
12/15/20	2030	578.0	(b)	(b)	< 4.646	< 12.17	< 6.058	< 5.903	< 9.778
Mean	2793	608.8	-	-	-	-	-	-	-
	Nb-95*	Zr-95*	I-131*	Cs-134*	Cs-137*	Ba-140*	La-140*		
01/14/20	< 2.517	< 4.372	< 0.623	< 2.609	< 2.711	< 10.19	< 3.455		
02/11/20	< 4.884	< 7.796	< 0.773	< 6.000	< 5.454	< 18.98	< 7.051		
03/17/20	< 5.268	< 9.943	< 0.750	< 8.161	< 4.406	< 21.24	< 8.262		
04/14/20	< 4.738	< 7.343	< 0.635	< 4.122	< 4.504	< 20.45	< 6.669		
05/12/20	< 5.931	< 10.45	< 0.658	< 4.979	< 5.838	< 20.75	< 6.370		
06/16/20	< 6.533	< 12.98	< 0.736	< 5.143	< 6.034	< 28.92	< 8.263		
07/15/20	< 5.692	< 9.622	< 0.744	< 6.575	< 5.346	< 23.87	< 7.666		
08/12/20	< 4.516	< 12.44	< 0.598	< 7.302	< 6.160	< 22.99	< 9.615		
09/16/20	< 6.301	< 9.573	< 0.892	< 7.896	< 6.647	< 22.87	< 5.557		
10/13/20	< 5.036	< 7.533	< 0.740	< 5.515	< 4.395	< 18.77	< 7.851		
11/17/20	< 5.927	< 9.992	< 0.675	< 6.835	< 6.791	< 28.50	< 7.411		
12/15/20	< 6.101	< 9.052	< 0.826	< 6.563	< 6.811	< 24.06	< 9.807		
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)

COLLECTION DATE	LOCATION 09A**							
	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	03/30/20	(a)	(a)	(a)	(a)	1419	736.0	< 64.21	< 55.99	< 1193	
09A*	03/30/20	(a)	(a)	(a)	(a)	12960	1634	< 103.2	< 77.92	< 1418			
11	03/30/20	(a)	(a)	(a)	(a)	20630	1885	< 90.82	< 73.05	< 1375			
08	10/14/20	< 446.0	< 40.30	< 40.30	< 40.30	762.2	439.8	< 55.15	< 51.51	< 1046			
09A*	10/14/20	< 535.0	< 43.90	< 43.90	< 43.90	12930	1249	< 48.77	< 38.36	< 997.1			
11	10/14/20	< 630.0	< 44.30	< 44.30	< 44.30	20790	1773	< 80.98	< 66.98	< 1407			
	Indicator Mean	-	-	-	-	10900	1208	-	-	-			
	Control Mean	-	-	-	-	12945	1442	-	-	-			

LOCATION	COLLECTION DATE	Th-228 (+/-)		Th-232 (+/-)	
		08	03/30/20	< 109.1	< 109.1
09A*	03/30/20	707.6	143.3	734.2	179.3
11	03/30/20	763.0	94.93	685.5	209.8
08	10/14/20	161.0	66.89	< 211.5	< 211.5
09A*	10/14/20	165.1	63.45	< 221.1	< 221.1
11	10/14/20	1071	106.3	741.2	181.9
	Indicator Mean	665.0	89.37	713.4	195.9
	Control Mean	436.4	103.4	734.2	179.3

(a) Sr-89/90 analyses performed 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	03/30/20	(a)	(a)	< 1240		< 62.76	< 42.02	< 1104
08	10/14/20	< 659.0	< 46.00	1062	667.9	< 55.01	< 54.98	< 1143
	Mean	-	-	1062	667.9	-	-	-

LOCATION	COLLECTION DATE	Th-228	Th-232
08	03/30/20	< 89.91	< 242.6
08	10/14/20	< 103.4	< 242.4
	Mean	-	-

* 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)	05/13/20	1566	782.3	< 83.12	< 182.2	< 103.3	< 78.75	< 207.8
	(b)	05/13/20	1506	854.3	< 56.86	< 117.4	< 72.98	< 72.89	< 119.7
	(a)	11/03/20	1534	742.6	< 37.31	< 88.97	< 52.25	< 54.62	< 94.62
	(b)	11/03/20	872.4	547.4	< 48.27	< 58.76	< 48.45	< 40.94	< 91.34
25**	(a)	05/13/20	1659	1082	< 71.20	< 193.8	< 93.38	< 70.53	< 195.8
	(b)	05/13/20	1951	700.5	< 65.53	< 136.7	< 55.44	< 60.76	< 127.4
	(a)	11/06/20	1371	730.6	< 68.86	< 125.8	< 69.20	< 65.27	< 161.8
	(b)	11/24/20	892.8	562.0	< 52.46	< 101.3	< 47.95	< 48.88	< 98.06
		Mean	1419	750.2	-	-	-	-	-
		Indicator Mean	1370	731.7	-	-	-	-	-
		Control Mean	1468	768.8	-	-	-	-	-

LOCATION	Fish Type	COLLECTION DATE	Cs-134*	Cs-137*
08	(a)	05/13/20	< 98.95	< 105.2
	(b)	05/13/20	< 61.10	< 61.98
	(a)	11/03/20	< 41.78	< 58.64
	(b)	11/03/20	< 40.75	< 47.12
25**	(a)	05/13/20	< 85.71	< 76.77
	(b)	05/13/20	< 74.62	< 60.10
	(a)	11/06/20	< 68.66	< 60.81
	(b)	11/24/20	< 46.91	< 50.27
		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 2020 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 2020 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. In the past, Cs-137, a plant related nuclide, has been 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 2020 reporting period.

4.1 *Gamma Exposure Rate*

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

The results of the analyses are presented in Table 3-2. Figure 4-1 shows the historical trend of TLD exposure rate measurements. Control and indicator averages indicate a steady relationship. Two dosimeters made of CaF and LiF sensitive elements are deployed at each sampling location. These TLDs replaced the previously used CaSO₄:Dy in Teflon TLDs in January 2001. The dose with the replacement TLDs is lower than that of the previously used TLDs. This will continue to be monitored.

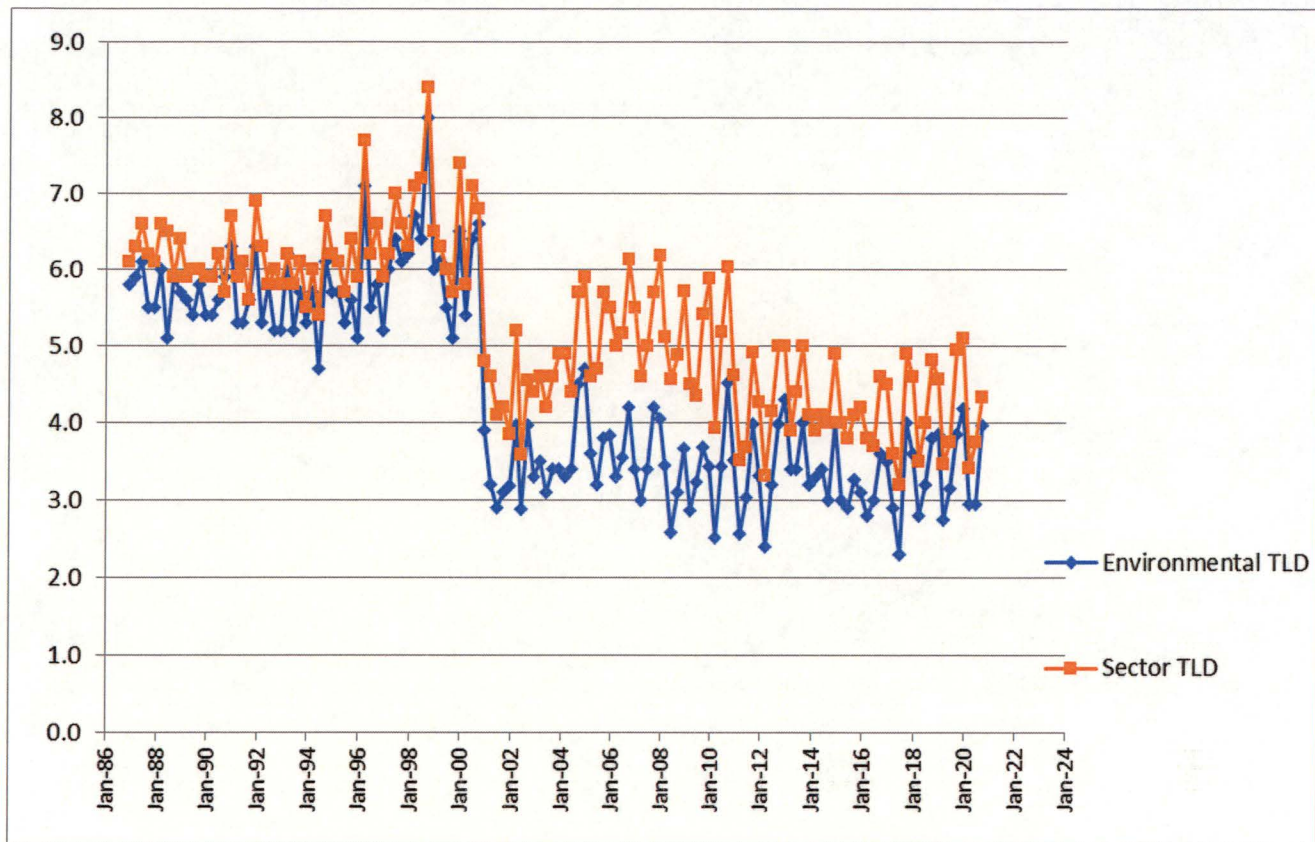


Figure 4-1 TLD (mrem/Standard Month)

Sector TLDs are deployed quarterly at thirty-two locations in the environs of the North Anna site. Two badges are placed at each location. The average level of these 32 sector TLD locations (two badges at each location) was 4.1 mR/standard month with a range of 1.4 to 8.7 mR/standard month. The highest quarterly average reading for any single location was obtained at location NW-29/61. This value was 7.1 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 3.6 mR/standard month with a range of 1.7 to 5.9 mR/standard month. The average annual reading for these locations was 5.5 mR/standard month with a range from 4.3 to 6.8 mR/standard month. The control location showed a quarterly average of 3.1 mR/standard month with a range of 2.5 to 3.8 mR/standard month. Its annual reading was 5.1 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 3.7 mR/standard month, while Station C-1/2 and C-5/6 had a quarterly average of 2.9 mR/standard month with a range of 1.5 to 6.8 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/m³ to a high of 0.75 pCi/m³.

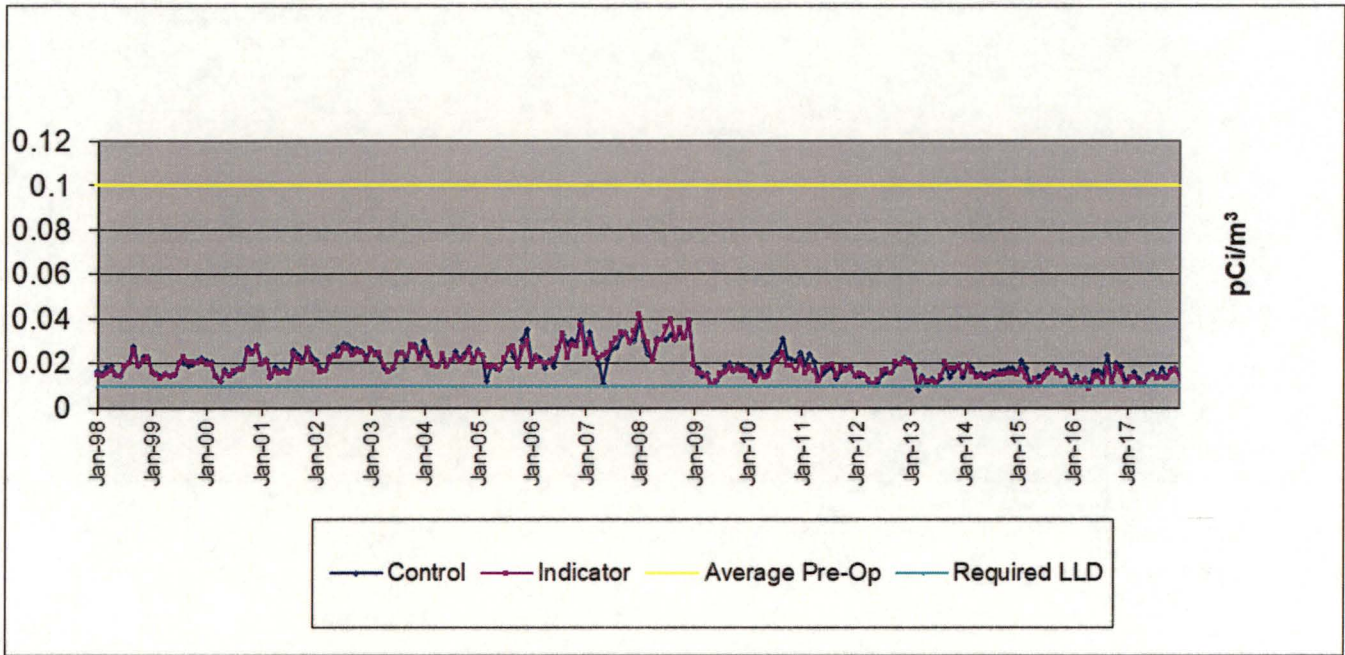


Figure 4-2 Historical Gross Beta in Air Particulates

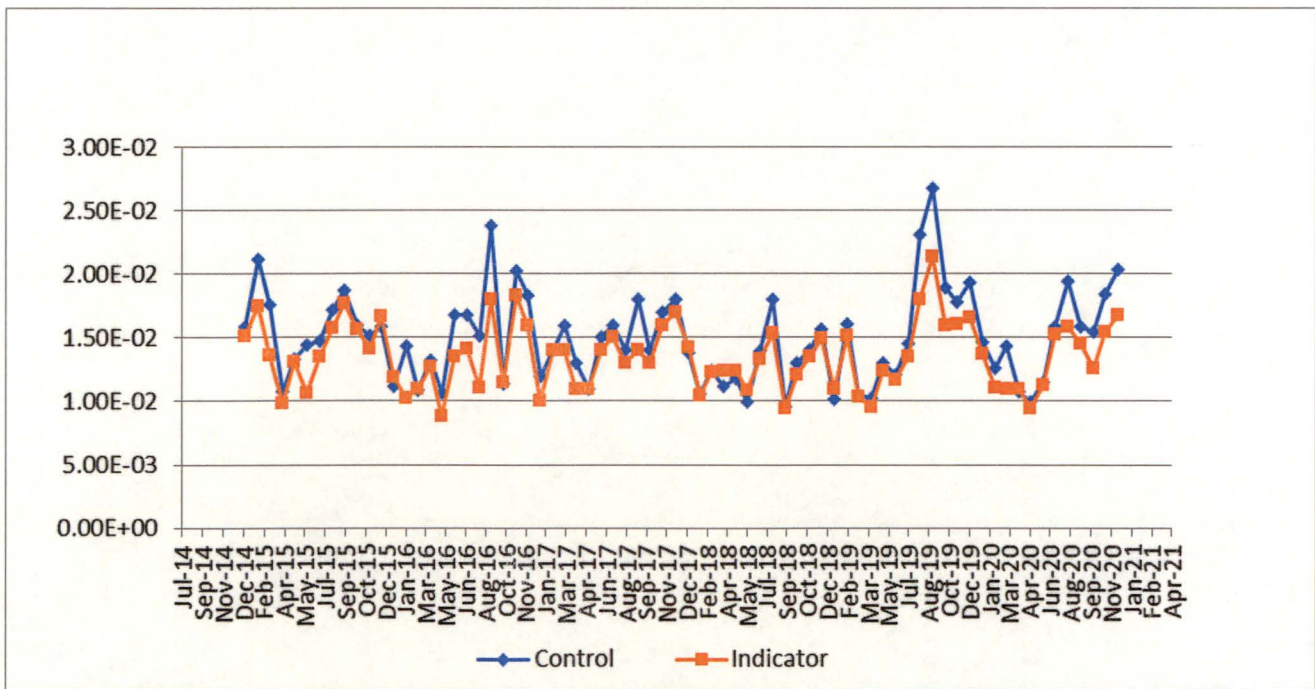


Figure 4-3 2020 Gross Beta in Air Particulates (pCi/m³)

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 not due to be collected during the reporting period.

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 2020. 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 2020 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 Th-232, were detected in some samples. No plant related isotopes were identified in any vegetation sample during 2020.

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 2858 pCi/liter and a range of 1390 to 3960 pCi/liter, see Figure 4-4. No river water samples were collected during the pre-operational period.

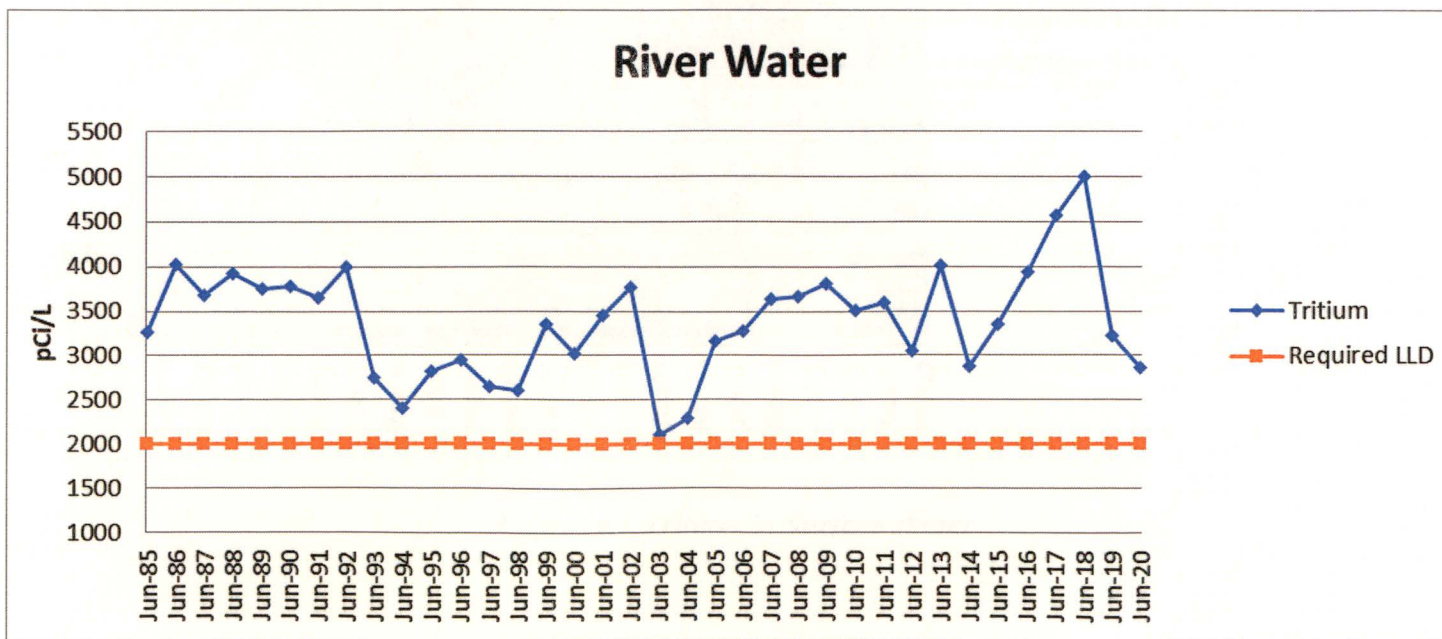


Figure 4-4 Tritium in River water

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. Tritium was detected in 2 out of 4 samples at the control location. The average level of tritium at the control station was 778 pCi/L with a range of 719 to 837 pCi/L. The average level of tritium activity at the indicator station was 2793 pCi/L with a range of 2030 to 4030 pCi/L.

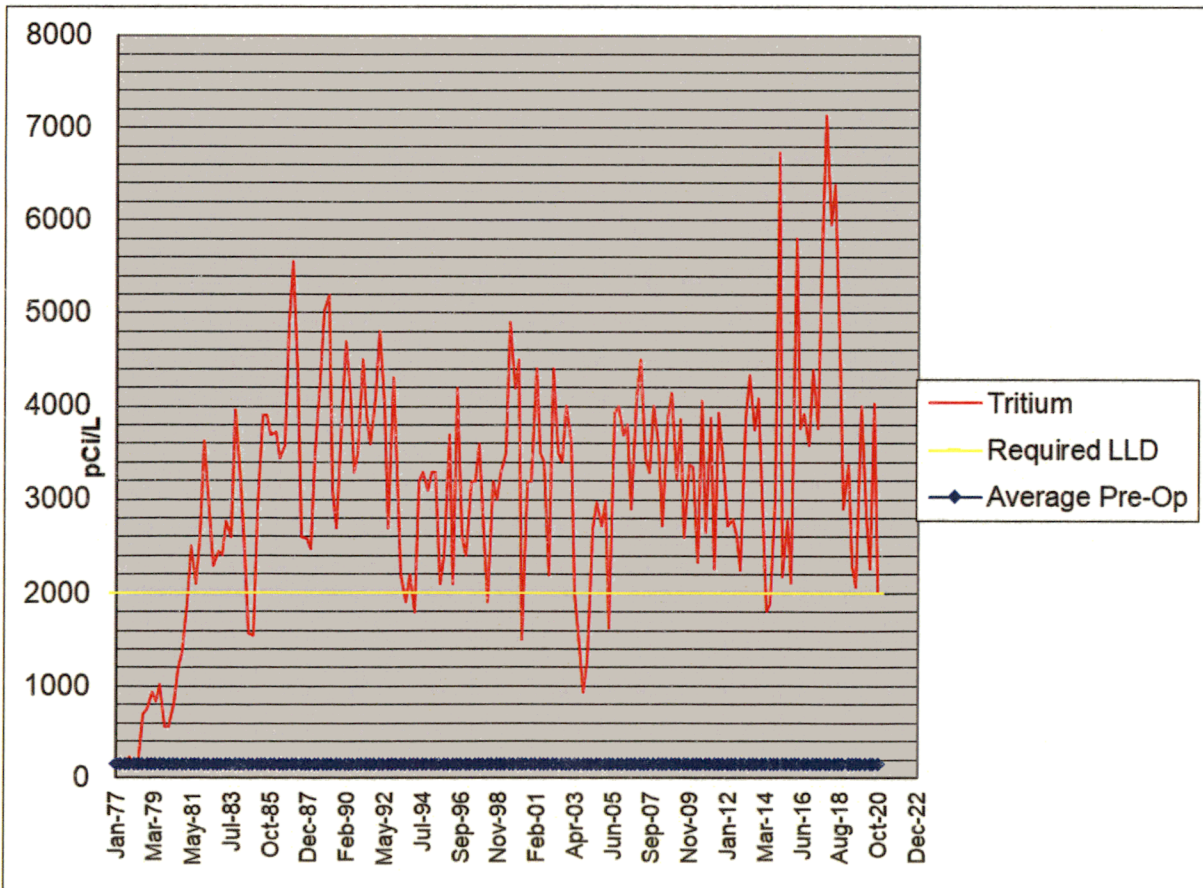


Figure 4.5 Tritium in Surface Water

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.

No plant related isotopes were detected in 2020. 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 2020. 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.

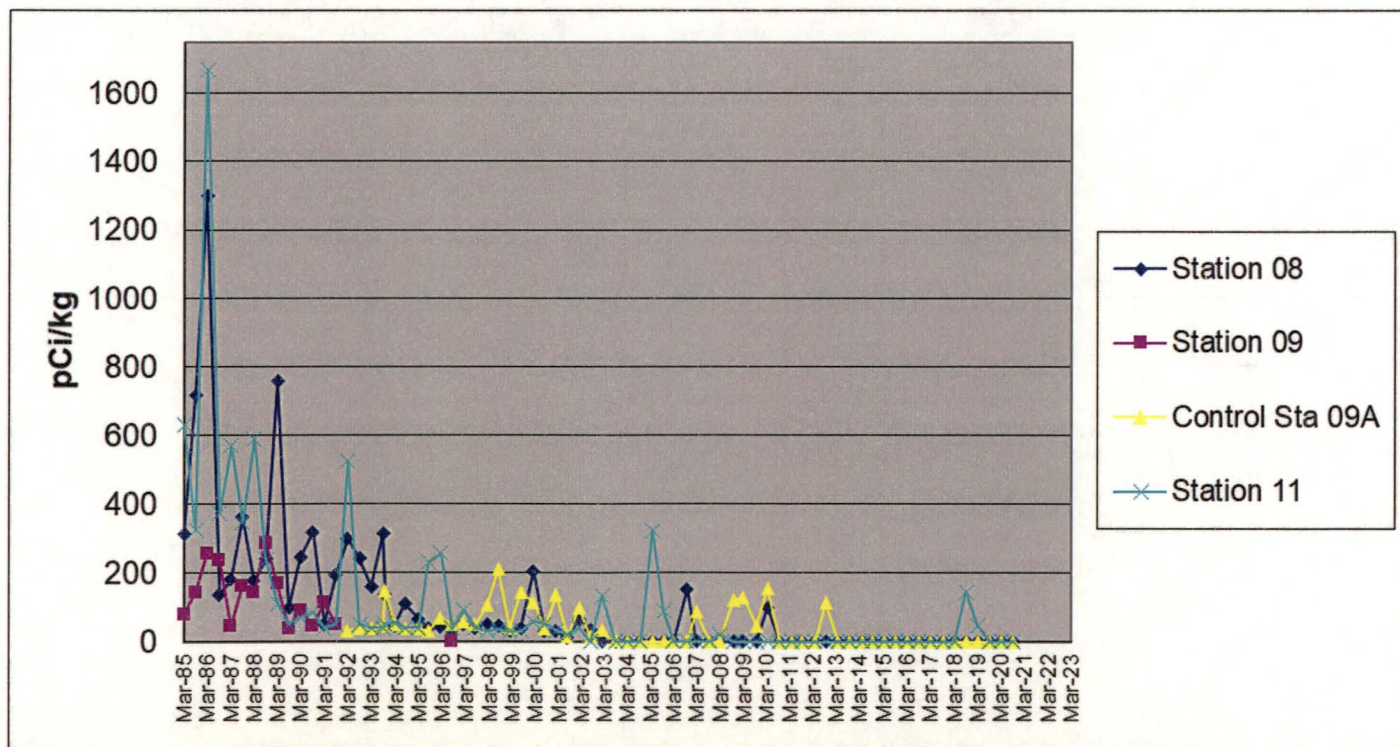


Figure 4-6 Cs-137 in Sediment/Silt

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 2020 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 2020 – North Anna

Location	Description	Date of Sampling	Reason(s) for Loss/Exception
14B,15,16,23,26	Vegetation	01/14/20	Seasonal unavailability
14B,15,16,23,26	Vegetation	02/11/20	Seasonal unavailability
14B,15,16,23,26	Vegetation	03/10/20	Seasonal unavailability
14B,15,16,23,26	Vegetation	04/14/20	Seasonal unavailability
14B,15,16,23,26	Vegetation	11/10/20	Seasonal unavailability
14B,15,16,23,26	Vegetation	12/09/20	Seasonal unavailability
WSW-23	TLD	09/30/20	TLD was collected and shipped to vendor, no results reported.
NW-61	TLD	12/29/20	TLD was collected and shipped to vendor, no results reported.

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 2020

LAND USE CENSUS
North Anna Power Station
Louisa County, Virginia

January 1 to December 31, 2020

<i>Direction</i>	<i>Distance (miles)</i>					
	<i>Nearest Site Boundary</i>	<i>Nearest Resident</i>	<i>Nearest Garden (> 50m²)</i>	<i>Nearest Meat Animal</i>	<i>Nearest Milch Cow</i>	<i>Nearest Milch Goat</i>
<i>N</i>	0.87	1.3	2.75	4.03	<i>NONE</i>	<i>NONE</i>
<i>NNE</i>	0.85	0.9	3.25	1.6	<i>NONE</i>	<i>NONE</i>
<i>NE</i>	0.82	0.9	1.6	1.6	<i>NONE</i>	<i>NONE</i>
<i>ENE</i>	0.81	2.37	2.4	2.49	<i>NONE</i>	<i>NONE</i>
<i>E</i>	0.83	1.25	1.75	3.5	<i>NONE</i>	<i>NONE</i>
<i>ESE</i>	0.85	1.7	1.7	<i>NONE</i>	<i>NONE</i>	<i>NONE</i>
<i>SE</i>	0.88	1.4	1.4	1.4	<i>NONE</i>	<i>NONE</i>
<i>SSE</i>	0.91	1.0	2.66	1.6	<i>NONE</i>	<i>NONE</i>
<i>S</i>	0.94	1.03	1.48	2.0	<i>NONE</i>	<i>NONE</i>
<i>SSW</i>	1.01	1.27	2.00	2.0	<i>NONE</i>	<i>NONE</i>
<i>SW</i>	1.06	1.65	3.96	<i>NONE</i>	<i>NONE</i>	<i>NONE</i>
<i>WSW</i>	1.09	1.62	1.77	<i>NONE</i>	<i>NONE</i>	<i>NONE</i>
<i>W</i>	1.06	1.5	1.93	<i>NONE</i>	<i>NONE</i>	<i>NONE</i>
<i>WNW</i>	1.02	1.1	2.67	4.98	<i>NONE</i>	<i>NONE</i>
<i>NW</i>	0.97	0.98	1.09	<i>NONE</i>	<i>NONE</i>	<i>NONE</i>
<i>NNW</i>	0.90	1.0	1.33	2.3	<i>NONE</i>	<i>NONE</i>

2019 to 2020 Land Use Census Changes

		2019 Distance	2020 Distance
Nearest Resident	Direction NONE		
Site Boundary Garden	NONE		
	NNE	1.66	3.25
	ESE	1.71	1.70
	S	1.49	1.48
	SSE	1.00	2.66
	SSW	2.37	2.00
	SW	1.65	3.96
Meat Animal	NONE		
Milch Cow	NONE		
Milch Goat	NONE		

APPENDIX B: SUMMARY OF INTERLABORATORY COMPARISONS

YEAR 2020

Summary of Results – Inter-laboratory Comparison Program (ICP)

The TBE Laboratory analyzed Performance Evaluation (PE) samples of air particulate (AP), 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 $\pm 20\%$ of the reference value
- Acceptable with Warning (flag = "W") - result falls in the $\pm 20\%$ to $\pm 30\%$ 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, 126 out of 133 analyses performed met the specified acceptance criteria. Seven 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 MAPEP February 2020 AP U-233/234 and U-238 results were evaluated as *Not Acceptable*. The reported value for U-233/234 was 0.0416 ± 0.0102 Bq/sample and the known result was 0.075 Bq/sample (acceptance range 0.053 - 0.098). The reported value for U-238 was 0.0388 ± 0.00991 Bq/sample and the

known result was 0.078 Bq/sample (acceptance range 0.055 - 0.101). This sample was run as the workgroup duplicate and had RPD's of 10.4% (U-234) and 11.7% (U-238). After the known results were obtained, the sample was relogged. The filter was completely digested with tracer added originally; the R1 results were almost identical. It was concluded that the recorded tracer amount was actually double, causing the results to be skewed. Lab worksheets have been modified to verify actual tracer amount vs. LIMS data. TBE changed vendors for this cross-check to ERA MRAD during the 2nd half of 2020. Results were acceptable at 97.8% for U-234 and 106% for U-238. (NCR 20-13)

2. The Analytics September 2020 milk Sr-89 result was evaluated as *Not Acceptable*. The reported value was 62.8 pCi/L and the known result was 95.4 (66%). All QC data was reviewed and there were no anomalies. This was the first failure for milk Sr-89 since 2013 and there have only been 3 upper/lower boundary warnings since that time. It is believed that there may have been some loss during the sample prep (ashing). The December 2020 result was at 92% of the known. (NCR 20-19)
3. The ERA October 2020 water I-131 result was evaluated as *Not Acceptable*. The reported value was 22.9 pCi/L and the known result was 28.2 (acceptance range 23.5 - 33.1). The reported result was 81% of the known, which passes TBE QC criteria. This was the first failure for water I-131. (NCR 20-17)
4. The ERA October 2020 water Gross Alpha and Gross Beta results were evaluated as *Not Acceptable*. The reported/acceptable values and ranges are as follows:

	<u>Reported</u>	<u>Known</u>	<u>Range</u>
Gross Alpha	40.0	26.2	13.3 - 34.7
Gross Beta	47.5	69.1	48.0 - 76.0

All QC data was reviewed with no anomalies and a cause for failure could not be determined. This was the first failure for water Gross Beta. A Quick Response follow-up cross-check was analyzed as soon as possible with acceptable results at 96.8% for Gross Alpha and 102% for Gross Beta. (NCR 20-18)

5. The MAPEP August 2020 soil Ni-63 result was evaluated as *Not Acceptable*. The reported value was 438 ± 21.1 Bq/kg and the known result was 980 Bq/kg (acceptance range 686 - 1274). It is believed that some Ni-63 loss may have occurred during the sample prep. This investigation is still on-going at this time. (NCR 20-20)

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 Value	Known Value ^(a)	Ratio of TBE to Known Result	Evaluation ^(b)
September 2020	E13247	Milk	Sr-89	pCi/L	62.8	95.4	0.66	N ⁽¹⁾
			Sr-90	pCi/L	12.0	12.8	0.94	A
	E13248	Milk	Ce-141	pCi/L	156	150	1.04	A
			Co-58	pCi/L	172	180	0.96	A
			Co-60	pCi/L	369	379	0.97	A
			Cr-51	pCi/L	372	372	1.00	A
			Cs-134	pCi/L	171	200	0.85	A
			Cs-137	pCi/L	241	250	0.96	A
			Fe-59	pCi/L	217	200	1.08	A
			I-131	pCi/L	84.6	95.0	0.89	A
			Mn-54	pCi/L	175	180	0.97	A
			Zn-65	pCi/L	252	270	0.93	A
				E13249	Charcoal	I-131	pCi	70.2
	E13250	AP	Ce-141	pCi	101	101	1.00	A
			Co-58	pCi	111	120	0.92	A
			Co-60	pCi	249	254	0.98	A
			Cr-51	pCi	287	249	1.15	A
			Cs-134	pCi	114	134	0.85	A
			Cs-137	pCi	159	168	0.95	A
			Fe-59	pCi	127	134	0.95	A
			Mn-54	pCi	114	121	0.94	A
			Zn-65	pCi	168	181	0.93	A
	E13251	Soil	Ce-141	pCi/g	0.241	0.191	1.26	W
			Co-58	pCi/g	0.211	0.228	0.93	A
			Co-60	pCi/g	0.466	0.481	0.97	A
			Cr-51	pCi/g	0.450	0.472	0.95	A
			Cs-134	pCi/g	0.273	0.254	1.07	A
			Cs-137	pCi/g	0.370	0.390	0.95	A
			Fe-59	pCi/g	0.233	0.254	0.92	A
			Mn-54	pCi/g	0.217	0.229	0.95	A
Zn-65	pCi/g	0.368	0.343	1.07	A			
	E13252	AP	Sr-89	pCi	79.9	100.0	0.80	A
			Sr-90	pCi	12.1	13.4	0.90	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 20-19

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Value	Known Value ^(a)	Ratio of TBE to Known Result	Evaluation ^(b)
December 2020	E13254	Milk	Sr-89	pCi/L	82.2	89.7	0.92	A
			Sr-90	pCi/L	12.4	13.0	0.96	A
	E13255	Milk	Ce-141	pCi/L	91.1	100	0.91	A
			Co-58	pCi/L	77.5	84.3	0.92	A
			Co-60	pCi/L	147	152	0.97	A
			Cr-51	pCi/L	259	253	1.02	A
			Cs-134	pCi/L	97.1	108	0.90	A
			Cs-137	pCi/L	117	127	0.92	A
			Fe-59	pCi/L	114	112	1.02	A
			I-131	pCi/L	84.3	91.9	0.92	A
			Mn-54	pCi/L	137	143	0.96	A
			Zn-65	pCi/L	175	190	0.92	A
	E13256	Charcoal	I-131	pCi	70.2	78.2	0.90	A
	E13257A	AP	Ce-141	pCi	67.4	74.6	0.90	A
			Co-58	pCi	57.9	62.9	0.92	A
			Co-60	pCi	108	113	0.95	A
			Cr-51	pCi	162	189	0.86	A
			Cs-134	pCi	68.1	80.4	0.85	A
			Cs-137	pCi	82.4	95.0	0.87	A
			Fe-59	pCi	80.5	83.7	0.96	A
			Mn-54	pCi	102	107	0.95	A
	Zn-65	pCi	115	142	0.81	A		
	E13258	Soil	Ce-141	pCi/g	0.167	0.170	0.98	A
			Co-58	pCi/g	0.125	0.143	0.87	A
			Co-60	pCi/g	0.245	0.257	0.95	A
			Cr-51	pCi/g	0.393	0.429	0.92	A
			Cs-134	pCi/g	0.147	0.183	0.80	A
			Cs-137	pCi/g	0.260	0.288	0.90	A
			Fe-59	pCi/g	0.199	0.190	1.05	A
			Mn-54	pCi/g	0.229	0.243	0.94	A
			Zn-65	pCi/g	0.320	0.322	0.99	A
	E13259	AP	Sr-89	pCi	85.0	78.6	1.08	A
			Sr-90	pCi	13.1	11.4	1.15	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

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Value	Known Value ^(a)	Acceptance Range	Evaluation ^(b)
February 2020	20-GrF42	AP	Gross Alpha	Bq/sample	0.676	1.24	0.37 - 2.11	A
			Gross Beta	Bq/sample	2.03	2.00	1.00 - 3.00	A
	20-MaS42	Soil	Ni-63	Bq/kg	0.01		(1)	A
			Sr-90	Bq/kg	348	340	238 - 442	A
	20-MaW42	Water	Ni-63	Bq/L	11.6	11.1	7.8 - 14.4	A
			Pu-238	Bq/L	0.926	0.94	0.66 - 1.22	A
			Pu-239/240	Bq/L	0.712	0.737	0.516 - 0.958	A
	20-RdF42	AP	U-234/233	Bq/sample	0.0416	0.075	0.053 - 0.098	N ⁽⁵⁾
			U-238	Bq/sample	0.0388	0.078	0.055 - 0.101	N ⁽³⁾
	20-RdV42	Vegetation	Cs-134	Bq/sample	3.23	3.82	2.67 - 4.97	A
			Cs-137	Bq/sample	2.64	2.77	1.94 - 3.60	A
			Co-57	Bq/sample	0.0281		(1)	A
			Co-60	Bq/sample	2.62	2.79	1.95 - 3.63	A
			Mn-54	Bq/sample	4.3	4.58	3.21 - 5.95	A
Sr-90			Bq/sample	0.396	0.492	0.344 - 0.640	A	
20-RdV42	Vegetation	Zn-65	Bq/sample	3.93	3.79	2.65 - 4.93	A	
August 2020	20-GrF43	AP	Gross Alpha	Bq/sample	0.267	0.528	0.158 - 0.989	A
			Gross Beta	Bq/sample	0.939	0.915	0.458 - 1.373	A
	20-MaS43	Soil	Ni-63	Bq/kg	438	980	686 - 1274	N ⁽⁴⁾
			Tc-99	Bq/kg	1.11		(1)	A
	20-MaW43	Water	Ni-63	Bq/L	0.175		(1)	A
			Tc-99	Bq/L	8.8	9.4	6.6 - 12.2	A
	20-RdV43	Vegetation	Cs-134	Bq/sample	3.635	4.94	3.46 - 6.42	W
			Cs-137	Bq/sample	0.0341		(1)	A
			Co-57	Bq/sample	5.855	6.67	4.67 - 8.67	W
			Co-60	Bq/sample	3.122	4.13	2.89 - 5.37	W
			Mn-54	Bq/sample	4.524	5.84	4.09 - 7.59	A
			Sr-90	Bq/sample	1.01	1.39	0.97 - 1.81	W
	20-RdV43	Vegetation	Zn-65	Bq/sample	4.706	6.38	4.47 - 8.29	W

(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

(1) False positive test

(2) Sensitivity evaluation

(3) See NCR 20-13

(4) See NCR 20-20

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Value	Known Value ^(a)	Acceptance Limits	Evaluation ^(b)	
March 2020	MRAD-32	Water	Am-241	pCi/L	52.5	45.3	31.1 - 57.9	A	
			Fe-55	pCi/L	155	152	89.3 - 221	A	
			Pu-238	pCi/L	34.0	36.4	21.9 - 47.2	A	
			Pu-239	pCi/L	30.9	33.6	20.8 - 41.4	A	
April 2020	RAD-121	Water	Ba-133	pCi/L	41.8	41.8	34.0 - 46.7	A	
			Cs-134	pCi/L	42.9	46.3	37.1 - 50.9	A	
			Cs-137	pCi/L	226	234	211 - 259	A	
			Co-60	pCi/L	52.4	50.3	45.3 - 57.9	A	
			Zn-65	pCi/L	83.3	86.8	78.1 - 104	A	
			GR-A	pCi/L	20.1	23.6	11.9 - 31.6	A	
			GR-B	pCi/L	45.6	60.5	41.7 - 67.2	A	
			U-Nat	pCi/L	18.45	18.6	14.9 - 20.9	A	
			H-3	pCi/L	14200	14100	12300 - 15500	A	
			Sr-89	pCi/L	58.0	60.1	48.3 - 67.9	A	
			Sr-90	pCi/L	34.1	44.7	33.0 - 51.2	A	
I-131	pCi/L	27.4	28.9	24.1 - 33.8	A				
September 2020	MRAD-33	Soil	Sr-90	pCi/Kg	4360	4980	1550 - 7760	A	
			AP	Fe-55	pCi/Filter	189	407	149 - 649	A
				U-234	pCi/Filter	17.9	18.3	13.6 - 21.4	A
				U-238	pCi/Filter	19.1	18.1	13.7 - 21.6	A
		Water	Am-241	pCi/L	160	176	121 - 225	A	
			Fe-55	pCi/L	299	298	175 - 433	A	
			Pu-238	pCi/L	200	191	115 - 247	A	
			Pu-239	pCi/L	105	100	61.9 - 123	A	
October 2020	RAD-123	Water	Ba-133	pCi/L	37.1	37.0	29.8 - 41.6	A	
			Cs-134	pCi/L	50.6	52.7	42.5 - 58.0	A	
			Cs-137	pCi/L	131	131	118 - 146	A	
			Co-60	pCi/L	62.9	60.5	54.4 - 69.1	A	
			Zn-65	pCi/L	167	162	146 - 191	A	
			GR-A	pCi/L	40.0	26.2	13.3 - 34.7	N ⁽¹⁾	
			GR-B	pCi/L	47.5	69.1	48.0 - 76.0	N ⁽¹⁾	
			U-Nat	pCi/L	17.2	20.3	16.3 - 22.7	A	
			H-3	pCi/L	23800	23200	20,300 - 25,500	A	
			Sr-89	pCi/L	41.1	43.3	33.4 - 50.5	A	
Sr-90	pCi/L	28.5	30.2	22.0 - 35.0	A				
I-131	pCi/L	22.9	28.2	23.5 - 33.1	N ⁽²⁾				
November 2020	QR111920K	Water	GR-A	pCi/L	50.7	52.4	27.3 - 65.6	A	
			GR-B	pCi/L	24.9	24.3	15.0 - 32.3	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 20-18

(2) See NCR 20-17