VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 25, 2022

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Serial No.	22-125
S&L/SCN	R0
Docket Nos.	50-280
	50-281
	72-2
	72-55
License Nos.	DPR-32
	DPR-37
	SNM-2501

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
2021 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

Surry Units 1 and 2 Technical Specification 6.6.B.2 requires the submittal of an Annual Radiological Environmental Operating Report (AREOR) for Surry Power Station. Surry Independent Spent Fuel Storage Installation (ISFSI) Technical Specification Appendix C, Item 1.3.1 requires that the Surry ISFSI be included in the environmental monitoring for Surry Power Station. Accordingly, enclosed is the Surry Power Station AREOR for the period of January 1, 2021 through December 31, 2021, which includes environmental monitoring for the Surry ISFSI.

If you have any further questions, please contact William Terry at 757-365-2010.

Sincerely,

Johnny Henderson

Johnny Henderson
Director Safety & Licensing
Surry Power Station

Attachment

Commitments made in this letter: None

IE25
NMSS26
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cc: U. S. Nuclear Regulatory Commission Region II
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Director, Nuclear Material Safety and Safeguards
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Washington, D. C. 20555-0001

NRC Senior Resident Inspector
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Serial No. 22-125
Docket Nos.: 50-280
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ATTACHMENT 1

2021 Annual Radiological Environmental Operating Report

SURRY POWER STATION UNITS 1 AND 2
VIRGINIA ELECTRIC AND POWER COMPANY

2021 Annual Radiological Environmental Operating Report

Surry Power Station

Dominion Energy®

Dominion Energy

Surry Power Station

Radiological Environmental Monitoring Program

January 1, 2021 to December 31, 2021

Annual Radiological Environmental Operating Report

Surry Power Station

January 1, 2021 to December 31, 2021

Prepared by: _____

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Manager Radiological Protection and Chemistry

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PREFACE

This report is submitted as required by Technical Specification 6.6.B.2, Annual Radiological Environment Operating Report, for Surry, Units 1 and 2, Virginia Electric and Power Company Docket Nos. 50-280 and 50-281, and the Surry Independent Spent Fuel Storage Installation (ISFSI) Technical Specifications, Appendix C, Item 1.3.1.

1. EXECUTIVE SUMMARY

This document is a detailed report of the 2021 Surry Power Station Radiological Environmental Monitoring Program (REMP). Radioactivity levels from January 1 through December 31, 2021, in air, water, silt, shoreline sediment, milk, aquatic biota, food products and direct exposure pathways have been analyzed, evaluated, and summarized. The REMP is designed to confirm that radiological effluent releases are As Low As (is) Reasonably Achievable (ALARA), no undue environmental effects occur, and the health and safety of the public are protected. The program also detects any unexpected environmental processes that could allow radiation accumulations in the environment or food pathway chains.

Radiation and radioactivity in the environment are monitored within a 20-mile radius of the station. Surry Power Station personnel collect a variety of samples within this area. Several sampling locations for each medium are selected using available meteorological, land use, and water use data. Two types of samples are obtained. The first type, control samples, is collected from areas that are beyond the measurable influence of Surry Power Station or any other nuclear facility. These samples represent normal background radiation levels. Background radiation levels 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 contribution from station operations 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 control sample values and the pre-operational baseline to determine if changes in radioactivity levels are attributable to station operations, or natural variation, or other causes such as the Chernobyl and Fukushima Daiichi accidents that released radioactive material to the environment.

Teledyne Brown Engineering, Inc. (TBE) provides radioanalyses for this program and Mirion Technologies provides thermoluminescent dosimetry (TLD) 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 United States Nuclear Regulatory Commission (USNRC) requires that equipment used for radiological environmental monitoring must be able to detect specified minimum Lower Limits of Detection (LLDs). This ensures that analyses are as accurate as possible. The USNRC also mandates a reporting level for 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, aquatic, terrestrial and direct radiation exposure. The airborne exposure pathway includes radioactive airborne iodine and particulates. The 2021 airborne results were comparable to previous years. No station related radioactivity was detected and natural radioactivity levels remained at levels consistent with past years' results. Aquatic exposure pathway samples include well and river water, silt and shoreline sediments, crabs, fish, clams, and oysters. Naturally occurring radionuclides such as beryllium-7, potassium-40, radium-226, actinium-228, thorium-228, and thorium-232 were detected at average environmental levels. No man-made radionuclides were detected in well water. This trend is consistent throughout the operational environmental monitoring program. No man-made radionuclides were detected in river water. Silt samples indicated the presence of cesium-137 and naturally occurring radionuclides. Cesium-137 concentrations were present in indicator location samples at nominal background levels. No other man-made radionuclides were detected. These background levels are attributable to fallout from historic weapons testing and nuclear accidents such as Chernobyl. Naturally occurring beryllium-7, potassium-40, radium-226, actinium-228, thorium-228, and thorium-232 were detected at average environmental levels. Shoreline sediment, which may provide a direct exposure pathway, contained no station related radionuclides. Naturally occurring radionuclides potassium-40, thorium-228, and thorium-232 were detected at average environmental levels. The terrestrial exposure pathway includes milk and food products. Iodine-131 was not detected in any 2021 milk samples and has not been detected in milk prior to or since the 1986 Chernobyl accident. Strontium-90 was detected in milk and this activity is attributable to past atmospheric nuclear weapons testing. No other man-made radionuclides were detected in milk samples. Consistent with historical data, naturally occurring potassium-40 was detected in milk. No man-made radionuclides were detected in food product samples. Naturally occurring potassium-40 was detected in food product samples. The direct exposure pathway measures environmental radiation dose using TLDs. TLD results have remained relatively constant over the years.

During 2021, as in previous years, the operation of Surry Power Station has 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 2021 was 0.038 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 sources in the environment provide approximately 50% of radiation exposure to man, while nuclear power contributes less than 0.1%. These results demonstrate compliance with federal and state regulations and demonstrate the adequacy of radioactive effluent controls at Surry Power Station.

2. PROGRAM DESCRIPTION

2.1 Introduction

This report documents the 2021 Surry Power Station Operational Radiological Environmental Monitoring Program (REMP). Dominion Energy's Surry Power Station is located on the Gravel Neck peninsula adjacent to the James River, approximately 25 miles upstream of the Chesapeake Bay. The site consists of two units, each with a pressurized water reactor (PWR) nuclear steam supply system and turbine generator furnished by Westinghouse Electric Corporation. Each unit was designed with a nominal gross electrical output of 910 megawatts electric (MWe). Unit 1 achieved commercial operation on December 22, 1972, and Unit 2 on May 1, 1973.

The United States Nuclear Regulatory Commission regulations (10CFR50.34a) require that nuclear power plants be designed, constructed, and operated to keep levels of radioactive material in effluents to unrestricted areas As Low As (is) Reasonably Achievable. To ensure these criteria are met, the operating license for Surry Power Station includes Technical Specifications that address the release of radioactive effluents. In-plant monitoring is used to ensure that these 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 station environs is also included in Surry Power Station Technical Specifications.

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

Occasionally, samples of environmental media may show the presence of man-made radionuclides. As a method of referencing the measured radionuclide concentrations in the sample media to a dose consequence to man, the data is compared to the reporting level concentrations listed in the USNRC Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants", (December, 1975) and VPAP-2103S, Offsite Dose Calculation Manual (Surry). 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 REMP for 2021 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 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 2021 sampling program for Surry Power Station. All samples listed in Table 2-1 are taken at indicator locations except those labeled "control location." Dominion Energy personnel collect all samples listed in Table 2-1.

Table 2-2 summarizes the analysis program conducted by Teledyne Brown Engineering and Mirion Technologies for Surry Power Station. All samples, except for TLDs, are shipped to Teledyne Brown Engineering, located in Knoxville, TN, for analysis. The TLDs are shipped to Mirion Technologies, located in Irvine, CA, for processing.

The Surry Radiological Monitoring Locations map (Figures 1 – 5) denote sample locations for Surry Power Station. The locations are color coded to designate sample types.

Table 2-1
SURRY - 2021
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Distance Station	Distance Miles	Direction	Degrees	Collection Frequency	Remarks
Environmental	Control	(00)	-	-	-	Quarterly	Onsite (Stored in lead shield outside the protected area)
TLDs	West North West	(02)	0.2	WNW	293°	Quarterly	Site Boundary
	Surry Station Discharge	(03)	0.4	NW	321°	Quarterly	Site Boundary
	North North West	(04)	0.2	NNW	329°	Quarterly	Site Boundary
	North	(05)	0.3	N	4°	Quarterly	Site Boundary
	North North East	(06)	0.3	NNE	28°	Quarterly	Site Boundary
	North East	(07)	0.3	NE	44°	Quarterly	Site Boundary
	East North East	(08)	0.4	ENE	67°	Quarterly	Site Boundary
	East	(09)	0.3	E	89°	Quarterly	Site Boundary
	West	(10)	0.1	W	271°	Quarterly	Site Boundary
	West South West	(11)	0.4	WSW	252°	Quarterly	Site Boundary
	South West	(12)	0.3	SW	228°	Quarterly	Site Boundary
	South South West	(13)	0.3	SSW	201°	Quarterly	Site Boundary
	South	(14)	0.4	S	182°	Quarterly	Site Boundary
	South South East	(15)	0.6	SSE	157°	Quarterly	Site Boundary
	South East	(16)	0.9	SE	135°	Quarterly	Site Boundary
	Station Intake	(18)	1.6	ESE	115°	Quarterly	Site Boundary
	Hog Island Reserve	(19)	2.0	NNE	26°	Quarterly	Near Resident
	Bacon's Castle	(20)	4.5	SSW	202°	Quarterly	Apx. 5 miles
	Route 633	(21)	4.9	SW	227°	Quarterly	Apx. 5 miles
	Alliance	(22)	5.1	WSW	247°	Quarterly	Apx. 5 miles
	Surry	(23)	7.7	WSW	256°	Quarterly	Population Center
	Route 636 and 637	(24)	4.0	W	270°	Quarterly	Apx. 5 miles
	Scotland Wharf	(25)	5.0	WNW	284°	Quarterly	Apx. 5 miles
	Jamestown	(26)	6.3	NW	308°	Quarterly	Apx. 5 miles
	Colonial Parkway	(27)	3.8	NNW	333°	Quarterly	Apx. 5 miles
	Route 617 and 618	(28)	4.9	NNW	340°	Quarterly	Apx. 5 miles
	Kingsmill	(29)	4.6	N	2°	Quarterly	Apx. 5 miles
	Williamsburg	(30)	7.8	N	0°	Quarterly	Population Center
	Kingsmill North	(31)	5.5	NNE	12°	Quarterly	Apx. 5 miles
	Budweiser	(32)	5.8	NNE	27°	Quarterly	Population Center
	Water Plant	(33)	5.0	NE	46°	Quarterly	Apx. 5 miles

Table 2-1
SURRY - 2021
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance Miles	Direction	Degrees	Collection Frequency	Remarks
Environmental TLDs	BASF	(34)	5.1	ENE	70°	Quarterly	Apx. 5 miles
	Lee Hall	(35)	7.1	ENE	75°	Quarterly	Population Center
	Goose Island	(36)	5.1	E	90°	Quarterly	Apx. 5 miles
	Fort Eustis	(37)	4.9	ESE	104°	Quarterly	Apx. 5 miles
	Newport News	(38)	19.3	SE	130°	Quarterly	Population Center
	James River Bridge	(39)	17.1	SE	142°	Quarterly	Control Location
	Benn's Church	(40)	17.0	SSE	159°	Quarterly	Control Location
	Smithfield	(41)	13.4	SSE	167°	Quarterly	Control Location
	Rushmere	(42)	5.3	SSE	156°	Quarterly	Apx. 5 miles
	Route 628	(43)	5.1	S	177°	Quarterly	Apx. 5 miles
Air Charcoal and Particulate	Surry Station	(SS)	0.3	NNE	18°	Weekly	Site boundary location with highest D/Q
	Hog Island Reserve	(HIR)	2.0	NNE	26°	Weekly	
	Bacon's Castle	(BC)	4.5	SSW	202°	Weekly	
	Alliance	(ALL)	5.1	WSW	247°	Weekly	
	Colonial Parkway	(CP)	3.8	NNW	333°	Weekly	
	BASF	(BASF)	5.1	ENE	70°	Weekly	
	Fort Eustis	(FE)	4.9	ESE	104°	Weekly	
	Newport News	(NN)	19.3	SE	130°	Weekly	Control Location
River Water	Surry Station Discharge	(SD)	0.4	NW	323°	Monthly	
	Scotland Wharf	(SW)	4.9	WNW	284°	Monthly	Control Location
Well Water	Surry Station	(SS)	0.1	SW	227°	Quarterly	Onsite
	Hog Island Reserve	(HIR)	2.0	NNE	28°	Quarterly	
	Construction Site	(CS)	0.3	E	87°	Quarterly	
Shoreline Sediment	Hog Island Reserve	(HIR)	0.6	N	7°	Semi-Annually	
	Chickahominy River	(CHIC)	11.2	WNW	301°	Semi-Annually	Control Location
Silt	Chickahominy River	(CHIC)	11.2	WNW	300°	Semi-Annually	Control Location
	Surry Station Discharge	(SD)	0.5	NW	315°	Semi-Annually	
	Surry Station Intake	(SI)	1.8	ESE	112°	Semi-Annually	

Table 2-1
SURRY - 2021
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance Miles	Direction	Degrees	Collection Frequency	Remarks
Milk	Colonial Parkway	(CP)	3.7	NNW	336°	Monthly	
	Beachy Farm	(BF)	12.0	SW	220°	Monthly	Control Location
	Epps	(EPPS)	4.8	SSW	200°	Monthly	
Oysters	Point of Shoals	(POS)	6.4	SSE	157°	Semi-Annually	
	Mulberry Point	(MP)	4.9	ESE	124°	Semi-Annually	
	Swash Hole Island	(SHI)	6.8	SE	128°	Semi-Annually	
Clams	Chickahominy River	(CHIC)	11.2	WNW	300°	Semi-Annually	Control Location
	Surry Station Discharge	(SD)	1.3	NNW	341°	Semi-Annually	
	Jamestown Island	(JI)	3.9	NW	324°	Semi-Annually	
Fish	Surry Station Discharge	(SD)	1.3	NNW	341°	Semi-Annually	
Crabs	Surry Station Discharge	(SD)	1.3	NNW	341°	Annually	
Crops (Corn, Peanuts, Soybeans)	Brock's Farm	(BROCK)	3.8	S	183°	Annually	
	Slade's Farm	(SLADE)	3.2	S	179°	Annually	

Table 2-2
SURRY - 2021
SAMPLE ANALYSIS PROGRAM

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD*	REPORT UNITS
Thermoluminescent Dosimetry (TLD)	Quarterly	Gamma Dose	6	mR/Std. Quarter
Air Iodine	Weekly	I-131	0.07	pCi/m^3
Air Particulate	Weekly	Gross Beta	0.01	pCi/m^3
	Quarterly (a)	Gamma Isotopic		pCi/m^3
		Cs-134	0.05	
		Cs-137	0.06	
River Water	Quarterly Composite of monthly sample	Tritium (H-3)	2000	pCi/L
	Monthly	I-131	10	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	
Well Water	Quarterly	Tritium (H-3)	2000	pCi/L
		I-131	1	
		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	

Footnotes located at end of table.

Table 2-2
SURRY - 2021
SAMPLE ANALYSIS PROGRAM
Pg. 2 of 3

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD*	REPORT UNITS
Shoreline Sediment	Semi-Annually	Gamma Isotopic		pCi/kg - dry
		Cs-134	150	
		Cs-137	180	
Silt	Semi-Annually	Gamma Isotopic		pCi/kg - dry
		Cs-134	150	
		Cs-137	180	
Milk	Monthly	I-131	1	pCi/L
		Gamma Isotopic		pCi/L
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
	Quarterly Composite of CP monthly sample	Sr-89	NA	pCi/L
		Sr-90	NA	
Oysters	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	
Clams	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	
Crabs	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	

Footnotes located at end of table.

Table 2-2
SURRY - 2021
SAMPLE ANALYSIS PROGRAM
Pg. 3 of 3

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD*	REPORT UNITS
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	Annually	Gamma Isotopic		pCi/kg - wet
		I-131	60	
		Cs-134	60	
		Cs-137	80	

Note: This table is not a complete listing of nuclides that can be detected and reported. Other peaks that are measurable and identifiable, together with the above nuclides, are also identified and reported.

* LLD is the Lower Limit of Detection as defined and required in the USNRC Branch Technical Position on an Acceptable Radiological Environmental Monitoring Program, Revision 1, November 1979.

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

(a) Quarterly composites of each location's weekly air particulate samples are analyzed for gamma emitters. NA None assigned.

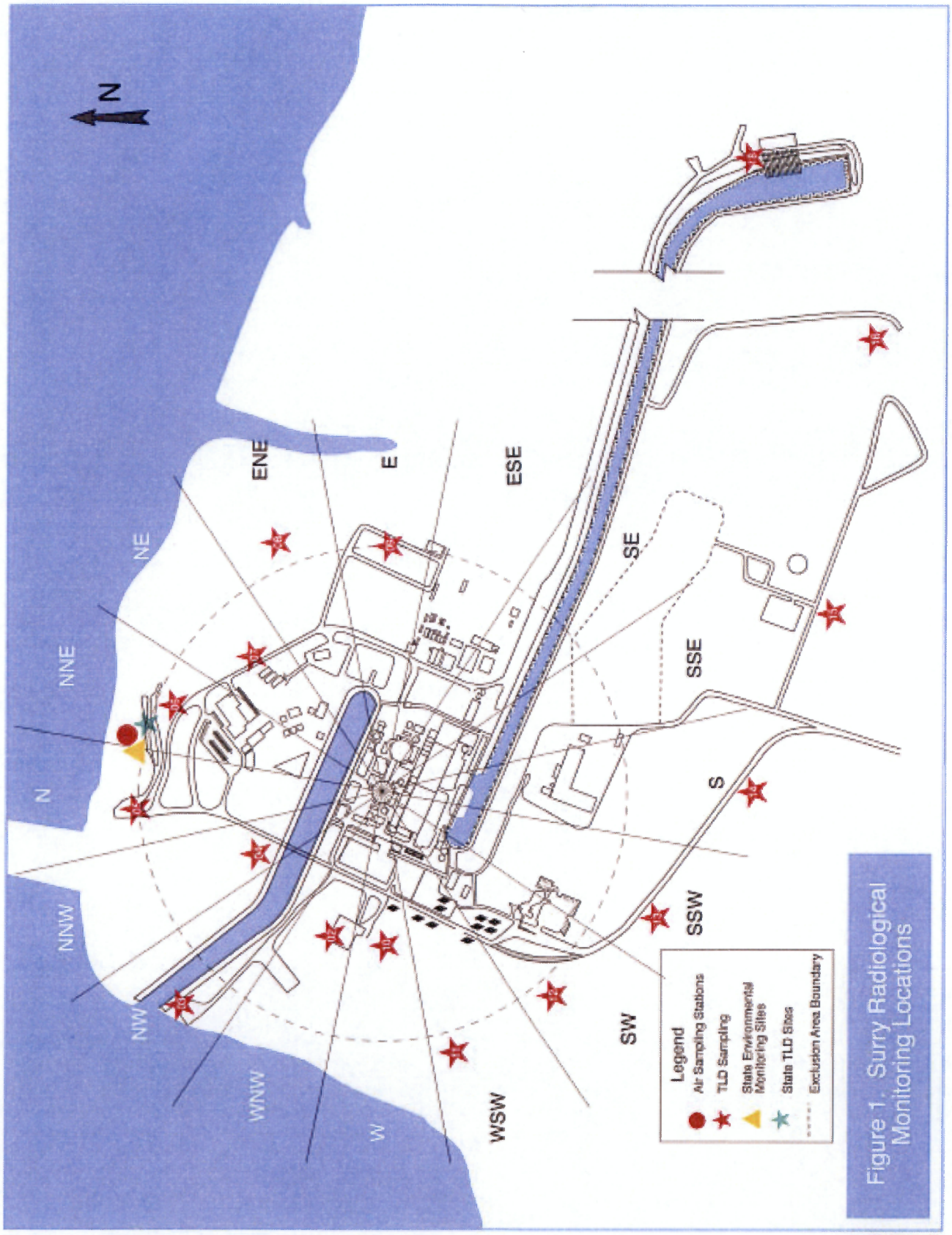

Figure 1. Surry Radiological Monitoring Locations

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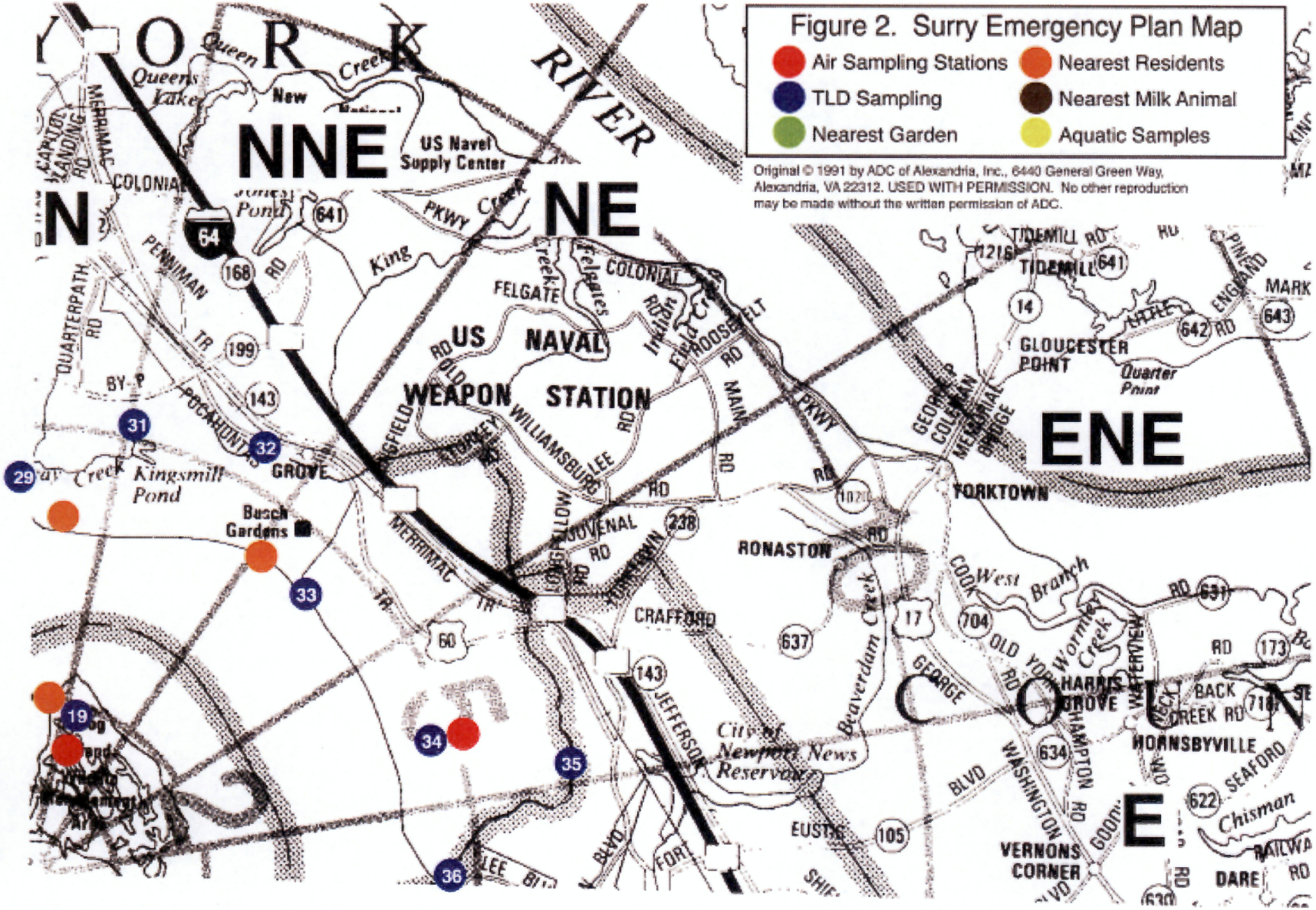
Figure 2. Surry Emergency Plan Map
Air Sampling Stations
Nearest Residents
TLD Sampling
Nearest Milk Animal
Nearest Garden
Aquatic Samples
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Queens Lake
New Kingsmill Pond
Kingsmill Pond
Busch Gardens
GROVE
CRAFFORD
RONASTON
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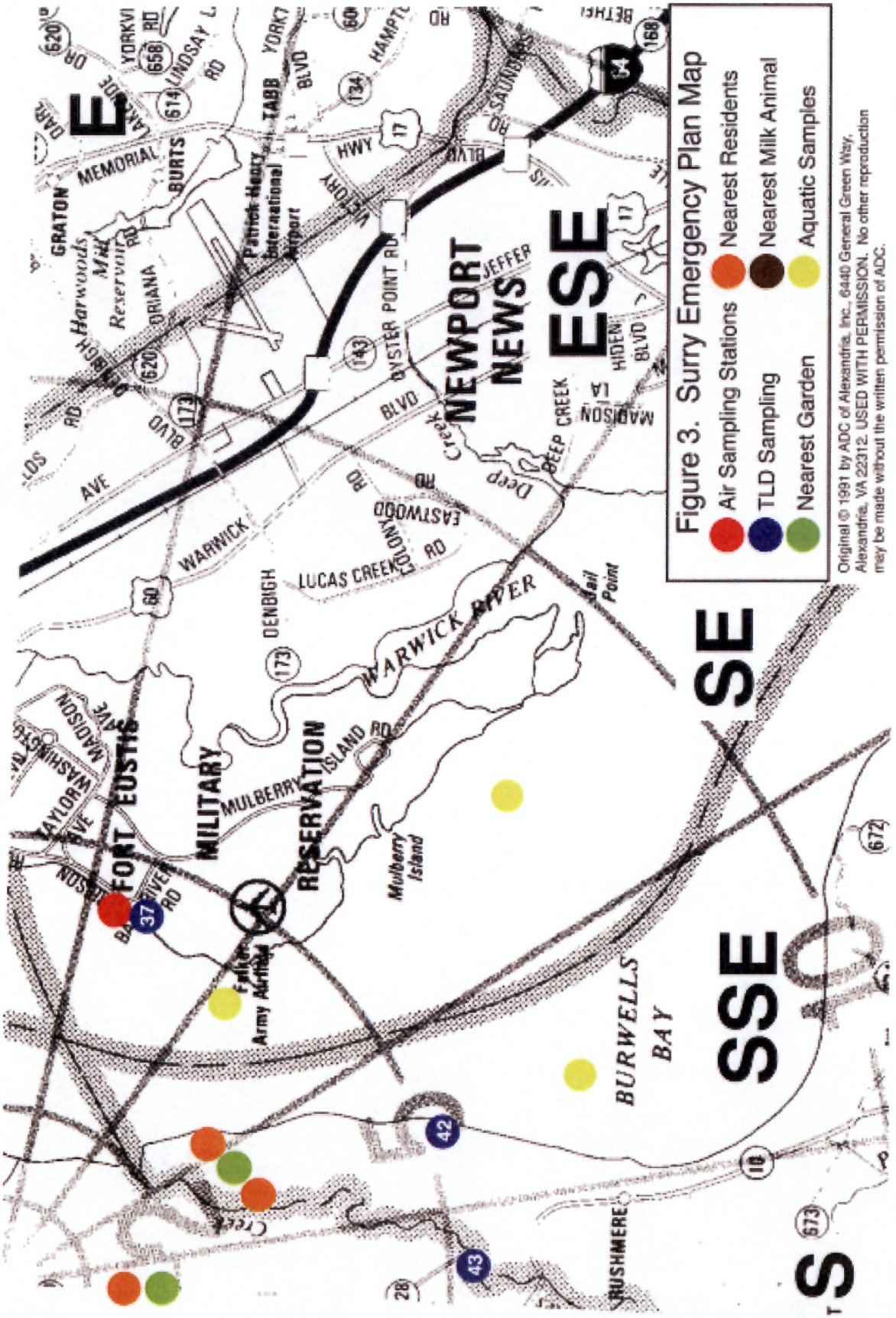
Figure 3. Surry Emergency Plan Map
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TLD Sampling
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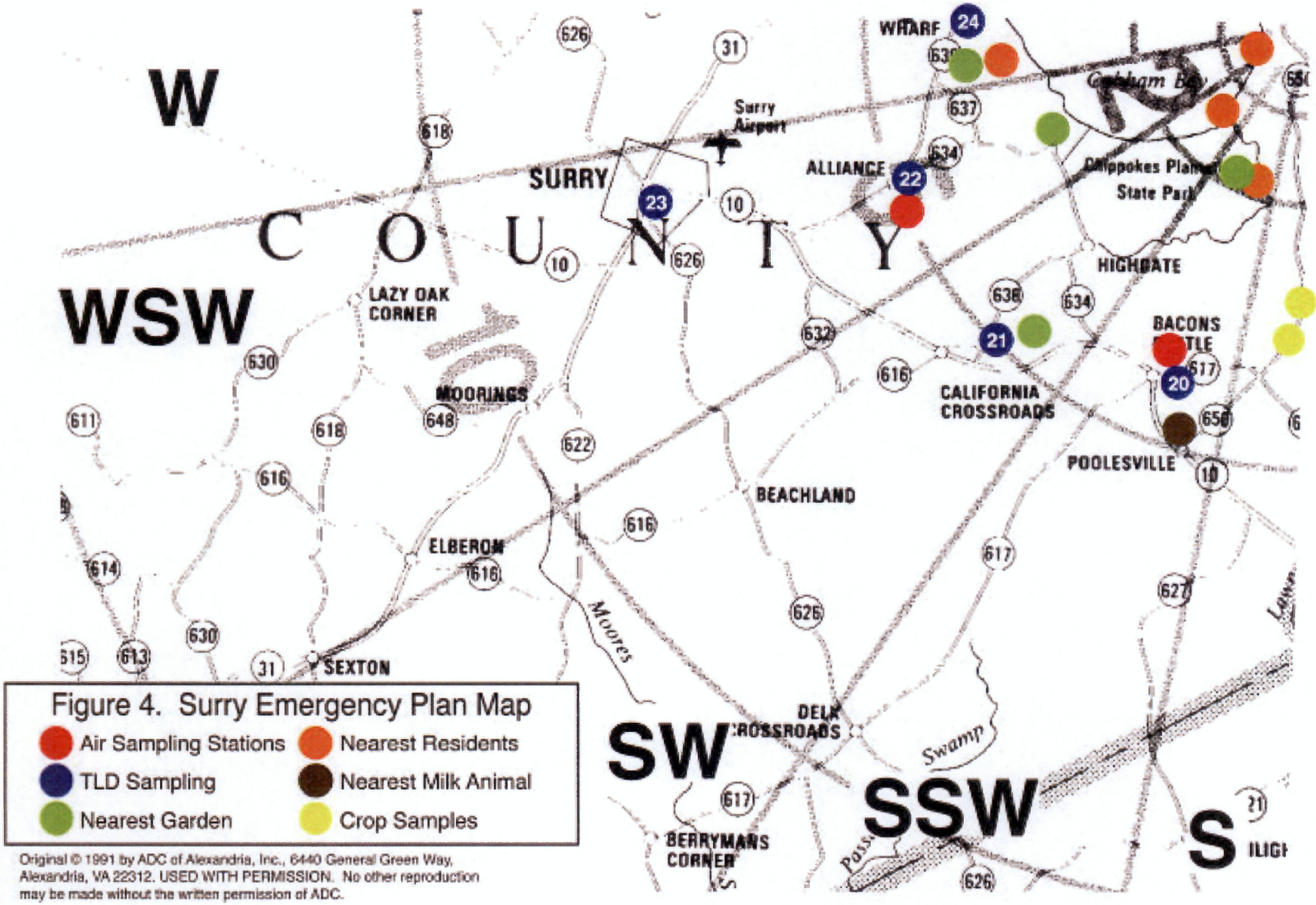

Figure 4. Surry Emergency Plan Map

- Air Sampling Stations
- Nearest Residents
- TLD Sampling
- Nearest Milk Animal
- Nearest Garden
- Crop Samples

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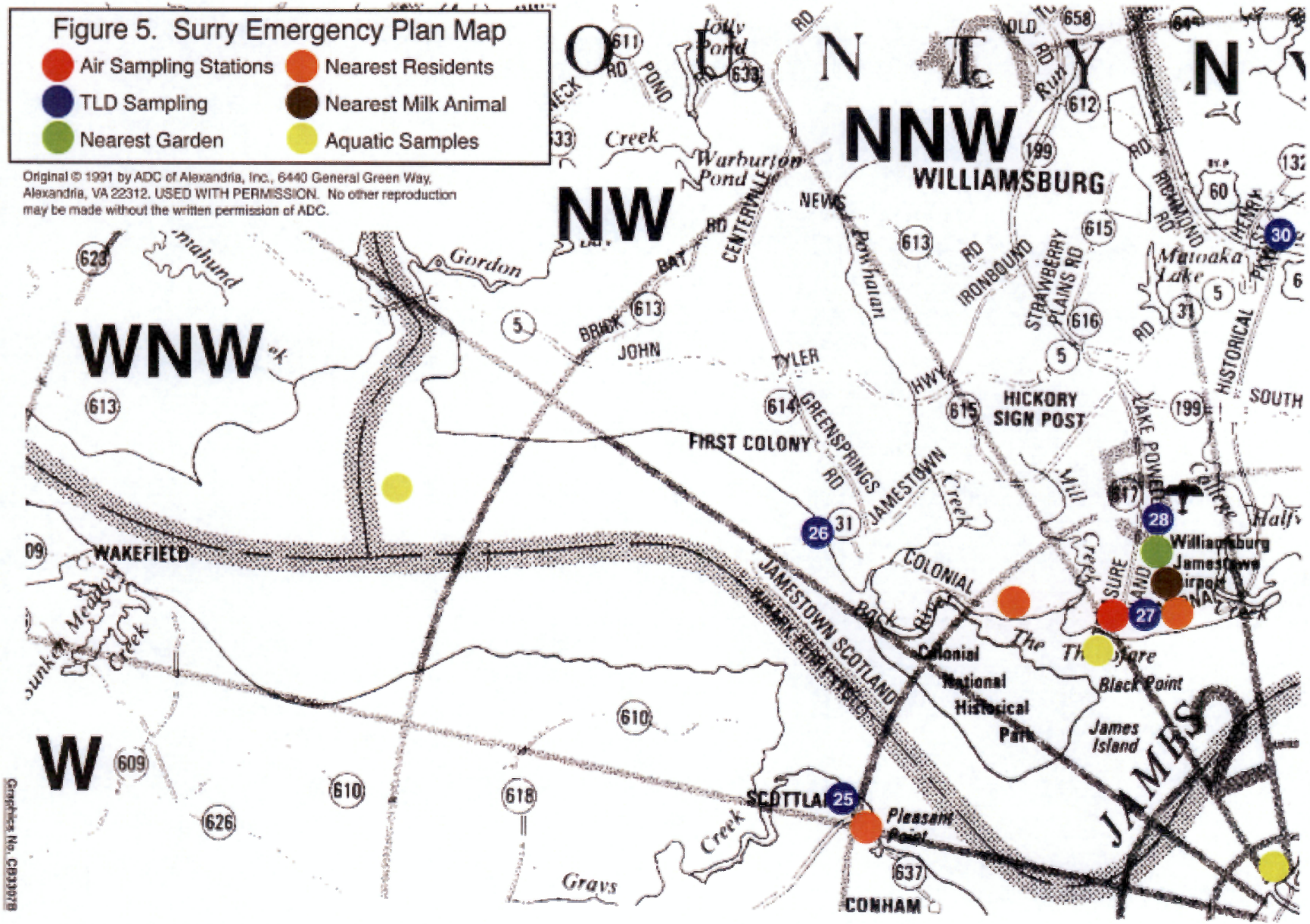
Figure 5. Surry Emergency Plan Map
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Mill Creek
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Powhatan
Centerville
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3. ANALYTICAL RESULTS

3.1 Summary of Results

In accordance with the Surry 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", Revision 1, November 1979. A more detailed analysis of the data is provided in Section 4.

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
SURRY NUCLEAR POWER STATION
Docket No. 50-280-281

Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD	Indicator Locations	Location with Highest Mean			Control Locations	Number of Nonroutine Reported Measurements
				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Direct Radiation *TLD (mR/Std. Quarter)*	**Gamma Dose**	164	2	**16.5 (152/152) (10.9-23.4)**	**STA-9**	**0.3 mi E**	**22.5 (4/4) (20.6-23.4)**	**17.2 (12/12) (14.0-21.8)**	0
Air Particulate *(1e^{-3} pCi/m^3)*	**Gross Beta**	416	10	**16.2 (364/364) (4.65-41.9)**	**FE**	**4.9 mi. ESE**	**21.0 (52/52) (8.95-41.9)**	**15.7 (52/52) (6.74-27.4)**	0
	GAMMA	32							
	Cs-134	32	50	<LLD	N/A		<LLD	<LLD	0
	Cs-137	32	60	<LLD	N/A		<LLD	<LLD	0
	Be-7	32		**139 (28/28) (86.9-212)**	**FE**	**4.9 mi. ESE**	**186 (4/4) (168-212)**	**135 (4/4) (127-144)**	0
Air Iodine *(1e^{-3} pCi/m^3)*	**I-131**	416	70	<LLD	N/A		<LLD	<LLD	0
Milk *(pCi/Liter)*	**SR-89**	4	5	<LLD	N/A		<LLD	NA	0
	SR-90	4	1	**1.76 (4/4) (1.26-2.06)**	**CP**	**3.7 mi. NNW**	**1.76 (4/4) (1.26-2.06)**	NA	0
	GAMMA	36							
	Cs-134	36	15	<LLD	N/A		<LLD	<LLD	0
	Cs-137	36	18	<LLD	N/A		<LLD	<LLD	0
	Ba-140	36	60	<LLD	N/A		<LLD	<LLD	0
	La-140	36	15	<LLD	N/A		<LLD	<LLD	0
	I-131	36	1	<LLD	N/A		<LLD	<LLD	0
	K-40	36		**1184 (24/24) (987-1484)**	**CP**	**3.7 mi. NNW**	**1186 (12/12) (1001-1306)**	**1152 (12/12) (984-1344)**	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
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Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD	Indicator Locations	Location with Highest Mean			Control Locations	Number of Nonroutine Reported Measurements
				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Food Products	**GAMMA**	3							
(pCi/kg wet)	Cs-134	3	60	<LLD	N/A		<LLD	N/A	0
	Cs-137	3	80	<LLD	N/A		<LLD	N/A	0
	I-131	3	60	<LLD	N/A		<LLD	N/A	0
	K-40	3		**9396 (3/3) (2202-19670)**	**SLADE**	**3.2 mi. S**	**19670 (1/1) (19670-19670)**	NA	0
Well Water	**H-3**	12	2000	<LLD	N/A		<LLD	N/A	0
(pCi/Liter)									
	GAMMA	12							
	Mn-54	12	15	<LLD	N/A		<LLD	N/A	0
	Co-58	12	15	<LLD	N/A		<LLD	N/A	0
	Fe-59	12	30	<LLD	N/A		<LLD	N/A	0
	Co-60	12	15	<LLD	N/A		<LLD	N/A	0
	Zn-65	12	30	<LLD	N/A		<LLD	N/A	0
	Nb-95	12	15	<LLD	N/A		<LLD	N/A	0
	Zr-95	12	30	<LLD	N/A		<LLD	N/A	0
	I-131	12	1	<LLD	N/A		<LLD	N/A	0
	Cs-134	12	15	<LLD	N/A		<LLD	N/A	0
	Cs-137	12	18	<LLD	N/A		<LLD	N/A	0
	Ba-140	12	60	<LLD	N/A		<LLD	N/A	0
	La-140	12	15	<LLD	N/A		<LLD	N/A	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SURRY NUCLEAR POWER STATION

Docket No. 50-280-281

Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD	Indicator Locations	Location with Highest Mean			Control Locations	Number of Nonroutine Reported Measurements
				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
River Water	**H-3**	8	2000	<LLD	N/A		<LLD	<LLD	0
(pCi/Liter)									
	GAMMA	24							
	Mn-54	24	15	<LLD	N/A		<LLD	<LLD	0
	Co-58	24	15	<LLD	N/A		<LLD	<LLD	0
	Fe-59	24	30	<LLD	N/A		<LLD	<LLD	0
	Co-60	24	15	<LLD	N/A		<LLD	<LLD	0
	Zn-65	24	30	<LLD	N/A		<LLD	<LLD	0
	Nb-95	24	15	<LLD	N/A		<LLD	<LLD	0
	Zr-95	24	30	<LLD	N/A		<LLD	<LLD	0
	I-131	24	10	<LLD	N/A		<LLD	<LLD	0
	Cs-134	24	15	<LLD	N/A		<LLD	<LLD	0
	Cs-137	24	18	<LLD	N/A		<LLD	<LLD	0
	Ba-140	24	60	<LLD	N/A		<LLD	<LLD	0
	La-140	24	15	<LLD	N/A		<LLD	<LLD	0
	K-40	24		**98.8 (5/12) (86.3-115)**	**SD**	**0.4 mi. NW**	**98.8 (5/12) (86.3-115)**	**74.0 (1/12) (74.0-74.0)**	0
	Th-228	24		**12.8 (1/12) (12.8-12.8)**	**SD**	**0.4 mi. NW**	**12.8 (1/12) (12.8-12.8)**	**8.24 (1/12) (8.24-8.24)**	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
SURRY NUCLEAR POWER STATION
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Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD	Indicator Locations	Location with Highest Mean			Control Locations	Number of Nonroutine Reported Measurements
				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Sediment Silt	**GAMMA**	6							
(pCi/kg dry)	CS-134	6	150	<LLD	N/A		<LLD	<LLD	0
	Cs-137	6	180	**220 (1/4) (220-220)**	**SI**	**1.8 mi. ESE**	**220 (1/2) (220-220)**	<LLD	0
	K-40	6		**15435 (4/4) (12420-18790)**	**SD**	**0.5 mi. NW**	**15605 (2/2) (12420-18790)**	**15230 (2/2) (14730-15730)**	0
	Ra-226	6		**1990 (1/4) (1990-1990)**	**CHIC**	**11.2 mi. WNW**	**3469 (1/2) (3469-3469)**	**3469 (1/2) (3469-3469)**	0
	Ac-228	6		**1234 (1/4) (1234-1234)**	**SI**	**1.8 mi. ESE**	**1234 (1/4) (1234-1234)**	<LLD	0
	Th-228	6		**1061 (4/4) (754-1245)**	**CHIC**	**11.2 mi. WNW**	**1256 (2/2) (1220-1291)**	**1256 (2/2) (1220-1291)**	0
	Th-232	6		**1119 (3/4) (1062-1170)**	**SD**	**0.5 mi. NW**	**1147 (2/2) (1124-1170)**	**1141 (2/2) (1111-1171)**	0
	BE-7	6		**1854 (2/4) (1623-2084)**	**SD**	**0.5 mi. NW**	**2084 (1/2) (2084-2084)**	<LLD	0
Shoreline Sediment	**GAMMA**	4							
(pCi/kg dry)	CS-134	4	150	<LLD	N/A		<LLD	<LLD	0
	CS-137	4	180	<LLD	N/A		<LLD	<LLD	0
	K-40	4		**5203 (2/2) (4260-6145)**	**HIR**	**0.6 mi. N**	**5203 (2/2) (4260-6145)**	**1695 (2/2) (1561-1829)**	0
	Th-228	4		**79.9 (2/2) (61.3-98.5)**	**CHIC**	**11.2 mi. WNW**	**334 (2/2) (89.8-579)**	**334 (2/2) (89.8-579)**	0
	Th-232	4		<LLD	**CHIC**	**11.2 mi. WNW**	**709 (1/2) (709-709)**	**709 (1/2) (709-709)**	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
SURRY NUCLEAR POWER STATION
Docket No. 50-280-281

Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD	Indicator Locations	Location with Highest Mean			Control Locations	Number of Nonroutine Reported Measurements
				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Fish	**GAMMA**	4							
(pCi/kg wet)	Mn-54	4	130	<LLD	N/A		<LLD	N/A	0
	Co-58	4	130	<LLD	N/A		<LLD	N/A	0
	Fe-59	4	260	<LLD	N/A		<LLD	N/A	0
	Co-60	4	130	<LLD	N/A		<LLD	N/A	0
	Zn-65	4	260	<LLD	N/A		<LLD	N/A	0
	Cs-134	4	130	<LLD	N/A		<LLD	N/A	0
	Cs-137	4	150	<LLD	N/A		<LLD	N/A	0
	K-40	4		**1977 (4/4) (1336-3077)**	**SD**	**1.3 mi. NNW**	**1977 (4/4) (1336-3077)**	NA	0
Oysters	**GAMMA**	6							
(pCi/kg wet)	Mn-54	6	130	<LLD	N/A		<LLD	N/A	0
	Co-58	6	130	<LLD	N/A		<LLD	N/A	0
	Fe-59	6	260	<LLD	N/A		<LLD	N/A	0
	Co-60	6	130	<LLD	N/A		<LLD	N/A	0
	Zn-65	6	260	<LLD	N/A		<LLD	N/A	0
	Cs-134	6	130	<LLD	N/A		<LLD	N/A	0
	Cs-137	6	150	<LLD	N/A		<LLD	N/A	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY
SURRY NUCLEAR POWER STATION
Docket No. 50-280-281

Medium or Pathway Sampled (Units)	Analysis Type	Total Number	LLD	Indicator Locations	Location with Highest Mean			Control Locations	Number of Nonroutine Reported Measurements
				Mean (Range)	Number	Distance Direction	Mean (Range)	Mean (Range)	
Clams	**GAMMA**	6							
(pCi/kg wet)	Mn-54	6	130	<LLD	N/A		<LLD	<LLD	0
	Co-58	6	130	<LLD	N/A		<LLD	<LLD	0
	Fe-59	6	260	<LLD	N/A		<LLD	<LLD	0
	Co-60	6	130	<LLD	N/A		<LLD	<LLD	0
	Zn-65	6	260	<LLD	N/A		<LLD	<LLD	0
	Cs-134	6	130	<LLD	N/A		<LLD	<LLD	0
	Cs-137	6	150	<LLD	N/A		<LLD	<LLD	0
Crabs	**GAMMA**	1							
(pCi/kg wet)	Mn-54	1	130	<LLD	N/A		<LLD	N/A	0
	Co-58	1	130	<LLD	N/A		<LLD	N/A	0
	Fe-59	1	260	<LLD	N/A		<LLD	N/A	0
	Co-60	1	130	<LLD	N/A		<LLD	N/A	0
	Zn-65	1	260	<LLD	N/A		<LLD	N/A	0
	Cs-134	1	130	<LLD	N/A		<LLD	N/A	0
	Cs-137	1	150	<LLD	N/A		<LLD	N/A	0
	K-40	1		**1569 (1/1) (1569-1569)**	**SD**	**1.3 mi. NNW**	**1569 (1/1) (1569-1569)**	NA	0

3.2 Analytical Results of 2021 REMP Samples

Radiological analyses of environmental media characteristically approach and frequently fall below the detection limits of state-of-the-art measurement methods. 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 positive when the measured value exceeds 2σ uncertainty, unless otherwise noted. MDC is noted in the footnote in several tables. The term <MDC means the value is less than its Minimum Detectable Concentration and is therefore, not considered a positive value or result. Positive values or results are indicated by **bold** text.

Teledyne Brown Engineering 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 Surry ODCM.

Data are given according to sample type as indicated below.

1. Gamma Exposure Rate
2. Air Particulates, Weekly Gross Beta Radioactivity
3. Air Particulates, Weekly I-131
4. Air Particulates, Quarterly Gamma Spectroscopy
5. Animal Milk
6. Food Products
7. Well Water
8. River Water
9. Silt
10. Shoreline Sediment
11. Fish
12. Oysters
13. Clams
14. Crabs

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

$MDD_Q = 3 \times \sigma_Q = 3 \times 1.0 = 3$ (5) Note: If $MDD_Q < 5$ mR, THEN MDD_Q rounded to 5 mR (ANSI N13.37)
$MDD_A = 3 \times \sigma_A = 3 \times 2.8 = 8.8$ (10) Note: If $MDD_A < 10$ mR, THEN MDD_A rounded to 10 mR (ANSI N13.37)

Monitoring Location	Quarterly Baseline, B_Q Baseline, (mrem)	Normalized Quarterly Monitoring Data, M_Q (mrem per standard quarter)				Quarterly Facility Dose [a] $F_Q = M_Q - B_Q$ (mrem)				Annual Baseline B_A (mrem)	Annual Monitoring Data M_A (mrem)	Annual Facility Dose [b] $F_A = M_A - B_A$ (mrem)
		1	2	3	4	1	2	3	4			
2	19.8	19.6	20.9	19.3	20.1	ND	ND	ND	ND	79.2	79.9	ND
3	19.2	19.6	19.9	17.4	18.9	ND	ND	ND	ND	76.9	75.8	ND
4	17.9	17.4	19.0	17.4	17.7	ND	ND	ND	ND	71.7	71.4	ND
5	19.0	19.0	19.6	18.3	18.6	ND	ND	ND	ND	76.0	75.5	ND
6	18.4	18.0	18.6	17.7	19.1	ND	ND	ND	ND	73.8	73.4	ND
7	18.7	17.0	19.6	19.0	17.4	ND	ND	ND	ND	74.6	73.0	ND
8	17.0	17.0	17.7	15.5	18.3	ND	ND	ND	ND	68.4	68.5	ND
9	23.2	23.4	23.4	20.6	22.6	ND	ND	ND	ND	92.8	90.1	ND
10	18.1	18.0	19.0	17.7	18.3	ND	ND	ND	ND	72.5	72.9	ND
11	16.1	16.1	16.7	15.8	15.5	ND	ND	ND	ND	64.2	64.1	ND
12	16.6	16.4	16.4	15.5	17.0	ND	ND	ND	ND	66.4	65.3	ND
13	18.6	18.6	18.6	17.7	18.6	ND	ND	ND	ND	74.5	73.6	ND
14	17.9	17.7	19.3	16.4	18.6	ND	ND	ND	ND	71.6	72.0	ND
15	18.5	17.7	18.3	17.0	19.5	ND	ND	ND	ND	74.1	72.6	ND
16	17.0	17.7	17.7	15.5	17.7	ND	ND	ND	ND	67.7	68.5	ND
18	14.5	15.8	14.8	13.9	15.5	ND	ND	ND	ND	58.0	59.9	ND
19	15.5	16.1	15.5	14.5	15.5	ND	ND	ND	ND	62.1	61.5	ND
20	14.3	14.5	14.2	13.5	13.4	ND	ND	ND	ND	57.4	55.6	ND
21	15.1	15.4	15.5	14.2	15.6	ND	ND	ND	ND	60.5	60.7	ND
22	13.2	13.5	13.3	12.0	13.1	ND	ND	ND	ND	52.7	51.8	ND
23	18.1	20.1	19.1	16.8	19.0	ND	ND	ND	ND	72.3	75.0	ND
24	14.8	13.5	15.2	13.9	14.3	ND	ND	ND	ND	59.2	56.9	ND
25	18.1	19.2	19.4	17.1	18.1	ND	ND	ND	ND	72.3	73.8	ND
26	15.7	15.1	15.8	13.3	15.6	ND	ND	ND	ND	62.9	59.9	ND
27	14.7	14.5	15.5	13.3	15.3	ND	ND	ND	ND	58.7	58.6	ND
28	14.2	14.8	14.6	12.7	15.0	ND	ND	ND	ND	56.8	57.1	ND
29	13.2	13.1	13.3	12.4	13.7	ND	ND	ND	ND	52.9	52.6	ND
30	14.4	15.1	14.3	13.0	14.7	ND	ND	ND	ND	57.7	57.1	ND
31	12.3	13.1	12.7	10.9	12.2	ND	ND	ND	ND	49.2	48.9	ND
32	15.2	14.5	14.9	14.0	14.3	ND	ND	ND	ND	60.7	57.7	ND
33	14.2	15.8	15.5	14.0	15.9	ND	ND	ND	ND	57.1	61.2	ND
34	16.0	16.8	17.1	14.9	16.5	ND	ND	ND	ND	64.1	65.3	ND
35	18.6	20.1	20.2	16.7	20.0	ND	ND	ND	ND	74.4	77.0	ND
36	18.6	19.5	19.2	16.8	18.4	ND	ND	ND	ND	74.4	73.8	ND
37	15.4	16.1	16.4	13.7	14.7	ND	ND	ND	ND	61.7	60.9	ND
38	20.9	17.1	17.4	15.5	16.5	ND	ND	ND	ND	83.6	66.5	ND
39C	14.9	15.0	16.1	14.0	14.5	ND	ND	ND	ND	59.7	59.6	ND
40C	16.2	15.4	16.7	14.5	16.2	ND	ND	ND	ND	64.7	62.8	ND
41C	21.8	21.2	21.8	20.2	20.8	ND	ND	ND	ND	87.3	84.1	ND
42	16.4	15.8	16.7	14.8	15.8	ND	ND	ND	ND	65.5	63.1	ND
43	14.3	17.4	14.8	13.9	14.6	ND	ND	ND	ND	57.3	60.6	ND

[a] ND = Not detected, where $M_Q < (B_Q + MDD_Q)$
[b] ND = Not detected, where $M_A < (B_A + MDD_A)$
d = Damaged TLDs; m = Missing TLDs; v = Vendor reports TLD not received.
N/A = Missing or Damaged TLD Reading Not Available for Calculation.
Note: Table formatted in accordance with ANSI/HPS N13.37-2014, Environmental Dosimetry Criteria for system Design and Implementation.

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
($1.0E^{-3}$ pCi/m^3 ± 2 Sigma)

COLLECTION DATE	SAMPLING LOCATIONS							
	SS	HIR	BC	ALL	CP	BASF	FE	NN-C
January 5	**9.57** ± 2.64	**7.49** ± 2.51	**11.0** ± 2.77	**13.3** ± 2.95	**10.9** ± 2.75	**9.51** ± 2.61	**11.1** ± 2.73	**12.7** ± 2.92
January 11/12	**13.2** ± 2.83	**8.76** ± 2.56	**11.3** ± 2.76	**13.9** ± 2.94	**15.7** ± 2.97	**13.6** ± 2.82	**13.4** ± 3.17	**13.5** ± 2.93
January 19	**17.6** ± 2.96	**14.4** ± 2.78	**19.9** ± 3.19	**19.5** ± 3.21	**19.7** ± 3.17	**19.6** ± 3.12	**22.3** ± 3.53	**20.9** ± 3.27
January 26	**11.5** ± 2.83	**9.88** ± 2.73	**11.9** ± 2.87	**7.48** ± 2.64	**13.2** ± 2.94	**12.1** ± 2.83	**14.5** ± 2.97	**12.4** ± 2.97
Feburary 2	**6.25** ± 2.45	**6.58** ± 2.45	**6.22** ± 2.49	**8.94** ± 2.69	**9.36** ± 2.68	**7.20** ± 2.49	**8.95** ± 2.60	**7.89** ± 2.63
Feburary 9	**9.71** ± 2.47	**11.0** ± 2.52	**15.1** ± 2.74	**9.34** ± 2.48	**14.1** ± 2.72	**10.8** ± 2.49	**17.3** ± 2.86	**12.6** ± 2.71
Feburary 16	**9.17** ± 2.65	**9.80** ± 2.65	**13.4** ± 2.99	**12.7** ± 2.92	**10.6** ± 2.76	**8.71** ± 2.60	**13.0** ± 2.81	**11.1** ± 2.83
Feburary 23	**15.6** ± 2.78	**14.1** ± 2.65	**15.4** ± 2.71	**14.7** ± 2.68	**17.0** ± 2.78	**15.1** ± 2.64	**20.4** ± 2.93	**17.6** ± 2.87
March 2	**13.7** ± 2.95	**8.16** ± 2.59	**12.2** ± 2.88	**12.7** ± 2.92	**13.5** ± 2.92	**10.5** ± 2.69	**14.8** ± 2.93	**10.0** ± 2.78
March 8	**12.0** ± 2.98	**12.9** ± 3.00	**13.5** ± 3.08	**13.4** ± 3.13	**14.8** ± 3.18	**10.6** ± 2.87	**18.0** ± 3.30	**11.1** ± 3.03
March 16	**18.9** ± 2.82	**14.4** ± 2.56	**19.3** ± 2.88	**19.0** ± 2.87	**19.3** ± 2.85	**16.4** ± 2.66	**23.4** ± 3.00	**16.3** ± 2.77
March 23	**14.9** ± 2.75	**10.6** ± 2.47	**15.8** ± 2.81	**13.6** ± 2.71	**13.7** ± 2.69	**14.2** ± 2.67	**18.8** ± 2.93	**13.9** ± 2.75
March 29	**9.92** ± 2.96	**6.00** ± 2.66	**7.55** ± 2.79	**9.98** ± 3.00	**9.63** ± 2.92	**8.84** ± 2.81	**14.5** ± 3.16	**9.24** ± 2.96
Qtr. Avg. ± 2 s.d.	**12.5 ± 7.28**	**10.3 ± 5.86**	**13.3 ± 7.94**	**13.0 ± 7.12**	**14.0 ± 6.73**	**12.1 ± 7.06**	**16.2 ± 8.61**	**13.0 ± 7.13**
April 6	**22.7** ± 2.95	**13.8** ± 2.46	**17.6** ± 2.76	**17.8** ± 2.77	**17.3** ± 2.71	**15.8** ± 2.61	**24.1** ± 3.03	**19.7** ± 2.94
April 13	**15.2** ± 2.94	**11.2** ± 2.68	**12.5** ± 2.71	**13.7** ± 2.89	**13.9** ± 2.82	**12.0** ± 2.64	**15.1** ± 2.81	**13.1** ± 2.78
April 19/20	**7.67** ± 2.67	**4.65** ± 2.44	**6.97** ± 2.60	**9.67** ± 2.55	**8.73** ± 2.45	**7.56** ± 2.31	**10.8** ± 2.51	**9.57** ± 2.54
April 27	**17.3** ± 2.65	**11.6** ± 2.29	**15.8** ± 2.59	**17.1** ± 2.90	**21.7** ± 3.13	**17.1** ± 2.84	**23.3** ± 3.12	**19.9** ± 3.12
May 4	**19.3** ± 3.00	**12.6** ± 2.59	**18.9** ± 2.97	**18.9** ± 3.01	**18.3** ± 2.94	**18.5** ± 2.89	**23.8** ± 3.18	**20.1** ± 3.09
May 11	**14.1** ± 2.69	**10.5** ± 2.45	**10.9** ± 2.51	**10.2** ± 2.48	**10.7** ± 2.51	**11.0** ± 2.47	**14.4** ± 2.68	**12.3** ± 2.67
May 18	**10.6** ± 2.53	**8.97** ± 2.41	**10.4** ± 2.52	**11.6** ± 2.62	**10.1** ± 2.51	**10.6** ± 2.50	**14.7** ± 2.74	**12.0** ± 2.70
May 25	**17.5** ± 3.16	**15.4** ± 3.03	**17.4** ± 3.18	**17.8** ± 3.21	**19.0** ± 3.25	**15.9** ± 3.03	**21.9** ± 3.32	**17.2** ± 3.22
June 1	**13.4** ± 2.73	**11.0** ± 2.57	**12.3** ± 2.68	**12.6** ± 2.70	**14.9** ± 2.81	**13.4** ± 2.67	**17.6** ± 2.90	**16.5** ± 2.96
June 8	**8.63** ± 2.63	**8.19** ± 2.55	**8.02** ± 2.56	**7.68** ± 2.60	**9.00** ± 2.64	**9.68** ± 2.64	**12.4** ± 2.79	**7.67** ± 2.62
June 15	**6.71** ± 2.34	**7.47** ± 2.37	**8.66** ± 2.51	**5.25** ± 2.33	**8.47** ± 2.51	**6.82** ± 2.36	**12.1** ± 2.70	**6.74** ± 2.45
June 21	**15.4** ± 3.35	**10.0** ± 2.99	**16.3** ± 3.40	**18.4** ± 3.56	**16.8** ± 3.42	**18.6** ± 3.45	**24.1** ± 3.73	**15.9** ± 3.43
June 29	**10.7** ± 2.51	**9.03** ± 2.66	**9.90** ± 2.42	**8.70** ± 2.44	**9.65** ± 2.41	**7.21** ± 2.27	**10.7** ± 2.43	**9.47** ± 2.46
Qtr. Avg. ± 2 s.d.	**13.8 ± 9.57**	**10.3 ± 5.61**	**12.7 ± 8.06**	**13.0 ± 9.22**	**13.7 ± 9.12**	**12.6 ± 8.49**	**17.3 ± 10.8**	**13.9 ± 9.40**

TABLE 3-3
AIR PARTICULATES
GROSS BETA RADIOACTIVITY
($1.0E^{-3}$ pCi/m^3 ± 2 Sigma)

COLLECTION DATE	SAMPLING LOCATIONS							
	SS	HIR	BC	ALL	CP	BASF	FE	NN-C
July 7	9.87 ± 2.24	11.8 ± 2.58	10.2 ± 2.32	13.1 ± 2.55	13.5 ± 2.51	10.2 ± 2.30	15.4 ± 2.56	10.4 ± 2.36
July 13	12.2 ± 3.19	12.9 ± 3.23	12.0 ± 3.08	13.6 ± 3.24	14.8 ± 3.26	10.5 ± 2.95	17.8 ± 3.40	16.0 ± 3.41
July 19	12.3 ± 3.18	12.3 ± 3.17	13.8 ± 3.37	14.4 ± 3.47	14.8 ± 3.40	10.8 ± 3.13	16.9 ± 3.52	13.6 ± 3.43
July 27	18.0 ± 2.85	17.8 ± 2.84	15.9 ± 2.71	14.8 ± 2.69	17.0 ± 2.75	16.2 ± 2.66	22.8 ± 3.03	16.3 ± 2.76
August 3	22.0 ± 3.41	19.0 ± 3.27	22.0 ± 3.46	19.5 ± 3.35	20.1 ± 3.30	16.9 ± 3.08	28.9 ± 3.68	19.3 ± 3.35
August 9	11.8 ± 2.96	14.8 ± 3.34	15.3 ± 3.21	16.4 ± 3.34	16.6 ± 3.35	14.1 ± 3.18	20.1 ± 3.56	11.3 ± 3.16
August 17	12.7 ± 2.56	9.42 ± 2.36	14.6 ± 2.72	15.6 ± 2.80	12.7 ± 2.57	14.5 ± 2.60	19.6 ± 2.86	14.6 ± 2.70
August 23	8.08 ± 2.59	9.64 ± 2.73	6.83 ± 2.55	8.76 ± 2.72	10.5 ± 2.77	5.41 ± 2.57	11.9 ± 2.82	10.1 ± 2.81
August 31	25.0 ± 3.12	26.6 ± 3.18	26.0 ± 3.19	24.5 ± 3.16	25.6 ± 3.16	28.3 ± 3.24	35.2 ± 3.55	23.4 ± 3.10
September 7	15.1 ± 2.68	16.7 ± 2.77	18.1 ± 2.88	14.3 ± 2.69	14.8 ± 2.67	14.1 ± 2.61	22.9 ± 3.08	14.6 ± 2.73
September 13	14.4 ± 3.03	18.4 ± 3.25	17.2 ± 3.18	15.7 ± 3.16	17.4 ± 3.20	18.2 ± 3.20	25.9 ± 3.60	15.9 ± 3.19
September 21	23.0 ± 3.05	20.2 ± 2.91	28.2 ± 3.31	18.1 ± 2.88	23.6 ± 3.10	26.6 ± 3.19	30.0 ± 3.35	24.1 ± 3.16
September 28	15.4 ± 3.04	12.2 ± 2.84	16.8 ± 3.04	17.6 ± 3.11	17.5 ± 3.07	22.0 ± 3.25	22.8 ± 3.28	18.4 ± 3.20
Qtr. Avg. ± 2 s.d.	**15.4 ± 10.4**	**15.5 ± 9.76**	**16.7 ± 11.9**	**15.9 ± 7.42**	**16.8 ± 8.46**	**16.0 ± 13.1**	**22.3 ± 12.9**	**16.0 ± 8.85**
October 5	25.7 ± 3.43	22.2 ± 3.24	29.1 ± 3.69	21.7 ± 3.36	27.8 ± 3.59	27.0 ± 3.51	37.8 ± 3.97	20.2 ± 3.29
October 12	13.4 ± 2.85	11.2 ± 2.71	14.7 ± 2.91	14.6 ± 2.96	13.1 ± 2.83	15.7 ± 2.95	18.4 ± 3.11	13.6 ± 2.93
October 19	16.9 ± 2.86	17.1 ± 2.88	15.9 ± 2.83	11.3 ± 2.61	16.6 ± 2.87	19.2 ± 2.96	22.4 ± 3.14	13.2 ± 2.73
October 26	23.4 ± 3.35	25.1 ± 3.45	34.7 ± 3.87	31.3 ± 3.77	27.6 ± 3.55	31.3 ± 3.66	41.9 ± 4.12	25.1 ± 3.49
November 2	9.85 ± 2.70	7.10 ± 2.53	10.6 ± 2.68	7.94 ± 2.54	9.02 ± 2.56	10.5 ± 2.61	14.9 ± 2.88	10.2 ± 2.70
November 9	14.8 ± 2.76	15.4 ± 2.80	18.1 ± 3.03	20.5 ± 3.19	18.6 ± 3.04	18.9 ± 3.01	24.7 ± 3.33	20.3 ± 3.22
November 16	18.8 ± 3.03	19.0 ± 3.03	26.5 ± 3.44	25.1 ± 3.42	25.1 ± 3.37	23.4 ± 3.25	33.7 ± 3.74	27.4 ± 3.57
November 23	11.7 ± 2.66	17.2 ± 2.97	19.0 ± 3.09	18.2 ± 3.07	16.0 ± 2.90	18.2 ± 2.99	21.8 ± 3.17	18.5 ± 3.11
November 30	16.6 ± 2.98	19.0 ± 3.11	19.1 ± 3.14	15.1 ± 2.97	17.4 ± 3.05	18.4 ± 3.08	25.1 ± 3.41	21.8 ± 3.34
December 7	24.4 ± 3.32	26.3 ± 3.40	32.9 ± 3.72	26.3 ± 3.45	29.5 ± 3.54	25.4 ± 3.32	34.5 ± 3.73	27.4 ± 3.54
December 14	21.9 ± 3.27	21.9 ± 3.26	26.4 ± 3.51	21.5 ± 3.31	22.3 ± 3.31	22.0 ± 3.27	36.1 ± 3.89	24.7 ± 3.51
December 21	16.1 ± 2.96	16.9 ± 2.99	16.8 ± 3.00	16.3 ± 3.01	16.7 ± 2.99	21.0 ± 3.18	26.0 ± 3.43	14.8 ± 2.88
December 28	28.4 ± 3.52	30.3 ± 3.58	32.0 ± 3.68	28.5 ± 3.57	24.9 ± 3.38	31.1 ± 3.58	30.4 ± 3.61	24.1 ± 3.29
Qtr. Avg. ± 2 s.d.	**18.6 ± 11.4**	**19.1 ± 12.4**	**22.8 ± 15.7**	**19.9 ± 13.7**	**20.4 ± 12.6**	**21.7 ± 11.9**	**28.3 ± 16.2**	**20.1 ± 11.4**
Ann. Avg. ± 2 s.d.	**15.1 ± 10.6**	**13.8 ± 11.4**	**16.4 ± 13.7**	**15.4 ± 11.0**	**16.2 ± 10.7**	**15.6 ± 12.7**	**21.0 ± 15.5**	**15.7 ± 10.6**

TABLE 3-4
AIRBORNE IODINE
($1.0E^{-3}$ pCi/m^3 ± 2 Sigma)

COLLECTION DATE	Sampling Stations SS	HIR	BC	ALL	CP	BASF	FE	NN-C
January 5	-5.10 ± 12.0	-5.07 ± 11.9	-5.19 ± 12.2	-5.31 ± 12.5	-3.31 ± 16.0	-1.35 ± 6.54	-3.26 ± 15.8	-3.40 ± 16.4
January 11/12	6.61 ± 10.8	6.55 ± 10.7	6.71 ± 10.9	6.78 ± 11.0	1.09 ± 19.3	1.07 ± 19.0	1.31 ± 23.2	1.12 ± 19.9
January 19	5.10 ± 24.1	5.07 ± 24.0	5.42 ± 25.7	5.51 ± 26.1	-11.4 ± 22.6	-11.1 ± 22.0	-13.1 ± 25.9	-11.5 ± 22.9
January 26	3.18 ± 5.62	3.17 ± 5.60	3.27 ± 5.77	3.31 ± 5.85	2.85 ± 12.4	2.79 ± 12.1	1.34 ± 5.82	2.93 ± 12.7
Feburary 2	3.89 ± 9.91	3.85 ± 9.80	4.05 ± 10.3	4.09 ± 10.4	-4.01 ± 10.0	-3.89 ± 9.66	-3.89 ± 9.66	-4.06 ± 10.1
Feburary 9	-7.78 ± 21.6	-7.67 ± 21.3	-7.66 ± 21.3	-8.07 ± 22.4	-2.07 ± 17.7	-2.03 ± 17.4	-2.02 ± 17.3	-2.12 ± 18.2
Feburary 16	0.72 ± 16.6	0.71 ± 16.4	0.77 ± 17.6	0.76 ± 17.5	-6.18 ± 12.4	-6.04 ± 12.2	-4.94 ± 9.95	-6.23 ± 12.6
Feburary 23	-10.5 ± 11.0	-10.3 ± 10.8	-10.3 ± 10.8	-10.4 ± 10.9	3.75 ± 15.1	3.68 ± 14.8	3.68 ± 14.8	3.85 ± 15.5
March 2	-4.23 ± 23.2	-4.17 ± 22.8	-4.25 ± 23.3	-4.27 ± 23.4	-11.5 ± 14.7	-9.37 ± 11.9	-11.2 ± 14.3	-11.8 ± 15.0
March 8	8.42 ± 13.7	4.24 ± 6.91	8.42 ± 13.7	8.61 ± 14.1	-4.47 ± 12.6	-4.35 ± 12.2	-4.36 ± 12.2	-4.58 ± 12.9
March 16	-9.16 ± 10.9	-9.04 ± 10.7	-9.34 ± 11.1	-9.33 ± 11.1	5.90 ± 10.8	5.76 ± 10.5	5.76 ± 10.5	6.10 ± 11.1
March 23	2.85 ± 9.73	2.81 ± 9.60	2.86 ± 9.77	2.90 ± 9.91	-3.51 ± 11.3	-3.42 ± 11.0	-3.43 ± 11.0	-3.58 ± 11.5
March 29	-7.26 ± 12.4	-7.12 ± 12.1	-7.19 ± 12.3	-7.34 ± 12.5	6.05 ± 10.4	4.92 ± 8.47	5.90 ± 10.2	6.16 ± 10.6
April 6	0.89 ± 14.5	0.37 ± 5.95	0.93 ± 15.1	0.92 ± 14.9	11.5 ± 9.84 A	11.3 ± 9.73 A	11.4 ± 9.81 A	12.1 ± 10.4 A
April 13	4.84 ± 10.0	4.77 ± 9.87	4.72 ± 9.77	4.92 ± 10.2	-1.43 ± 11.8	-1.38 ± 11.4	-1.38 ± 11.4	-1.43 ± 11.8
April 19/20	12.8 ± 16.5	12.7 ± 16.4	12.6 ± 16.3	10.9 ± 14.0	-8.03 ± 15.4	-7.77 ± 14.9	-7.74 ± 14.8	-8.13 ± 15.6
April 27	1.33 ± 9.53	1.30 ± 9.31	1.34 ± 9.59	1.47 ± 10.5	1.21 ± 10.0	1.19 ± 9.82	1.15 ± 9.54	1.25 ± 10.4
May 4	19.7 ± 15.7 A	19.3 ± 15.4 A	19.6 ± 15.7 A	19.9 ± 15.9 A	-6.58 ± 11.9	-6.37 ± 11.5	-6.43 ± 11.6	-6.75 ± 12.2
May 11	-4.39 ± 7.95	-4.33 ± 7.85	-4.40 ± 7.97	-4.45 ± 8.06	-3.16 ± 7.29	-3.07 ± 7.08	-3.06 ± 7.07	-3.25 ± 7.49
May 18	-5.50 ± 15.0	-5.45 ± 14.9	-5.52 ± 15.0	-5.56 ± 15.2	0.59 ± 11.3	0.58 ± 11.1	0.58 ± 11.0	0.61 ± 11.7
May 25	4.77 ± 16.0	4.74 ± 16.0	4.81 ± 16.2	4.83 ± 16.2	-9.40 ± 19.0	-9.14 ± 18.4	-9.13 ± 18.4	-9.62 ± 19.4
June 1	18.5 ± 16.8 A	18.3 ± 16.6 A	18.7 ± 16.9 A	18.6 ± 16.9 A	12.4 ± 11.0 A	6.13 ± 5.47 A	12.0 ± 10.7 A	12.7 ± 11.3 A
June 8	-1.76 ± 12.7	-1.72 ± 12.4	-1.73 ± 12.5	-1.19 ± 8.57	-1.74 ± 12.5	-7.93 ± 12.8	-7.90 ± 12.8	-8.30 ± 13.4
June 15	1.85 ± 7.74	1.83 ± 7.64	1.90 ± 7.95	1.95 ± 8.15	-19.2 ± 18.7	-18.8 ± 18.3	-18.8 ± 18.3	-19.6 ± 19.1
June 21	8.35 ± 19.4	8.20 ± 19.0	8.48 ± 19.7	8.64 ± 20.0	11.8 ± 17.6	4.78 ± 7.15	11.4 ± 17.0	11.9 ± 17.8
June 29	4.96 ± 10.5	5.59 ± 11.8	4.86 ± 10.3	5.10 ± 10.8	-0.69 ± 7.39	-0.69 ± 7.41	-0.67 ± 7.19	-0.71 ± 7.60

A = <MDC

TABLE 3-4
AIRBORNE IODINE
($1.0E^{-3}$ pCi/m^3 ± 2 Sigma)

COLLECTION DATE	Sampling Stations SS	HIR	BC	ALL	CP	BASF	FE	NN-C
July 7	3.93 ± 13.2	4.45 ± 15.0	4.11 ± 13.8	4.25 ± 14.3	-6.88 ± 13.5	-6.78 ± 13.3	-6.63 ± 13.0	-6.93 ± 13.6
July 13	0.51 ± 22.9	0.51 ± 22.8	0.49 ± 22.1	0.50 ± 22.7	-0.39 ± 10.5	-0.38 ± 10.2	-0.38 ± 10.3	-0.40 ± 10.8
July 19	10.9 ± 17.3	10.8 ± 17.2	11.4 ± 18.1	11.7 ± 18.5	0.18 ± 10.4	0.18 ± 10.2	0.18 ± 10.3	0.19 ± 10.7
July 27	-6.77 ± 16.5	-6.74 ± 16.4	-6.69 ± 16.3	-6.83 ± 16.7	-0.85 ± 16.7	-0.83 ± 16.2	-0.85 ± 16.5	-0.86 ± 16.9
August 3	-0.14 ± 12.2	-0.14 ± 12.2	-0.14 ± 12.4	-0.15 ± 12.5	4.60 ± 10.7	3.00 ± 6.98	4.54 ± 10.6	4.74 ± 11.0
August 9	4.46 ± 12.2	4.85 ± 13.2	4.53 ± 12.4	4.67 ± 12.7	0.00 ± 13.3	0.00 ± 13.1	0.00 ± 13.3	0.00 ± 14.0
August 17	-13.4 ± 9.87	-13.3 ± 9.77	-13.9 ± 10.3	-14.2 ± 10.5	2.70 ± 10.2	2.62 ± 9.91	2.63 ± 10.0	2.73 ± 10.4
August 23	1.71 ± 9.73	1.74 ± 9.90	1.78 ± 10.1	1.81 ± 10.3	-0.41 ± 5.91	-0.43 ± 6.30	-0.40 ± 5.78	-0.42 ± 6.03
August 31	0.14 ± 8.80	0.14 ± 8.76	0.14 ± 9.09	0.14 ± 9.24	-7.24 ± 16.8	-7.09 ± 16.5	-7.16 ± 16.7	-7.34 ± 17.1
September 7	0.44 ± 13.1	0.45 ± 13.1	0.46 ± 13.6	0.47 ± 13.8	-2.76 ± 10.6	-2.71 ± 10.4	-2.71 ± 10.4	-2.85 ± 11.0
September 13	-3.97 ± 19.8	-3.96 ± 19.7	-4.03 ± 20.1	-4.14 ± 20.6	7.72 ± 12.0	7.59 ± 11.8	7.58 ± 11.8	7.97 ± 12.4
September 21	-5.67 ± 9.72	-5.64 ± 9.67	-5.85 ± 10.0	-5.95 ± 10.2	-3.69 ± 9.07	-3.03 ± 7.45	-3.63 ± 8.93	-3.74 ± 9.19
September 28	-6.85 ± 15.6	-6.79 ± 15.5	-6.68 ± 15.2	-6.80 ± 15.5	-3.45 ± 10.8	-2.83 ± 8.90	-3.36 ± 10.6	-3.56 ± 11.2
October 5	7.48 ± 19.0	7.40 ± 18.8	7.91 ± 20.1	7.94 ± 20.2	6.71 ± 15.7	6.57 ± 15.4	3.11 ± 7.28	6.85 ± 16.0
October 12	-10.2 ± 8.96	-10.1 ± 8.88	-10.3 ± 9.03	-10.5 ± 9.25	3.81 ± 9.21	3.74 ± 9.05	3.77 ± 9.12	3.90 ± 9.45
October 19	-9.41 ± 15.9	-9.44 ± 15.9	-9.65 ± 16.3	-9.88 ± 16.6	-11.9 ± 17.7	-11.6 ± 17.3	-11.7 ± 17.5	-12.2 ± 18.2
October 26	0.08 ± 16.4	0.08 ± 16.6	0.08 ± 16.9	0.08 ± 17.2	-0.61 ± 7.28	-0.59 ± 7.11	-0.60 ± 7.22	-0.62 ± 7.39
November 2	-6.62 ± 16.2	-6.60 ± 16.1	-6.46 ± 15.8	-6.52 ± 16.0	18.3 ± 23.3	17.9 ± 22.8	18.0 ± 23.0	18.7 ± 23.8
November 9	-13.0 ± 24.6	-13.0 ± 24.6	-13.7 ± 25.8	-13.9 ± 26.2	-7.14 ± 27.9	-6.95 ± 27.1	-7.04 ± 27.5	-7.38 ± 28.8
November 16	1.82 ± 8.91	1.81 ± 8.86	1.87 ± 9.19	1.91 ± 9.37	-2.83 ± 9.74	-1.42 ± 4.89	-2.80 ± 9.63	-2.93 ± 10.1
November 23	-6.99 ± 25.9	-6.99 ± 25.9	-7.23 ± 26.8	-7.30 ± 27.0	-39.8 ± 27.9	-39.1 ± 27.4	-39.1 ± 27.4	-40.9 ± 28.7
November 30	-2.57 ± 10.3	-2.57 ± 10.3	-2.65 ± 10.6	-2.70 ± 10.8	6.67 ± 12.3	6.58 ± 12.1	6.57 ± 12.1	6.83 ± 12.6
December 7	-4.12 ± 16.3	-4.11 ± 16.3	-4.24 ± 16.8	-4.27 ± 16.9	-6.50 ± 16.5	-6.36 ± 16.2	-6.39 ± 16.2	-2.82 ± 7.15
December 14	-5.08 ± 17.5	-5.05 ± 17.4	-5.24 ± 18.1	-5.32 ± 18.4	1.87 ± 11.3	1.84 ± 11.1	1.83 ± 11.1	1.92 ± 11.6
December 21	4.35 ± 10.4	4.32 ± 10.4	4.46 ± 10.7	4.52 ± 10.8	-5.81 ± 11.8	-5.71 ± 11.6	-5.73 ± 11.6	-5.78 ± 11.7
December 28	-11.5 ± 11.7	-11.4 ± 11.6	-11.7 ± 12.0	-12.0 ± 12.2	-15.6 ± 11.2	-10.1 ± 7.25	-15.5 ± 11.1	-15.1 ± 10.9

A = <MDC

TABLE 3-5
AIR PARTICULATES
GAMMA EMITTER CONCENTRATIONS
($1.0E^{-3}$ pCi/m^3 ± 2 Sigma)

SAMPLING LOCATIONS	Nuclide	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Avg. ± 2 s.d.
SS	Cs-134	-0.25 ± 0.50	-0.16 ± 0.88	-0.63 ± 0.75	0.03 ± 1.07	
	Cs-137	0.18 ± 0.45	-0.08 ± 0.73	-0.25 ± 0.62	-0.74 ± 0.90	
	Be-7	**122** ± 20.5	**150** ± 26.3	**143** ± 20.5	**130** ± 28.6	136 ± 24.4
HIR	Cs-134	0.01 ± 0.54	0.30 ± 0.62	0.26 ± 0.62	-0.16 ± 0.75	
	Cs-137	-0.07 ± 0.56	0.26 ± 0.62	0.11 ± 0.67	0.09 ± 0.69	
	Be-7	**86.9** ± 19.1	**104** ± 18.0	**107** ± 24.4	**151** ± 24.0	112 ± 55.1
BC	Cs-134	-0.60 ± 0.74	-0.52 ± 0.72	-0.33 ± 0.86	-0.32 ± 0.79	
	Cs-137	-0.25 ± 0.56	0.03 ± 0.59	-0.50 ± 0.75	-0.36 ± 0.64	
	Be-7	**122** ± 21.1	**137** ± 26.6	**138** ± 22.7	**142** ± 20.0	135 ± 17.3
ALL	Cs-134	-0.59 ± 0.76	-0.11 ± 1.06	0.81 ± 1.26	-0.30 ± 0.73	
	Cs-137	0.36 ± 0.82	-0.28 ± 0.86	-0.21 ± 0.91	0.19 ± 0.69	
	Be-7	**123** ± 22.5	**136** ± 36.6	**120** ± 30.8	**120** ± 23.2	125 ± 15.7
CP	Cs-134	-1.06 ± 0.92	-0.20 ± 0.65	-0.09 ± 0.51	-0.06 ± 0.76	
	Cs-137	0.90 ± 0.67 **A**	-0.10 ± 0.54	0.13 ± 0.42	0.32 ± 0.75	
	Be-7	**144** ± 23.7	**139** ± 22.5	**147** ± 19.0	**128** ± 22.2	139 ± 16.5
BASF	Cs-134	0.45 ± 0.99	0.21 ± 1.06	-0.34 ± 0.57	0.09 ± 0.46	
	Cs-137	-1.09 ± 1.08	-0.54 ± 0.99	-0.12 ± 0.60	0.07 ± 0.40	
	Be-7	**130** ± 27.5	**143** ± 25.9	**139** ± 22.3	**157** ± 20.6	142 ± 22.1
FE	Cs-134	-0.28 ± 0.70	0.08 ± 0.75	0.30 ± 0.85	-0.90 ± 1.04	
	Cs-137	-0.03 ± 0.57	-0.33 ± 0.55	-0.31 ± 0.91	0.81 ± 0.97	
	Be-7	**168** ± 21.8	**169** ± 24.2	**196** ± 30.8	**212** ± 30.9	186 ± 43.1
NN-C	Cs-134	-0.21 ± 0.63	-0.13 ± 0.51	-0.46 ± 0.90	-0.18 ± 0.77	
	Cs-137	0.09 ± 0.60	0.19 ± 0.52	0.27 ± 0.65	-0.24 ± 0.49	
	Be-7	**129** ± 24.4	**140** ± 18.6	**127** ± 20.3	**144** ± 22.9	135 ± 16.8

A= <MDC

TABLE 3-6
MILK
GAMMA EMMITER AND STRONTIUM CONCENTRATIONS
(pCi/Liter ± 2 Sigma)

NUCLIDE	EPPS	*COLONIAL PARKWAY	BEACHY FARM-C
JANUARY			
Cs-134	-1.68 ± 5.87	0.33 ± 5.75	-1.32 ± 5.90
Cs-137	-0.92 ± 6.36	0.38 ± 5.35	2.85 ± 6.11
Ba-140	15.1 ± 26.1	7.33 ± 24.5	-17.0 ± 27.6
La-140	-1.98 ± 8.31	0.18 ± 6.43	-4.93 ± 5.60
I-131	0.11 ± 0.51	0.10 ± 0.54	-0.63 ± 0.48
K-40	**1308** ± 185	**1142** ± 188	**1077** ± 210
FEBRUARY			
Cs-134	-2.06 ± 4.12	2.10 ± 4.71	-0.16 ± 4.09
Cs-137	0.88 ± 3.81	-1.89 ± 5.16	2.41 ± 4.17
Ba-140	0.67 ± 14.0	-2.13 ± 15.6	-0.43 ± 12.1
La-140	1.25 ± 3.57	-1.23 ± 5.35	1.00 ± 4.82
I-131	0.03 ± 0.52	-0.28 ± 0.41	0.03 ± 0.47
K-40	**1302** ± 154	**1209** ± 183	**1038** ± 160
MARCH			
Cs-134	-0.36 ± 5.38	-3.37 ± 5.30	0.20 ± 4.50
Cs-137	-2.79 ± 5.23	-2.66 ± 4.81	-0.49 ± 4.95
Ba-140	4.11 ± 18.6	-21.1 ± 24.4	9.57 ± 17.9
La-140	-2.47 ± 6.84	-3.59 ± 5.50	-0.03 ± 4.87
I-131	0.09 ± 0.52	0.16 ± 0.47	0.37 ± 0.52
K-40	**1138** ± 192	**1155** ± 170	**1140** ± 145
Sr-89		3.38 ± 2.45 **A**	
Sr-90		**1.87** ± 0.63	
APRIL			
Cs-134	-3.57 ± 5.16	-1.82 ± 5.21	-1.01 ± 4.54
Cs-137	0.07 ± 5.86	1.51 ± 4.81	4.48 ± 5.72
Ba-140	-9.89 ± 16.9	-3.78 ± 17.5	-3.51 ± 15.0
La-140	-2.28 ± 4.49	1.56 ± 4.04	-5.42 ± 6.13
I-131	-0.20 ± 0.42	0.42 ± 0.56	0.56 ± 0.60
K-40	**1301** ± 191	**1237** ± 174	**1115** ± 174
MAY			
Cs-134	1.56 ± 5.27	1.20 ± 5.58	2.55 ± 4.83
Cs-137	1.67 ± 4.67	1.95 ± 5.69	4.78 ± 4.54 **A**
Ba-140	0.24 ± 18.2	2.02 ± 17.8	6.71 ± 16.4
La-140	-3.68 ± 4.67	-2.55 ± 6.55	1.44 ± 4.41
I-131	-0.29 ± 0.49	0.03 ± 0.50	0.00 ± 0.52 **A**
K-40	**1053** ± 159	**1306** ± 190	**998** ± 167

*Sr-89/90 analysis performed quarterly on location Colonial Parkway only.
A= <MDC

TABLE 3-6
MILK
GAMMA EMMITER AND STRONTIUM CONCENTRATIONS
(pCi/Liter ± 2 Sigma)

NUCLIDE	EPPS	*COLONIAL PARKWAY	BEACHY FARM-C
JUNE			
Cs-134	3.52 ± 5.53	0.10 ± 5.59	1.19 ± 4.96
Cs-137	1.45 ± 6.31	3.45 ± 5.83	1.98 ± 5.01
Ba-140	1.76 ± 18.4	7.72 ± 15.2	-7.36 ± 21.4
La-140	3.44 ± 5.66	-5.08 ± 7.49	-1.63 ± 4.95
I-131	-0.39 ± 0.43	0.24 ± 0.49	0.07 ± 0.51
K-40	**989** ± 170	**1276** ± 206	**1249** ± 176
Sr-89		-2.51 ± 2.41	
Sr-90		**1.83** ± 0.69	
JULY			
Cs-134	1.65 ± 4.82	0.58 ± 4.96	-1.82 ± 4.94
Cs-137	0.04 ± 3.99	2.59 ± 4.76	-0.33 ± 5.50
Ba-140	-11.8 ± 14.6	9.14 ± 15.7	-9.59 ± 17.6
La-140	0.69 ± 4.39	-1.53 ± 3.15	7.67 ± 6.48 **A**
I-131	-0.24 ± 0.47	0.43 ± 0.56	0.31 ± 0.33
K-40	**1245** ± 157	**1001** ± 131	**1275** ± 193
AUGUST			
Cs-134	4.20 ± 4.39	-2.68 ± 5.67	0.93 ± 5.49
Cs-137	3.42 ± 4.17	4.13 ± 6.02	0.99 ± 4.54
Ba-140	10.0 ± 13.3	2.15 ± 20.1	6.87 ± 16.1
La-140	-2.45 ± 3.72	-1.01 ± 5.90	0.97 ± 4.62
I-131	0.35 ± 0.53	-0.20 ± 0.47	0.01 ± 0.50
K-40	**1123** ± 150	**1234** ± 194	**1131** ± 171
SEPTEMBER			
Cs-134	-2.04 ± 4.71	-2.00 ± 4.77	0.31 ± 6.39
Cs-137	0.56 ± 4.18	-0.14 ± 5.13	6.06 ± 6.00 **A**
Ba-140	-11.4 ± 13.5	-8.99 ± 20.2	-27.2 ± 28.8
La-140	0.98 ± 4.63	1.70 ± 5.30	-1.29 ± 7.98
I-131	-0.36 ± 0.45	0.44 ± 0.54	0.34 ± 0.52
K-40	**1217** ± 149	**1187** ± 205	**1255** ± 203
Sr-89		3.83 ± 2.81 **A**	
Sr-90		**2.06** ± 0.84	
OCTOBER			
Cs-134	0.02 ± 6.16	-4.60 ± 7.29	0.69 ± 5.33
Cs-137	-5.02 ± 4.66	4.45 ± 6.27	2.24 ± 4.42
Ba-140	-0.56 ± 20.3	-11.3 ± 24.7	4.44 ± 15.6
La-140	-2.97 ± 5.27	0.85 ± 7.38	0.06 ± 5.61
I-131	0.49 ± 0.47 **A**	-0.28 ± 0.50	0.13 ± 0.50
K-40	**1033** ± 171	**1172** ± 178	**1214** ± 160

*Sr-89/90 analysis performed quarterly on location Colonial Parkway only.
A= <MDC

(pCi/Liter ± 2 Sigma)

NUCLIDE	EPPS	*COLONIAL PARKWAY	BEACHY FARM-C
NOVEMBER			
Cs-134	2.68 ± 4.17	2.80 ± 6.16	0.42 ± 2.91
Cs-137	2.57 ± 3.70	2.94 ± 5.21	-1.84 ± 2.69
Ba-140	4.87 ± 17.0	-21.8 ± 20.4	-3.70 ± 13.2
La-140	4.55 ± 7.01	-1.66 ± 6.63	0.50 ± 3.70
I-131	0.31 ± 0.55	-0.08 ± 0.46	-0.02 ± 0.47
K-40	**987** ± 150	**1134** ± 182	**1344** ± 148
DECEMBER			
Cs-134	-6.63 ± 5.96	3.30 ± 5.47	1.73 ± 5.96
Cs-137	1.39 ± 5.32	2.21 ± 5.92	-0.33 ± 5.95
Ba-140	-0.11 ± 18.8	12.1 ± 18.0	1.35 ± 20.0
La-140	-2.86 ± 5.02	0.74 ± 6.55	2.14 ± 4.43
I-131	0.55 ± 0.45 **A**	-0.19 ± 0.44	0.65 ± 0.52 **A**
K-40	**1484** ± 209	**1177** ± 185	**984** ± 172
Sr-89		2.93 ± 2.74 **A**	
Sr-90		**1.26** ± 0.69	

*Sr-89/90 analysis performed quarterly on location Colonial Parkway only.
A= <MDC

TABLE 3-7
FOOD PRODUCTS
GAMMA EMMITER CONCENTRATIONS
(pCi/kg (wet) ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	SAMPLE TYPE	NUCLIDE			
			Cs-134	**Cs-137**	**I-131**	**K-40**
BROCK	11/16/2021	CORN	-0.19 ± 7.94	2.79 ± 7.26	0.95 ± 8.40	**2202** ± 328
FARM	11/16/2021	PEANUTS	7.83 ± 15.2	10.3 ± 15.0	1.81 ± 15.7	**6317** ± 646
			Cs-134	**Cs-137**	**I-131**	**K-40**
SLADE FARM	11/16/2021	SOYBEANS	-5.11 ± 19.5	-0.93 ± 15.9	-14.0 ± 15.2	**19670** ± 974

A= <MDC

TABLE 3-8
WELL WATER
GAMMA EMMITER AND TRITIUM CONCENTRATIONS
(pCi/Liter ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	NUCLIDE				
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
SS	3/8/2021	2.37 ± 2.56	1.51 ± 2.49	-4.44 ± 4.32	0.00 ± 1.72	-7.96 ± 6.43
	6/1/2021	-1.04 ± 4.13	0.63 ± 3.72	-1.97 ± 5.14	-0.64 ± 3.91	-6.27 ± 8.62
	9/7/2021	-0.71 ± 3.40	2.20 ± 3.84	-0.08 ± 9.03	0.70 ± 3.20	-11.0 ± 11.6
	12/8/2021	-2.66 ± 3.89	0.64 ± 3.52	0.69 ± 6.81	2.57 ± 5.28	-8.17 ± 8.80
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	3/8/2021	0.79 ± 2.60	0.28 ± 4.25	0.27 ± 0.56	2.35 ± 2.92	0.73 ± 2.52
	6/1/2021	1.42 ± 3.11	-0.60 ± 6.41	0.50 ± 0.59	-1.16 ± 3.79	-2.23 ± 3.43
	9/7/2021	0.43 ± 4.14	-1.41 ± 6.38	0.38 ± 0.50	2.25 ± 4.27	-0.04 ± 4.41
	12/8/2021	-1.72 ± 3.92	5.42 ± 6.22	0.05 ± 0.52	-3.60 ± 4.34	0.00 ± 4.32
		Ba-140	**La-140**	**H-3**		
	3/8/2021	-0.02 ± 8.64	-0.55 ± 3.69	-18.9 ± 387		
	6/1/2021	6.54 ± 11.3	-0.87 ± 5.18	374 ± 602		
	9/7/2021	-10.8 ± 12.1	1.45 ± 3.58	222 ± 589		
	12/8/2021	-11.4 ± 14.5	1.04 ± 4.84	-704 ± 557		
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
HIR	3/8/2021	2.23 ± 2.38	0.22 ± 1.97	-0.98 ± 4.36	-1.60 ± 2.66	1.07 ± 5.18
	6/1/2021	-1.20 ± 3.75	-4.33 ± 3.52	1.70 ± 7.35	0.85 ± 3.57	-0.60 ± 7.88
	9/7/2021	-1.18 ± 3.79	0.13 ± 2.76	2.40 ± 7.62	1.50 ± 3.59	-0.97 ± 9.53
	12/8/2021	-1.35 ± 4.48	-0.85 ± 4.33	1.77 ± 6.63	-1.76 ± 4.23	-1.29 ± 7.90
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	3/8/2021	1.37 ± 2.27	-2.40 ± 4.28	-0.02 ± 0.46	-1.17 ± 2.73	-1.30 ± 2.71
	6/1/2021	1.67 ± 3.69	-6.35 ± 6.22	-0.29 ± 0.50	1.31 ± 3.43	-5.04 ± 3.78
	9/7/2021	-2.22 ± 3.76	-2.50 ± 7.23	0.35 ± 0.51	0.60 ± 3.88	0.03 ± 3.88
	12/8/2021	2.18 ± 4.19	0.63 ± 5.72	0.11 ± 0.31	0.32 ± 4.95	5.27 ± 4.97 **A**
		Ba-140	**La-140**	**H-3**		
	3/8/2021	-2.21 ± 10.3	-1.30 ± 3.38	95.0 ± 398		
	6/1/2021	8.61 ± 13.1	-0.36 ± 4.42	-317 ± 553		
	9/7/2021	4.21 ± 14.2	1.94 ± 3.93	6.31 ± 572		
	12/8/2021	-7.87 ± 15.3	0.20 ± 5.55	-336 ± 583		
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
TC	3/8/2021	2.07 ± 3.98	-3.06 ± 3.74	-5.02 ± 8.25	2.49 ± 4.66	-2.09 ± 9.65
	6/1/2021	-1.14 ± 3.82	2.56 ± 3.20	-2.12 ± 7.02	2.57 ± 3.21	-0.83 ± 8.44
	9/7/2021	-0.64 ± 4.29	-1.73 ± 4.37	2.19 ± 7.83	-0.64 ± 3.23	-14.0 ± 11.9
	12/8/2021	2.31 ± 4.04	-0.46 ± 3.74	-0.53 ± 6.87	0.60 ± 3.98	-23.5 ± 13.6
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	3/8/2021	0.04 ± 4.51	-2.05 ± 7.21	0.58 ± 0.54 **A**	-2.12 ± 4.24	-0.79 ± 4.67
	6/1/2021	-0.48 ± 3.26	4.82 ± 6.63	0.41 ± 0.55	1.80 ± 3.02	-4.07 ± 3.89
	9/7/2021	1.12 ± 3.87	7.80 ± 7.26 **A**	0.04 ± 0.50	0.33 ± 4.99	-2.27 ± 3.73
	12/8/2021	2.06 ± 4.54	2.67 ± 5.92	0.51 ± 0.36 **A**	0.77 ± 4.32	-2.28 ± 3.85
		Ba-140	**La-140**	**H-3**		
	3/8/2021	-3.31 ± 16.9	-3.94 ± 4.82	-34.7 ± 404		
	6/1/2021	11.0 ± 11.7	0.82 ± 4.81	278 ± 595		
	9/7/2021	-6.31 ± 17.2	-1.56 ± 6.57	-50.5 ± 568		
	12/8/2021	-0.22 ± 13.5	1.96 ± 6.10	108 ± 616		

A= <MDC

TABLE 3-9
RIVER WATER
GAMMA EMITTER AND TRITIUM CONCENTRATIONS
(pCi/Liter ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	NUCLIDE				
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
SD	1/12/2021	-0.94 ± 3.10	1.32 ± 2.83	-0.06 ± 6.49	0.01 ± 2.99	-1.71 ± 6.47
	2/2/2021	-4.27 ± 4.16	-1.43 ± 4.01	-2.67 ± 7.53	1.92 ± 4.75	-4.59 ± 9.03
	3/2/2021	0.83 ± 2.78	-0.14 ± 2.56	-0.44 ± 4.83	0.14 ± 1.74	-0.68 ± 4.64
	4/6/2021	-2.29 ± 4.10	-1.31 ± 4.08	-5.97 ± 7.12	-0.28 ± 5.35	0.24 ± 6.87
	5/4/2021	1.26 ± 2.65	0.10 ± 2.48	2.06 ± 6.19	0.04 ± 2.72	2.12 ± 5.56
	6/1/2021	-3.39 ± 3.32	0.24 ± 3.68	-1.12 ± 5.80	0.28 ± 3.69	-7.14 ± 9.10
	7/7/2021	3.55 ± 3.97	-1.25 ± 3.63	1.62 ± 8.17	-2.73 ± 3.89	1.30 ± 8.63
	8/3/2021	2.10 ± 3.14	0.90 ± 3.76	-3.95 ± 8.58	-3.61 ± 4.61	-0.38 ± 7.77
	9/7/2021	2.02 ± 3.86	1.53 ± 3.85	-5.43 ± 8.25	-0.24 ± 3.42	-2.79 ± 8.11
	10/5/2021	0.61 ± 3.17	1.89 ± 3.54	6.36 ± 6.58	-0.93 ± 3.50	-8.85 ± 7.72
	11/2/2021	-1.28 ± 3.29	-0.40 ± 3.29	-0.70 ± 6.74	-0.09 ± 3.51	-6.60 ± 7.34
	12/7/2021	-1.26 ± 2.62	0.19 ± 2.06	-1.30 ± 4.63	-2.47 ± 2.69	-4.31 ± 5.44
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	1/12/2021	4.00 ± 3.54 **A**	0.58 ± 5.90	-0.62 ± 4.83	1.25 ± 3.09	-2.11 ± 3.05
	2/2/2021	2.29 ± 3.63	-1.16 ± 6.83	0.73 ± 4.73	1.50 ± 4.63	0.70 ± 4.40
	3/2/2021	3.22 ± 2.91 **A**	1.16 ± 3.94	1.93 ± 4.09	-1.54 ± 3.21	-2.49 ± 2.74
	4/6/2021	-0.20 ± 3.89	-3.13 ± 6.26	0.16 ± 4.66	3.51 ± 4.18	-0.06 ± 4.36
	5/4/2021	2.67 ± 2.72	2.05 ± 4.37	-3.87 ± 4.04	-0.69 ± 3.16	1.07 ± 2.90
	6/1/2021	3.78 ± 3.01 **A**	1.69 ± 6.08	3.26 ± 4.36	-2.82 ± 3.62	-1.17 ± 3.67
	7/7/2021	0.45 ± 3.52	7.31 ± 8.07	4.53 ± 3.88 **A**	-2.71 ± 3.73	-5.73 ± 4.74
	8/3/2021	1.87 ± 3.77	3.55 ± 7.03	3.83 ± 4.53	3.16 ± 4.31	-2.04 ± 4.08
	9/7/2021	2.72 ± 3.41	-0.76 ± 6.15	3.19 ± 3.94	2.31 ± 4.50	2.63 ± 4.20
	10/5/2021	-0.32 ± 4.03	-4.39 ± 5.40	-1.39 ± 4.39	-1.03 ± 3.49	2.64 ± 4.08
	11/2/2021	1.38 ± 3.23	3.83 ± 6.23	-5.14 ± 4.99	0.89 ± 3.82	1.24 ± 3.86
	12/7/2021	-0.97 ± 2.61	-2.63 ± 4.68	0.19 ± 3.01	-0.95 ± 2.77	-1.42 ± 2.94
		Ba-140	**La-140**	**H-3**	**K-40**	**TH-228**
	1/12/2021	3.15 ± 14.4	3.35 ± 4.91			**12.8** ± 7.00
	2/2/2021	6.32 ± 17.0	2.92 ± 5.34			
	3/2/2021	9.48 ± 12.2	2.95 ± 3.90	-511 ± 556		
	4/6/2021	0.16 ± 11.9	0.93 ± 5.46			
	5/4/2021	-12.9 ± 12.6	-1.25 ± 3.87			
	6/1/2021	7.79 ± 13.0	-3.43 ± 4.68	266 ± 435		
	7/7/2021	7.02 ± 13.1	1.19 ± 5.26		**86.3** ± 75.2	
	8/3/2021	-9.30 ± 15.1	-3.35 ± 5.94		**89.7** ± 77.5	
	9/7/2021	4.18 ± 13.4	3.28 ± 4.62	-20.4 ± 445	**115** ± 80.3	
	10/5/2021	-1.19 ± 14.2	4.66 ± 4.57 **A**			
	11/2/2021	-14.5 ± 15.1	-2.26 ± 6.57		**90.4** ± 73.2	
	12/7/2021	5.27 ± 9.53	-0.47 ± 3.15	459 ± 641	**113** ± 68.5	

A= <MDC

TABLE 3-9
RIVER WATER
GAMMA EMITTER AND TRITIUM CONCENTRATIONS
(pCi/Liter ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	NUCLIDE				
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
SW-C	1/12/2021	0.24 ± 2.65	0.37 ± 3.10	3.91 ± 5.32	1.02 ± 3.14	-5.44 ± 6.24
	2/2/2021	-1.69 ± 3.51	-1.89 ± 3.54	5.24 ± 7.27	0.90 ± 3.17	-13.3 ± 7.90
	3/2/2021	-2.03 ± 3.71	0.14 ± 3.29	-4.39 ± 8.79	0.13 ± 3.89	-6.74 ± 8.73
	4/6/2021	2.68 ± 4.20	-1.64 ± 3.84	-4.91 ± 6.62	0.52 ± 3.99	-4.05 ± 6.76
	5/4/2021	0.25 ± 2.84	-0.23 ± 2.91	1.81 ± 5.47	-2.32 ± 3.25	-1.20 ± 6.38
	6/1/2021	0.29 ± 2.74	1.81 ± 2.19	0.58 ± 4.29	1.36 ± 2.14	2.34 ± 4.87
	7/7/2021	0.50 ± 2.23	-0.99 ± 2.23	2.28 ± 4.31	-1.20 ± 2.33	-11.3 ± 5.24
	8/3/2021	2.52 ± 3.71	1.26 ± 3.68	4.95 ± 8.07	-1.56 ± 3.73	-3.53 ± 8.07
	9/7/2021	1.99 ± 3.72	-0.47 ± 3.26	4.06 ± 6.10	0.84 ± 3.32	-6.03 ± 7.26
	10/5/2021	0.65 ± 3.04	1.40 ± 3.06	-4.50 ± 8.91	-2.23 ± 4.05	-7.39 ± 9.60
	11/2/2021	-3.29 ± 3.78	-2.42 ± 3.30	-2.23 ± 5.99	3.33 ± 3.42	-7.97 ± 9.42
	12/7/2021	2.59 ± 3.18	-0.83 ± 3.02	-3.26 ± 6.76	1.03 ± 3.36	0.15 ± 9.17
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	1/12/2021	2.44 ± 2.71	-3.26 ± 5.27	6.55 ± 5.19 **A**	-3.47 ± 3.03	0.16 ± 2.91
	2/2/2021	0.71 ± 3.10	-1.57 ± 5.39	-0.76 ± 4.16	2.31 ± 3.20	0.43 ± 3.67
	3/2/2021	0.83 ± 3.59	-4.06 ± 5.71	-0.42 ± 5.46	1.27 ± 3.82	6.96 ± 4.28 **A**
	4/6/2021	-2.49 ± 3.66	3.89 ± 7.26	-0.55 ± 4.20	1.06 ± 4.13	-1.37 ± 4.08
	5/4/2021	-4.08 ± 2.74	0.37 ± 5.73	3.53 ± 4.98	-0.65 ± 3.54	0.37 ± 2.87
	6/1/2021	0.77 ± 1.98	4.45 ± 3.83 **A**	-1.15 ± 2.72	-0.22 ± 2.21	-1.41 ± 2.56
	7/7/2021	1.41 ± 2.36	-1.79 ± 3.87	0.32 ± 2.65	-0.73 ± 2.44	-0.73 ± 2.35
	8/3/2021	1.64 ± 3.38	-4.45 ± 5.97	2.36 ± 4.35	0.33 ± 3.97	-2.49 ± 3.52
	9/7/2021	0.11 ± 3.75	0.48 ± 6.73	-0.66 ± 4.23	2.61 ± 4.35	0.02 ± 3.73
	10/5/2021	-1.91 ± 3.86	0.38 ± 5.76	0.07 ± 3.89	-0.10 ± 3.16	3.80 ± 4.72
	11/2/2021	0.27 ± 3.23	-0.48 ± 5.01	0.89 ± 4.58	0.54 ± 3.70	-1.01 ± 3.64
	12/7/2021	0.95 ± 3.43	-3.71 ± 5.75	-1.93 ± 4.31	-1.18 ± 3.79	-0.71 ± 3.87
		Ba-140	**La-140**	**H-3**	**K-40**	**TH-228**
	1/12/2021	7.20 ± 14.3	-1.59 ± 4.43			
	2/2/2021	4.95 ± 11.5	3.37 ± 3.72			
	3/2/2021	-6.48 ± 17.5	4.65 ± 6.08	128 ± 602		
	4/6/2021	3.36 ± 15.7	-3.05 ± 4.13			
	5/4/2021	2.29 ± 12.9	-3.15 ± 5.71			
	6/1/2021	4.10 ± 8.40	-3.04 ± 2.82	-38.2 ± 405		
	7/7/2021	3.38 ± 8.50	0.43 ± 2.86		**74.0** ± 51.7	**8.24** ± 4.74
	8/3/2021	3.57 ± 12.4	-3.98 ± 5.71			
	9/7/2021	-0.25 ± 14.1	-2.13 ± 4.45	15.5 ± 453		
	10/5/2021	-3.56 ± 12.3	1.34 ± 4.79			
	11/2/2021	9.41 ± 17.4	-2.56 ± 4.89			
	12/7/2021	4.40 ± 12.0	1.24 ± 4.19	-153 ± 600		

A= <MDC

TABLE 3-10
SEDIMENT SILT
GAMMA EMITTER CONCENTRATIONS
(pCi/kg (dry) ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	NUCLIDE			
		Cs-134	Cs-137	K-40	Th-228
SD	3/25/2021	32.6 ± 58.0	140 ± 70.4 B	**12420** ± 1696	**754** ± 229
	9/15/2021	124 ± 55.8 A	106 ± 63.2 A	**18790** ± 1993	**1024** ± 162
		Th-232	Ra-226	Be-7	
	3/25/2021	**1124** ± 241			
	9/15/2021	**1170** ± 215	**1990** ± 1453	**2084** ± 1179	
		Cs-134	Cs-137	K-40	Th-228
SI	3/17/2021	-13.1 ± 80.7	**220** ± 91.7	**14740** ± 2273	**1245** ± 176
	9/15/2021	28.2 ± 70.1	117 ± 76.1 A	**15790** ± 2185	**1220** ± 262
		Th-232	Be-7	Ac-228	
	3/17/2021		**1623** ± 1055	**1234** ± 400	
	9/15/2021	**1062** ± 324			
		Cs-134	Cs-137	K-40	Th-228
CHIC-C	3/17/2021	67.8 ± 81.1	55.1 ± 77.9	**14730** ± 1968	**1220** ± 218
	9/14/2021	24.9 ± 65.0	104 ± 72.7 A	**15730** ± 2022	**1291** ± 171
		Th-232	Ra-226		
	3/17/2021	**1111** ± 235			
	9/14/2021	**1171** ± 240	**3469** ± 2123		

A= <MDC
B= The analyte was not detected. Peak not identified, but forced activity concentration exceeds MDC and 2 sigma.

TABLE 3-11
SHORELINE SEDIMENT
GAMMA EMITTER CONCENTRATIONS
(pCi/kg (dry) ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	NUCLIDE				
		Cs-134	**Cs-137**	**K-40**	**Th-228**	
HIR	2/9/2021	-3.56 ± 19.9	-5.38 ± 18.9	**6145** ± 810	**61.3** ± 34.6	
	8/3/2021	2.67 ± 27.0	-4.03 ± 24.6	**4260** ± 927	**98.5** ± 51.6	
		Cs-134	**Cs-137**	**K-40**	**Th-228**	**Th-232**
CHIC-C	2/23/2021	1.87 ± 16.1	18.8 ± 17.1 **A**	**1561** ± 459	**89.8** ± 50.7	
	8/3/2021	43.0 ± 39.4 **A**	-19.0 ± 37.6	**1829** ± 643	**579** ± 104	**709** ± 133

A= <MDC

TABLE 3-12
FISH
GAMMA EMITTER CONCENTRATIONS
(pCi/kg (wet) ± 2 Sigma)

SAMPLING LOCATION	COLLECTION DATE	FISH TYPE	NUCLIDE			
			Mn-54	**Co-58**	**Fe-59**	**Co-60**
SD	4/6/2021	Catfish	13.4 ± 40.6	21.1 ± 37.1	44.2 ± 72.2	-11.9 ± 35.1
	4/6/2021	Game Fish	-5.09 ± 35.0	-23.3 ± 35.5	-34.4 ± 71.5	28.6 ± 42.4
	10/7/2021	Catfish	36.7 ± 48.3	-63.5 ± 44.3	-11.1 ± 82.1	-2.19 ± 44.0
	10/7/2021	Game Fish	0.20 ± 47.6	-21.7 ± 43.5	19.8 ± 104	-7.61 ± 50.5
			Zn-65	**Cs-134**	**Cs-137**	**K-40**
	4/6/2021	Catfish	-36.7 ± 72.3	-15.5 ± 40.0	4.42 ± 42.4	**1336** ± 852
	4/6/2021	Game Fish	21.9 ± 87.5	-2.28 ± 36.3	-2.40 ± 31.7	**1999** ± 897
	10/7/2021	Catfish	-102 ± 103	-12.6 ± 59.4	-33.9 ± 55.3	**3077** ± 1154
	10/7/2021	Game Fish	-69.9 ± 103	-2.62 ± 49.7	-2.96 ± 47.2	**1494** ± 757

A= <MDC

TABLE 3-13
OYSTERS
GAMMA EMITTER CONCENTRATIONS
(pCi/kg (wet) ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	NUCLIDE				
		Mn-54	**Co-58**	**Fe-59**		**Co-60**
POS	4/5/2021	20.5 ± 39.3	-13.7 ± 39.9	106 ± 82.6	A	15.4 ± 39.9
	9/30/2021	-12.5 ± 42.8	-19.3 ± 43.7	6.46 ± 79.0		4.70 ± 45.7
		Zn-65	**Cs-134**	**Cs-137**		
	4/5/2021	-33.5 ± 80.0	5.86 ± 44.6	6.47 ± 48.6		
	9/30/2021	-51.5 ± 84.5	24.1 ± 39.6	-14.1 ± 44.4		
		Mn-54	**Co-58**	**Fe-59**		**Co-60**
MP	4/5/2021	-10.4 ± 32.5	16.4 ± 25.9	-19.4 ± 70.6		-40.4 ± 30.3
	9/30/2021	-4.76 ± 38.2	-22.0 ± 50.9	-54.5 ± 92.4		-17.6 ± 55.5
		Zn-65	**Cs-134**	**Cs-137**		
	4/5/2021	-34.4 ± 70.3	12.2 ± 33.5	-5.28 ± 23.1		
	9/30/2021	-104 ± 91.4	-39.2 ± 43.7	26.8 ± 31.9		
		Mn-54	**Co-58**	**Fe-59**		**Co-60**
SHI	4/5/2021	-6.62 ± 42.5	-10.5 ± 39.1	35.5 ± 97.0		-10.2 ± 44.9
	9/30/2021	-4.20 ± 34.0	-26.5 ± 29.3	12.4 ± 74.2		-2.57 ± 40.2
		Zn-65	**Cs-134**	**Cs-137**		
	4/5/2021	-70.6 ± 72.0	18.1 ± 46.1	-1.75 ± 41.5		
	9/30/2021	-82.9 ± 89.2	4.16 ± 35.4	29.1 ± 41.4		

A= <MDC

TABLE 3-14
CLAMS
GAMMA EMITTER CONCENTRATIONS
(pCi/kg (wet) ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	NUCLIDE			
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
JI	3/25/2021	-23.5 ± 26.1	3.47 ± 35.0	-41.9 ± 77.7	-9.30 ± 38.1
	9/14/2021	-4.42 ± 22.4	37.5 ± 32.3 A	-16.8 ± 69.0	-3.65 ± 21.3
		Zn-65	**Cs-134**	**Cs-137**	
	3/25/2021	4.04 ± 65.6	21.0 ± 32.5	4.49 ± 32.5	
	9/14/2021	46.6 ± 57.8	-11.2 ± 24.3	5.28 ± 27.2	
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
SD	3/25/2021	6.42 ± 31.4	-3.23 ± 33.9	-12.9 ± 68.8	0.36 ± 28.9
	9/15/2021	12.3 ± 45.4	-36.6 ± 58.1	24.8 ± 113	-6.18 ± 43.5
		Zn-65	**Cs-134**	**Cs-137**	
	3/25/2021	-57.6 ± 84.9	-37.1 ± 39.8	-9.35 ± 31.5	
	9/15/2021	-0.30 ± 113	-16.4 ± 43.9	-16.2 ± 42.9	
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
CHIC-C	3/17/2021	5.20 ± 40.6	-38.2 ± 46.7	0.14 ± 113	-14.9 ± 38.8
	9/14/2021	-32.3 ± 36.9	14.6 ± 37.3	52.1 ± 83.2	-4.44 ± 40.5
		Zn-65	**Cs-134**	**Cs-137**	
	3/17/2021	-0.81 ± 87.2	4.70 ± 45.5	-22.2 ± 40.6	
	9/14/2021	15.2 ± 65.2	-20.9 ± 44.3	-10.0 ± 37.7	

A= <MDC

TABLE 3-15
CRABS
GAMMA EMITTER CONCENTRATIONS
(pCi/kg (wet) ± 2 Sigma)

SAMPLING LOCATIONS	COLLECTION DATE	NUCLIDE			
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
SD	7/16/2021	-43.5 ± 40.2	-7.50 ± 41.6	-29.8 ± 84.1	1.77 ± 31.5
		Zn-65	**Cs-134**	**Cs-137**	**K-40**
	7/16/2021	15.2 ± 78.3	-0.60 ± 42.2	11.2 ± 42.8	**1569** ± 815

4. DISCUSSION OF RESULTS

Data from the radiological analyses of environmental media collected during 2021 and tabulated in Section 3, are discussed below. The procedures and specifications followed in the laboratory for these analyses are as required in the Teledyne Brown Engineering quality assurance manuals and laboratory procedures. In addition to internal quality control measures performed by the laboratories, 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 Program are provided in Appendix B.

The predominant radioactivity detected throughout 2021 was from external sources, such as fallout from nuclear weapons tests (cesium-137) and naturally occurring radionuclides. Naturally occurring nuclides, such as beryllium-7, radium-226, actinium-228, thorium-228, thorium-232 and potassium-40, were detected in numerous samples.

The following is a discussion and summary of the results of the environmental measurements taken during the 2021 reporting period.

4.1 Gamma Exposure Rate

A thermoluminescent dosimeter (TLD) is an inorganic crystal used to detect ambient radiation. These TLDs are made of CaF and LiF compounds and are specifically designed for environmental monitoring. Three TLDs are deployed at each sampling location. TLDs are placed in two concentric rings around the station. The inner ring is in the vicinity of 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 centers 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 TLD analyses are presented in Table 3-2. There was no detectable external dose to members of the public from Surry Power Station in 2021. The results of the TLD analyses shown in Table 3-2 comply with Section 7 of ANSI/HPS N13.37-2014 to ensure accurate environmental results. The long-term integrity of each field monitoring location is accomplished by a thorough, documented evaluation of the location for changes that could impact data quality in accordance with Section 7.1 of the ANSI Standard. Since off-site processing of TLDs is used, extraneous dose received prior to and after removal from the field is quantified in compliance with Section 7.2 of the ANSI Standard. Data analysis for Table 3-2 was performed in accordance with Section 7.3 of the ANSI Standard. This includes normalizing results to a standard 91-day quarterly monitoring period, determination of the baseline background dose for each monitoring location and determination of the smallest facility-related dose that can be detected above the baseline background.

4.2 Airborne Gross Beta

Air is continuously sampled by passing through glass fiber particulate filters. The filters collect airborne particulate radionuclides. Once a week the samples are collected and analyzed for gross beta activity. Results of the weekly gross beta analyses are presented in Table 3-3. A review of the results from control and indicator locations continues to show no significant variation in measured activities. Refer to Figures 4.1 and 4.2 for details. Data presented in these figures indicate that any contribution from station related activities is not measurable.

Gross beta activity found during the pre-operational and early operating period of Surry 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 except for the Chernobyl accident in 1986, airborne gross beta results have remained steady.

Figure 4-1:
2021 GROSS BETA IN AIR PARTICULATES

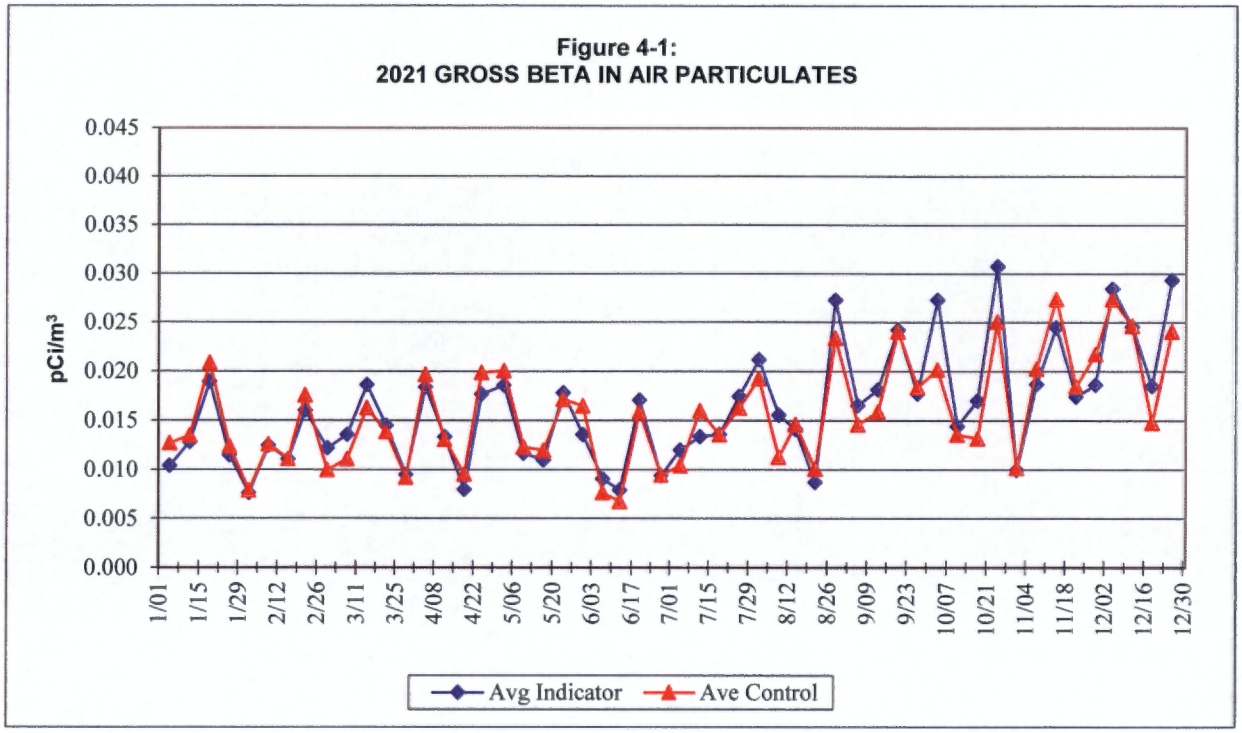
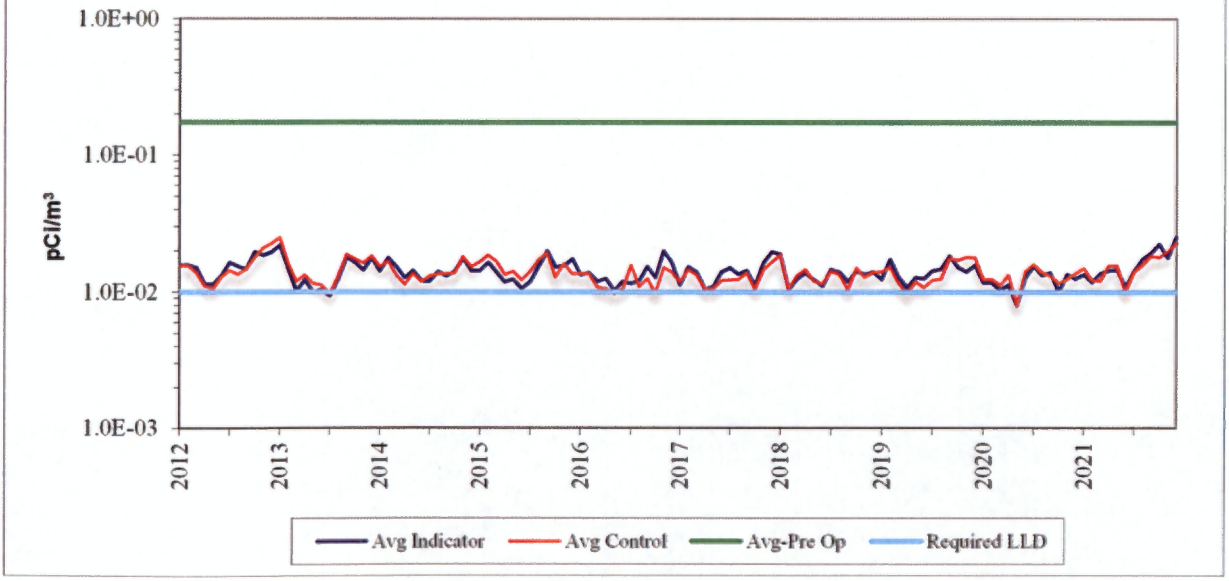


Figure 4-2:
GROSS BETA IN AIR PARTICULATES
10 YEAR HISTORICAL TREND



4.3 Airborne Radioiodine

Air is also continuously sampled for radioiodine by passing air through charcoal cartridges. Once a week, the charcoal cartridge samples are collected and analyzed. The results of the analyses are presented in Table 3-4. All results are below the lower limit of detection. No positive iodine-131 was detected in air samples in 2021.

4.4 Air Particulate Gamma

The air particulate filters from 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 beryllium-7, which is produced by cosmic processes. No man-made radionuclides were identified. These analyses confirm there are no effects from station effluents.

4.5 Animal Milk

Analysis of milk samples is generally the most sensitive indicator of fission product existence in the terrestrial environment. This, in combination with the significant human consumption of milk, results in this pathway often being the most critical as it relates to station radiological effluents. This pathway also shows measurable amounts of nuclear weapons testing fallout. Therefore, this media needs to be carefully evaluated when determining the effects from station effluents.

Results of gamma spectroscopy indicate no detectable station related radioactivity was identified in milk samples in 2021. Only naturally occurring potassium-40 was detected. The results of the analyses are presented in Table 3-6.

At the request of the Commonwealth of Virginia, a quarterly composite sample is prepared from the monthly milk samples from the Colonial Parkway collection station. The composite samples are analyzed for strontium-89 and strontium-90. No strontium-89 was detected in the four composites analyzed. Strontium-90 was detected in all four composite samples, with an average concentration of 1.76 pCi/L. Strontium-90 is not a component of station radiological effluents and is a product of nuclear weapons testing fallout.

4.6 Food Products

Three food product samples (corn, peanuts, and soybeans) were collected and analyzed by gamma spectroscopy. The results of the analyses are presented in Table 3-7. Only naturally occurring potassium-40 was detected in all samples. No station related radioactivity was detected in this pathway.

4.7 Well Water

Well water is not considered to be affected by station operations because there are no discharges made to this pathway. However, Surry Power Station monitors well water quarterly at three indicator locations. Well water samples are analyzed for gamma radiation and tritium. The results are presented in Table 3-8. No positive tritium or station related radioactivity was detected in 2021. Historically, during the pre-operational period, no gamma emitting isotopes were detected.

4.8 River Water

Samples of the James River water are collected monthly and the results are presented in Table 3-9. All samples are analyzed by gamma spectroscopy. The monthly samples are also composited and analyzed for tritium on a quarterly basis. No positive tritium or station related radioactivity was detected in this pathway in 2021. Only naturally occurring potassium-40 and thorium-228 were detected. No station related radioactivity was detected.

4.9 Silt

Silt is sampled to evaluate any buildup of radionuclides in the environment due to the operation of the station. Sampling of this pathway provides a good indication of the dispersion effects of effluents to the river. Buildup of radionuclides in silt could indirectly lead to increasing radioactivity levels in clams, oysters, crabs, and fish.

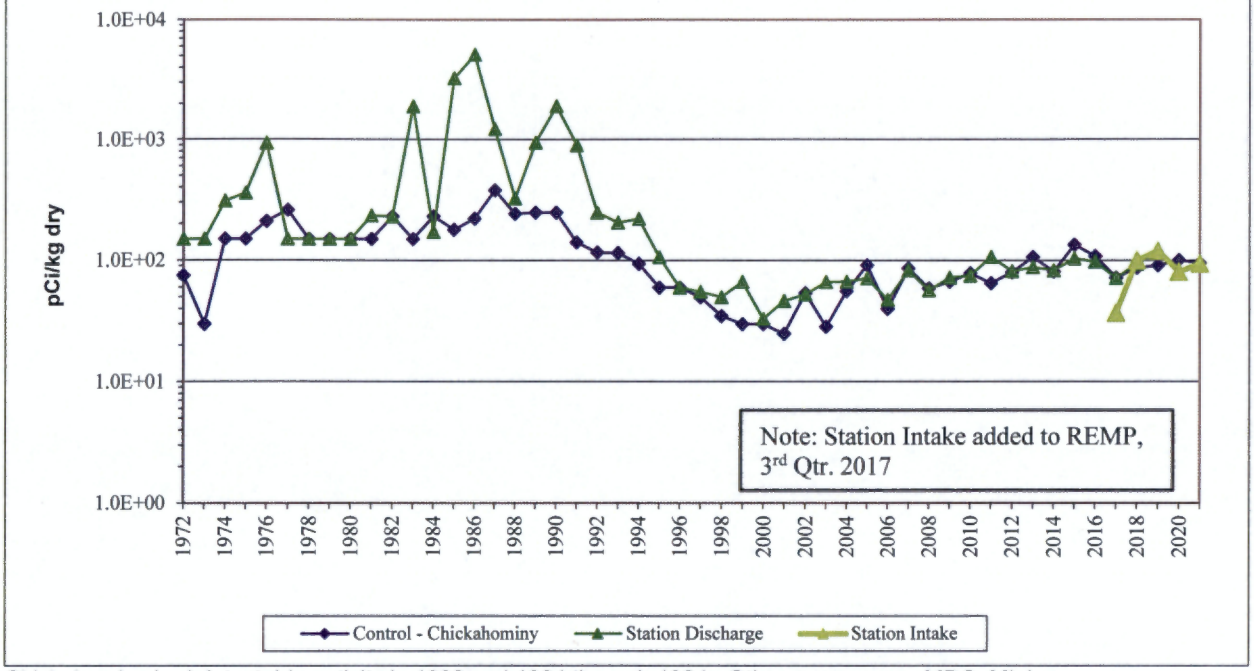
Samples of silt are collected from three locations: one upstream, one downstream of the station and one in the dredge area of the station intake. The station intake silt sample was added in 2017 to provide data for future station intake dredging operations. The results of the gamma spectroscopy analyses are presented in Table 3-10. Naturally occurring beryllium-7, potassium-40, radium-226, actinium-228, thorium-228, and thorium-232 were detected. Historically, cobalt-60 has been detected in samples obtained from the station discharge indicator location. Cobalt-60 has not been detected since 2003. A trend of cesium-137 and cobalt-60 concentrations is graphed and presented in Figures 4-4 and 4-5. For three decades, the general concentration for cesium-137 has continued to decrease. This trend is the calculated average of the semi-annual analysis results.

The presence of cesium-137 in indicator location, Station Intake, and control location, Chick is indicative of the accumulation, through runoff, of cesium-137 into the James River from residual weapons testing fallout. Samples collected from the James River, during the pre-operational period, indicated the presence of cesium-137. The pre-operational average cesium-137 concentration is indicated in Figure 4-5.

The Station Intake indicator sample was added to the REMP in 2017. The additional sample is collected in the dredge channel area at the station intake. The dredge channel is approximately 150' wide and 1750' in length. This location was added to support future station intake channel dredging operations. The trend of cesium-137 concentration in silt in the station intake dredge channel is procedurally monitored and evaluated.

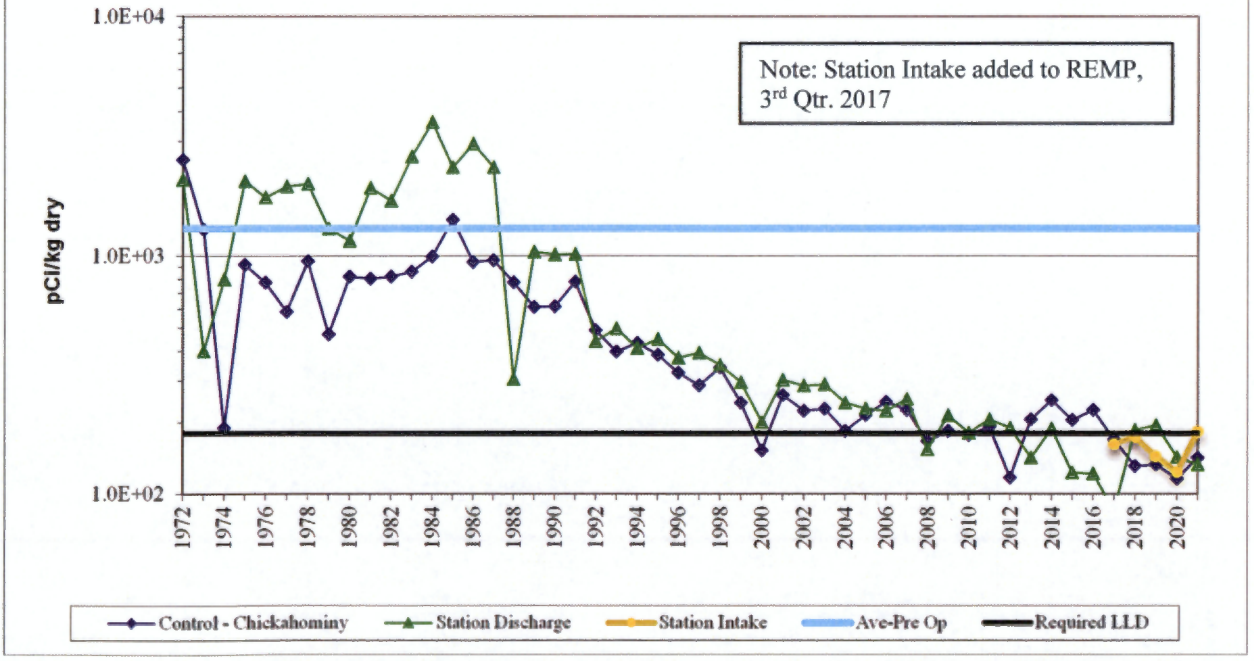
The highest silt indicator location in 2021 is the Station Intake with a cesium-137 concentration of 220 pCi/kg. This concentration remains consistent with aquatic sediment samples collected in control locations of the James River.

Figure 4-3:
COBALT-60 IN SILT



Chickahominy had detectable activity in 1982 and 1984 through 1994. Other years were <MDC, Minimum Detectable Concentration. Station Discharge was <MDC activity 1996 through 1998 and 2004 through 2021.

Figure 4-4:
CESIUM-137 IN SILT



4.10 Shoreline Sediment

Shoreline sediment, unlike river silt, may provide a direct dose to humans. A buildup of radionuclides along the shoreline may provide a source of direct exposure for those utilizing the area for commercial and recreational uses. The analysis results are presented in Table 3-11.

The naturally occurring radionuclides potassium-40, thorium-228, and thorium-232 were detected at concentrations equivalent to normal background activities. There were no radionuclides attributable to the operation of the station detected in any of the shoreline sediment samples.

4.11 Fish

The radioactivity measured in fish sampled from the Station Discharge Canal and analyzed by gamma spectroscopy is presented in Table 3-12. The 2021 results are similar to those seen over the last decade. Only naturally occurring potassium-40 was detected. No station related radioactivity was detected in this media.

4.12 Oysters

Oysters were collected from three different locations. The results of the oyster analyses are presented in Table 3-13. No gamma emitting radionuclides were detected in oysters sampled in 2021. No station related radioactivity has been detected in this media since 1991.

4.13 Clams

Clams are analyzed from three different locations. The results of the gamma spectroscopy analyses are presented in Table 3-14. No gamma emitting radionuclides related to station effluents were detected in clams sampled in 2021.

4.14 Crabs

The annual crab sample was collected from the Station Discharge and analyzed by gamma spectroscopy. The results of the analysis are presented in Table 3-15. Other than naturally occurring potassium-40, no other gamma emitting radionuclides related to station effluents were detected in this media. This is consistent with pre-operational data and data collected over the past decade.

5. PROGRAM EXCEPTIONS

There were two exceptions to the REMP sampling schedule in 2021.
The two exceptions are detailed below:

1. The Colonial Parkway (CP) milk sample from August 2021 was not found at the vendor lab when creating the 3rd quarter Sr-89/90 composite. The quarterly composite is composed of July and September samples only.

2. One of three TLDs from locations: (06) NNE, (22) ALL, (28) 617/618, and (39) JRB was discovered missing at the vendor lab for the fourth quarter. Standard quarter dose was calculated from these locations using two TLDs.

6. CONCLUSIONS

The results of the 2021 Radiological Environmental Monitoring Program for Surry Power Station are recorded and discussed previously in this document. This section provides a conclusion of each listed pathway.

- **Direct Radiation Exposure Pathway** - There was no detectable external dose to members of the public from Surry Power Station in 2021.
  Note: The units for the Direct Radiation Exposure Pathway as presented in Table 3-1 are now recorded in units of mRem/Standard Quarter to match units in the Gamma Exposure Rate recorded in Table 3-2.

- **Airborne Exposure Pathway** – Radioiodine analyses of charcoal cartridge samples indicated that no positive activity was detected. Quarterly gamma isotopic analyses of the composite particulate samples identified only naturally occurring beryllium-7. All indicator locations for air particulate gross beta concentrations trend well with the control locations. The effluent data was reviewed for the period of interest and concluded the station contribution is not measurable.

- **Milk** - Milk samples are an important indicator measuring the effect of radioactive iodine and radionuclides in airborne releases. No positive cesium-137 or iodine-131 activity was detected in any of the thirty-six samples. Naturally occurring potassium-40 was detected in this pathway at levels are similar to historical values.

  Strontium-90 was detected in each of the quarterly composite samples with an average concentration of 1.76 pCi/L. Strontium-90 is not a component of station effluents, but rather, a product of nuclear weapons testing fallout.

- **Food Products** – Only naturally occurring potassium-40 was detected in all three food product samples. Historically, cesium-137 had occasionally been detected in these samples and is attributable to global fallout from past nuclear weapons testing. No positive cesium-137 activity was detected in food product samples in 2021

- **Well Water** - Well water samples were analyzed for gamma emitting radionuclides and tritium. Well water sample analyses indicate no radioactivity was attributable to the operation of the station.

- **River Water** - River water samples were analyzed for gamma emitting radionuclides and tritium. Only naturally occurring potassium-40 and thorium-228 were detected. No positive tritium activity was detected.

- **Silt** – No radioactivity attributable to the operation of the station was detected in the control location. Only naturally occurring potassium-40, radium-226, thouium-228, and thorium-232 were detected.

  The indicator sample with the highest concentration of cesium-137 during 2021 is the station intake sample, with a concentration of 220 pCi/kg. This concentration is consistent with aquatic sediment samples collected in control locations of the James River. Naturally occurring beryllium-7, potassium-40, radium-226, thouium-228, thorium-232, and actinium-228 were also detected.

- **Shoreline Sediment** - There were no radionuclides attributable to the operation of Surry Power Station identified in any sample. Naturally occurring potassium-40, thorium-228, and thorium-232 were detected at concentrations equivalent to normal background activities.

Aquatic Biota

- **Fish** – Only naturally occurring potassium-40 was detected. There were no other positive gamma emitting radionuclides detected in any of the fish samples.

- **Oysters** – No positive gamma emitting radionuclides were detected in any of the oyster samples.

- **Clams -** No positive gamma emitting radionuclides were detected in any of the clam samples.

- **Crabs** – Other than naturally occurring potassium-40, there were no other positive gamma emitting radionuclides detected in any of the clam samples.

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References

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

2. 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.

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

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5. Dominion, Station Administrative Procedure, VPAP-2103S, "Offsite Dose Calculation Manual (Surry)".

6. Virginia Electric and Power Company, Surry Power Station Technical Specifications, Units 1 and 2.

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

8. NUREG/CR-4007, "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," September 1984.

9. NCRP Report No. 160, "Ionizing Radiation Exposure of the Population of the United States," March 2009.

10. Position paper on "Implementation of ANSI/HPS N13.37-2014 Environmental Dosimetry Criteria at Surry Power Station", November 2016 by John M. Sukosky, CHP.

APPENDICES

APPENDIX A: LAND USE CENSUS

Year 2021

*LAND USE CENSUS**

Surry Power Station, Surry County, Virginia

January 1 - December 31, 2021

Sector	Direction	Nearest Resident	Nearest Garden **	Nearest Cow	Nearest Goat
A	N	4.1 @ 10°	(a)	(a)	(a)
B	NNE	1.9 @ 32°	(a)	(a)	(a)
C	NE	4.7 @ 35°	(a)	(a)	(a)
D	ENE	(a)	(a)	(a)	(a)
E	E	(a)	(a)	(a)	(a)
F	ESE	(a)	(a)	(a)	(a)
G	SE	2.8 @ 142°	(a)	(a)	(a)
H	SSE	2.7 @ 158°	2.7 @ 158°	(a)	(a)
J	S	1.7 @ 181°	2.0 @ 183°	(a)	(a)
K	SSW	1.9 @ 192°	1.9 @ 192°	4.8 @ 200°	(a)
L	SW	1.2 @ 216°	4.7 @ 228°	(a)	(a)
M	WSW	0.4 @ 244°	3.6 @ 245°	(a)	(a)
N	W	3.1 @ 260°	3.4 @ 260°	(a)	(a)
P	WNW	4.9 @ 283°	(a)	(a)	(a)
Q	NW	4.6 @ 321°	(a)	(a)	(a)
R	NNW	3.8 @ 338°	4.4 @ 334°	3.7 @ 336°	(a)

* Locations are listed by miles and degrees heading relative to true north from center of Unit 1 Containment.

** Area greater than 50 m^2 and contains broadleaf vegetation.

(a) None

APPENDIX B: SUMMARY OF INTERLABORATORY COMPARISONS

Year 2021

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

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

For the TBE laboratory, 146 out of 154 analyses performed met the specified acceptance criteria. Seven analyses did not meet the specified acceptance criteria and were addressed through the TBE Corrective Action Program. *NOTE: One analysis (soil for Tc-99) that did not meet acceptance criteria was performed for TBE information and is not on the list of required ICP analyses.* A summary is found below:

1. The ERA MRAD March 2021 Water Fe-55 result was evaluated as *Not Acceptable*. The reported value for Fe-55 was 579 pCi/L and the known result was 275 pCi/L (acceptance range 162 - 400). When reviewing the original sample data, it was found that the carrier yield was 52.6% (lower than typical water samples). Looking at the etched plate that was counted, it appeared that some loss of sample could have occurred. The sample was logged for reanalysis and used as the workgroup duplicate. The results were acceptable at 197 and 221 respectively. Yields were 97.4% and 105.7% and the plated samples were centered with no apparent loss of sample. The loss of sample during plating resulted in a low yield which produced an artificially high sample result. (NCR 21-01)

2. The MAPEP February 2021 AP Gross Alpha result was evaluated as *Not Acceptable*. The reported value was 0.371 Bq/sample and the known result was 1.77 Bq/sample (acceptance range 0.53 - 3.01). A similar failure had occurred several years prior due to the filter being placed with the wrong side up on the detector. At that time, a small dot was placed on the top of the filter prior to removal from the package to indicate the correct side for counting. The current sample was still in the detector when the result was received (dot side facing the detector). The sample was recounted with a similar result and was flipped and recounted. The flipped result was 0.661 Bq/sample, within the acceptable range. Because TBE cannot rely on receiving correct packaging from the provider, MAPEP AP cross-checks will be counted on both sides going forward. *NOTE: The August sample had the same packaging issue (upside down).* (NCR 21-02)

3. The MAPEP February 2021 soil Ni-63 was evaluated as *Not Acceptable*. The reported value was 310 Bq/kg and the known result was 689 (acceptance range 482 - 896). All workgroup QC was reviewed with no anomalies. The analytical procedure had been revised prior to this analysis to eliminate added interferences. The sample yield was >100%, indicative of incomplete separation from interferences, leading to a lower result. The procedure was again revised after acceptable results were obtained. (NCR 21-03)

4. The ERA October 2021 water Gross Beta result was evaluated as *Not Acceptable*. The reported value was 63.0 pCi/L and the known was 55.7 (acceptance range 38.1 - 62.6) or 113% of the known. The 2-sigma error was 6.8, placing the reported result well within the acceptable range. All QA was reviewed with no anomalies. A follow-up Quick Response cross-check was analyzed with a 120% ratio (see item 7). (NCR 21-10)

5. The ERA October 2021 water Tritium result was evaluated as *Not Acceptable*. The reported value was 13,800 pCi/L and the known was 17,200 (acceptance range 15,000 - 18,900). The 2-sigma error was 1,430, placing the result within the acceptable range. TBE's internal QC acceptance is 70% - 130%, while ERA's for this sample was 87% - 110%. All QA was reviewed with no anomalies. A Quick Response follow-up cross-check was analyzed with a result of 17,500 pCi/L (known 17,800 pCi/L). (NCR 21-11)

6. The MAPEP August 2021 soil Ni-63 result was evaluated as *Not Acceptable*. The reported value was 546 Bq/kg and the known result was 1,280 Bq/kg (acceptance range 896 - 1,664). All QC was reviewed and no anomalies found. The procedure revision to remove added MAPAP interferences was ineffective for this sample. No client soil matrix samples were analyzed for Ni-63 in 2020 or 2021. The root cause investigation is still ongoing at this time. (NCR 21-13)

7. The ERA December 2021 Quick Response water Gross Beta result was evaluated as *Not Acceptable*. The reported value was 47.6 pCi/L and the known was 39.8 pCi/L or 120% of the known (acceptance range of 26.4 - 47.3). The 2-sigma error was 6.1, placing the reported result well within the acceptable range. All QA was reviewed with no anomalies. The original sample was recounted on a different detector with a result of 40.3 ± 6.27 pCi/L. The "failure" of this sample and the RAD-127 was due to the narrow upper acceptance ranges assigned (119% and 112%) (NCR 21-14)

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

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
March 2021	E13466	Milk	Sr-89	pCi/L	84.6	87.1	0.97	A
			Sr-90	pCi/L	11.5	12.6	0.91	A
	E13467	Milk	Ce-141	pCi/L	111	125	0.89	A
			Co-58	pCi/L	123	128	0.96	A
			Co-60	pCi/L	140	154	0.91	A
			Cr-51	pCi/L	252	242	1.04	A
			Cs-134	pCi/L	130	151	0.86	A
			Cs-137	pCi/L	110	110	1.00	A
			Fe-59	pCi/L	105	109	0.96	A
			I-131	pCi/L	77.6	86.9	0.89	A
			Mn-54	pCi/L	111	112	0.99	A
			Zn-65	pCi/L	200	211	0.95	A
	E13468	Charcoal	I-131	pCi	83.5	88.5	0.94	A
	E13469	AP	Ce-141	pCi	103.0	103	1.00	A
			Co-58	pCi	93.3	105	0.89	A
			Co-60	pCi	136	126	1.08	A
			Cr-51	pCi	213	198	1.07	A
			Cs-134	pCi	123.0	124	0.99	A
			Cs-137	pCi	86.3	90.1	0.96	A
			Fe-59	pCi	81.3	89.6	0.91	A
			Mn-54	pCi	93.5	92.0	1.02	A
			Zn-65	pCi	166	173	0.96	A
	E13470	Soil	Ce-141	pCi/g	0.232	0.262	0.89	A
			Co-58	pCi/g	0.251	0.268	0.94	A
			Co-60	pCi/g	0.306	0.322	0.95	A
			Cr-51	pCi/g	0.517	0.506	1.02	A
			Cs-134	pCi/g	0.263	0.317	0.83	A
			Cs-137	pCi/g	0.278	0.301	0.92	A
			Fe-59	pCi/g	0.228	0.229	1.00	A
			Mn-54	pCi/g	0.221	0.235	0.94	A
			Zn-65	pCi/g	0.448	0.441	1.02	A
	E13471	AP	Sr-89	pCi	92.2	95.5	0.97	A
			Sr-90	pCi	11.7	13.9	0.84	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.1 Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
September 2021	E13472	Milk	Sr-89	pCi/L	66.4	85.4	0.78	W
			Sr-90	pCi/L	11.9	14.0	0.85	A
	E13473	Milk	Ce-141	pCi/L	118	114	1.03	A
			Co-58	pCi/L	116	118	0.98	A
			Co-60	pCi/L	142	145	0.98	A
			Cr-51	pCi/L	244	236	1.03	A
			Cs-134	pCi/L	81	93.1	0.87	A
			Cs-137	pCi/L	105	112	0.94	A
			Fe-59	pCi/L	105	102	1.03	A
			I-131	pCi/L	65.1	85.6	0.76	W
			Mn-54	pCi/L	128	128	1.00	A
			Zn-65	pCi/L	158	153	1.03	A
	E13474	Charcoal	I-131	pCi	85.2	90.9	0.94	A
	E13475	AP	Ce-141	pCi	126	135	0.94	A
			Co-58	pCi	148	139	1.07	A
			Co-60	pCi	183	171	1.07	A
			Cr-51	pCi	322	278	1.16	A
			Cs-134	pCi	118	110	1.08	A
			Cs-137	pCi	147	132	1.12	A
			Fe-59	pCi	131	120	1.09	A
			Mn-54	pCi	161	151	1.06	A
			Zn-65	pCi	202	180	1.12	A
	E13476	Soil	Ce-141	pCi/g	0.215	0.219	0.98	A
			Co-58	pCi/g	0.208	0.226	0.92	A
			Co-60	pCi/g	0.277	0.277	1.00	A
			Cr-51	pCi/g	0.388	0.452	0.86	A
			Cs-134	pCi/g	0.157	0.178	0.88	A
			Cs-137	pCi/g	0.270	0.284	0.95	A
			Fe-59	pCi/g	0.218	0.195	1.12	A
			Mn-54	pCi/g	0.239	0.246	0.97	A
			Zn-65	pCi/g	0.312	0.293	1.06	A
	E13477	AP	Sr-89	pCi	85.6	68.3	1.25	W
			Sr-90	pCi	12.6	11.2	1.13	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 Reported Value	Known Value [a]	Acceptance Range	Evaluation [b]
February 2021	21-GrF44	AP	Gross Alpha	Bq/sample	0.371	1.77	0.53 - 3.01	N[3]
			Gross Beta	Bq/sample	0.731	0.65	0.325 - 0.974	A
	21-MaS44	Soil	Ni-63	Bq/kg	310	689.0	482 - 896	N[4]
			Tc-99	Bq/kg	457	638	447 - 829	W
	21-MaSU44	Urine	Cs-134	Bq/L	2.34	2.73	1.91 - 3.55	A
			Cs-137	Bq/L	2.54	2.71	1.90 - 3.52	A
			Co-57	Bq/L	0.4100		*(1)*	A
			Co-60	Bq/L	2.24	2.44	1.71 - 3.17	A
			Mn-54	Bq/L	2.03	2.03	1.42 - 2.64	A
			K-40	Bq/L	52.8	54.0	38 - 70	A
			U-234	Bq/L	0.108	0.0877	0.0614 - 0.114	W
			U-238	Bq/L	0.101	0.091	0.064 - 0.118	A
			Zn-65	Bq/L	1.06	1.34	*(2)*	A
	21-MaW44	Water	Ni-63	Bq/L	6.7	8.2	5.7 - 10.7	A
			Tc-99	Bq/L	3.850	4.01	2.81 - 5.21	A
	21-RdV44	Vegetation	Cs-134	Bq/sample	3.13	3.60	2.5 - 4.7	A
			Cs-137	Bq/sample	4.64	4.69	3.28 - 6.10	A
			Co-57	Bq/sample	5.25	5.05	3.54 - 6.57	A
			Co-60	Bq/sample	2.86	2.99	2.09 - 3.89	A
			Mn-54	Bq/sample	5.02	5.25	3.68 - 6.83	A
			Sr-90	Bq/sample	0.631	0.673	0.471 - 0.875	A
			Zn-65	Bq/sample	-0.233		*(1)*	A
August 2021	21-GrF45	AP	Gross Alpha	Bq/sample	0.368	0.960	0.288 - 1.632	A
			Gross Beta	Bq/sample	0.595	0.553	0.277 - 0.830	A
	21-MaS45	Soil	Ni-63	Bq/kg	546	1280	896 - 1664	N[5]
			Tc-99	Bq/kg	453	777	544 - 1010	N[6]
	21-MaSU45	Urine	Cs-134	Bq/L	3.10	3.62	2.53 - 4.71	A
			Cs-137	Bq/L	0.083		*(1)*	A
			Co-57	Bq/L	0.844	0.87	0.606 - 1.125	A
			Co-60	Bq/L	0.0535		*(1)*	A
			Mn-54	Bq/L	0.459	0.417	*(2)*	A
			K-40	Bq/L	48.8	54.0	38 - 70	A
			U-234	Bq/L	0.133	0.116	0.081 - 0.151	A
			U-238	Bq/L	0.137	0.121	0.085 - 0.157	A
			Zn-65	Bq/L	0.339	0.420	*(2)*	A
	21-MaW45	Water	Ni-63	Bq/L	33.5	39.5	27.7 - 51.4	A
			Tc-99	Bq/L	3.5	3.7	2.60 - 4.82	A
	21-RdV45	Vegetation	Cs-134	Bq/sample	3.42	4.34	3.04 - 5.64	W
			Cs-137	Bq/sample	2.14	2.21	1.55 - 2.87	A
			Co-57	Bq/sample	4.08	4.66	3.26 - 6.06	A
			Co-60	Bq/sample	2.81	3.51	2.46 - 4.56	A
			Mn-54	Bq/sample	0.035		*(1)*	A
			Sr-90	Bq/sample	1.15	1.320	0.92 - 1.72	A
			Zn-65	Bq/sample	2.05	2.43	1.70 - 3.16	A

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

(b) DOE/MAPEP evaluation:
A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

(1) False positive test
(2) Sensitivity evaluation
*(3) See **NCR 21-02***
*(4) See **NCR 21-03***
*(5) See **NCR 21-13***
(6) Tc-99 cross-checks done for TBE information only - not required

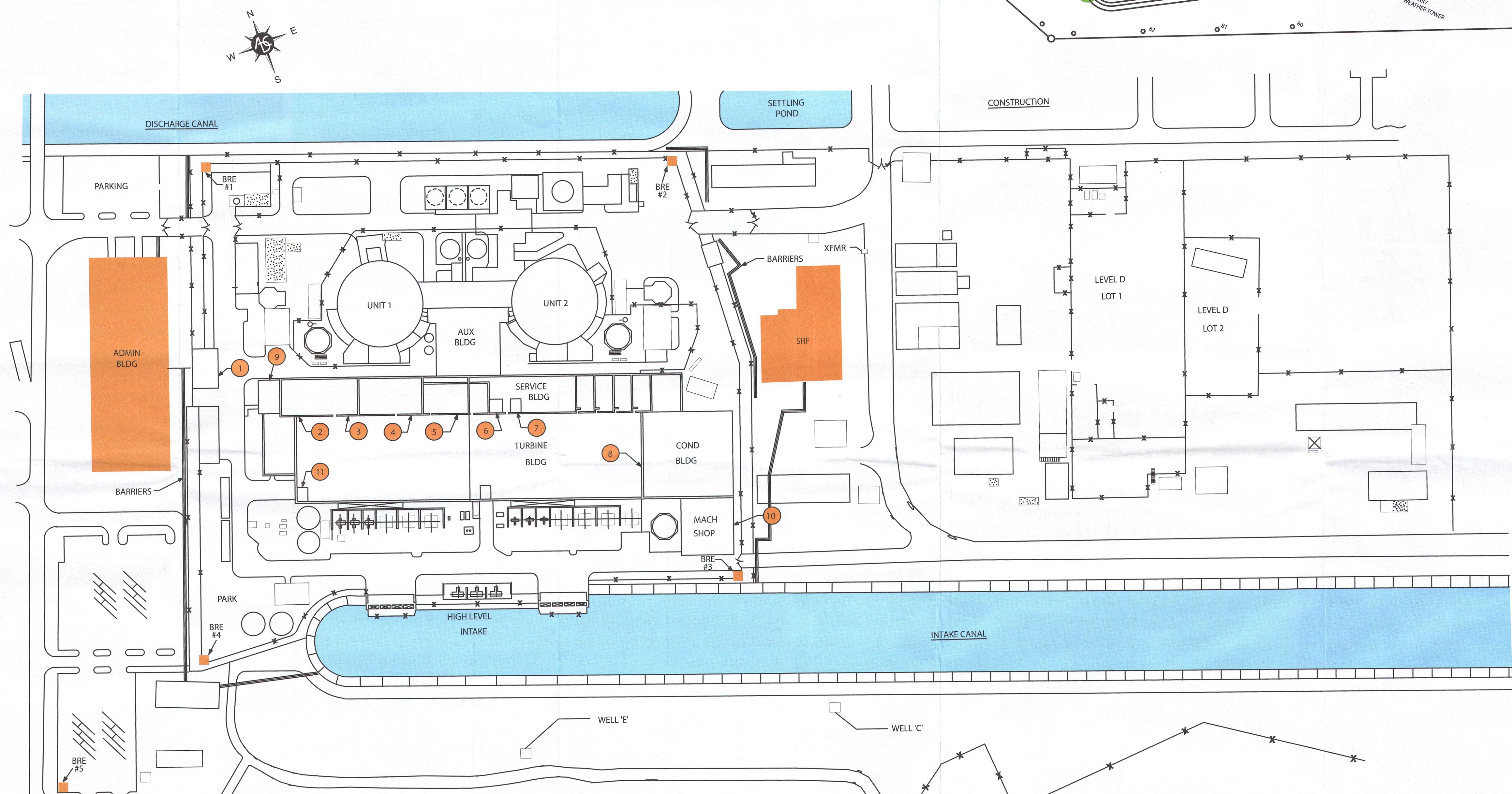
A.3 ERA Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Limits	Evaluation [b]
March 2021	MRAD-34	Water	Am-241	pCi/L	175	157	108 - 201	A
			Fe-55	pCi/L	579	275	162 - 400	N(1)
			Pu-238	pCi/L	181	171	103 - 222	A
			Pu-239	pCi/L	153	142	87.9 - 175	A
		Soil	Sr-90	pCi/kg	6570	9190	2860 - 14,300	A
		AP	Fe-55	pCi/filter	107	121	44.2 - 193	A
			U-234	pCi/filter	25.99	25.5	18.9 - 29.9	A
			U-238	pCi/filter	24.7	25.3	19.1 - 30.2	A
April 2021	RAD-125	Water	Ba-133	pCi/L	92.3	90.5	76.2 - 99.6	A
			Cs-134	pCi/L	62.9	70.5	57.5 - 77.6	A
			Cs-137	pCi/L	161	168	151 - 187	A
			Co-60	pCi/L	22.5	20.9	17.7 - 25.8	A
			Zn-65	pCi/L	183	177.0	159 - 208	A
			GR-A	pCi/L	30.8	30.2	15.4 - 39.4	A
			GR-B	pCi/L	60.1	67.5	46.8 - 74.2	A
			U-Nat	pCi/L	36.45	36.9	30.0 - 40.8	A
			H-3	pCi/L	13,400	14,600	12,800 - 16,100	A
			Sr-89	pCi/L	64.5	63.5	51.4 - 71.5	A
			Sr-90	pCi/L	22.8	23.0	16.5 - 27.0	A
			I-131	pCi/L	28.2	26.7	22.2 - 31.4	A
September 2021	MRAD-35	Water	Am-241	pCi/L	68	63.7	43.7 - 81.5	A
			Fe-55	pCi/L	179	246	145 - 358	A
			Pu-238	pCi/L	102	114	68.5 - 148	A
			Pu-239	pCi/L	32	34.3	21.2 - 42.3	A
		Soil	Sr-90	pCi/kg	6160	6090	1,900 - 9,490	A
		AP	Fe-55	pCi/filter	493	548	200 - 874	A
			Pu-238	pCi/filter	28	28.5	21.5 - 35.0	A
			Pu-239	pCi/filter	21	21.6	16.1 - 26.1	A
			U-234	pCi/filter	7.95	7.76	5.75 - 9.09	A
			U-238	pCi/filter	8.0	7.69	5.81 - 9.17	A
October 2021	RAD-127	Water	Ba-133	pCi/L	82.8	87.5	73.6 - 96.2	A
			Cs-134	pCi/L	64.0	70.1	57.1 - 77.1	A
			Cs-137	pCi/L	145	156	140 - 174	A
			Co-60	pCi/L	83.2	85.9	77.3 - 96.8	A
			Zn-65	pCi/L	133	145	130 - 171	A
			GR-A	pCi/L	76.0	66.7	35.0 - 82.5	A
			GR-B	pCi/L	63.0	55.7	38.1 - 62.6	N(2)
			U-Nat	pCi/L	52.88	55.5	45.3 - 61.1	A
			H-3	pCi/L	13,800	17,200	15,000 - 18,900	N(3)
			Sr-89	pCi/L	54.9	61.0	49.1 - 68.9	A
			Sr-90	pCi/L	24.8	29.3	21.3 - 34.0	A
			I-131	pCi/L	27.4	26.4	21.9 - 31.1	A
December 2021	QR 120121Y	Water	GR-B	pCi/L	47.6	39.8	26.4 - 47.3	N(4)
			H-3	pCi/L	17,500	17,800	15,600 - 19,600	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 21-01***
*(2) See **NCR 21-10***
*(3) See **NCR 21-11***
*(4) See **NCR 21-14***



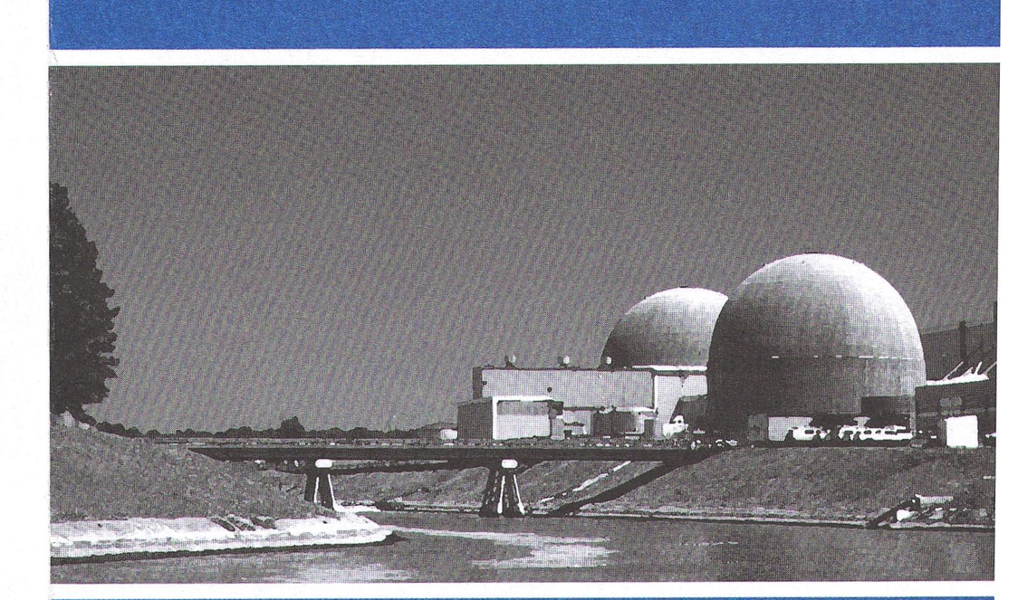
PERSONNEL ASSEMBLY AREA LEGEND

1. SECURITY
2. CHEMISTRY OFFICE
3. INSTRUMENT SHOP
4. TECHNICAL SUPPORT CENTER
5. CONTROL ROOM/CONTROL ROOM ANNEX
6. HEALTH PHYSICS OFFICE
7. HEALTH PHYSICS CLEAN CHANGE AREA
8. CONDENSATE POLISHING BUILDING
9. OPERATIONAL SUPPORT CENTER/WORK CONTROL CENTER
10. MACHINE SHOP
11. UNIT #1 TRACK BAY

Commonwealth of Virginia/ Dominion

Surry Emergency Plan Map

Monitoring Points



Dominion