VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 20, 2015

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

Serial No. 15-149
SS&L/JSA R0
Docket Nos. 50-280
50-281
72-2
72-55
License Nos. DPR-32
DPR-37
SNM-2501

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
INDEPENDENT SPENT FUEL STORAGE INSTALLATION
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, 2014 through December 31, 2014, which includes environmental monitoring for the Surry ISFSI.

If you have any further questions, please contact Jason Eggart at 757-365-2010.

Sincerely,

Douglas C. Lawrence
Director Safety & Licensing
Surry Power Station

Attachment

Commitments made in this letter: None

IE25
IE77
NMSS26

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

Director, Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001

NRC Senior Resident Inspector
Surry Power Station

Director
Division of Radiological Health
109 Governor Street, Room 730
Richmond, Virginia 23219

Serial No. 15-149
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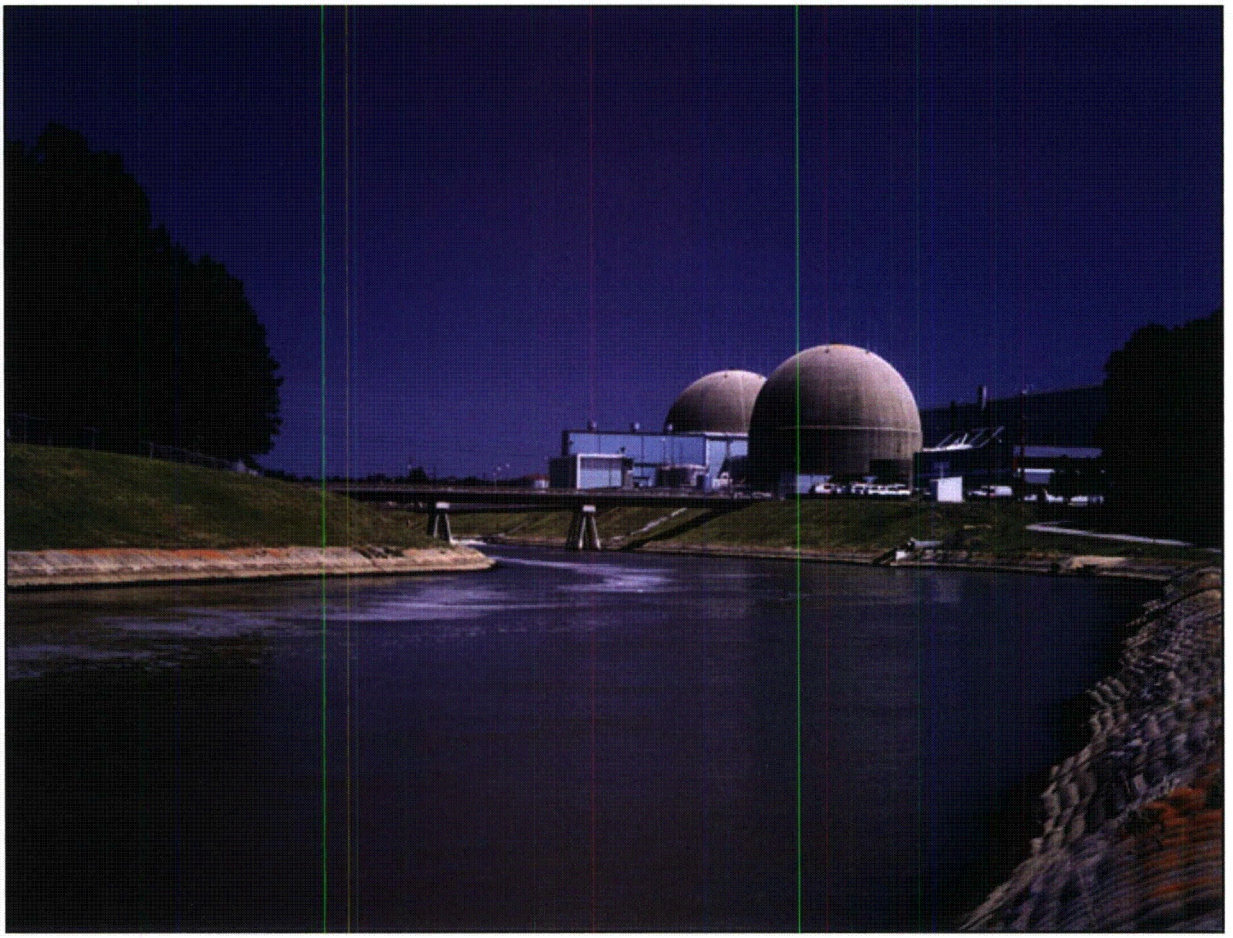
72-55

ATTACHMENT 1

2014 Annual Radiological Environmental Operating Report

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

Surry Power Station



2014 Annual Radiological Environmental Operating Report

Dominion®

Dominion

Surry Power Station

Radiological Environmental Monitoring Program

January 1, 2014 to December 31, 2014

Annual Radiological Environmental Operating Report

Surry Power Station

January 1, 2014 to December 31, 2014

Prepared by: P. F. Blount

P. F. Blount
Health Physicist

Reviewed by: P. R. Harris

P. R. Harris
Supervisor Radiological Analysis

Reviewed by: W. A. Terry

W. A. Terry
Supervisor Health Physics Technical Services

Approved by: Jason W Eggart

J. W. Eggart
Manager Radiological Protection and Chemistry

Table of Contents

PREFACE

This report is submitted as required by Technical Specification 6.6.B.2, Annual Radiological Environmental 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 2014 Surry Power Station Radiological Environmental Monitoring Program (REMP). Radioactivity levels from January 1 through December 31, 2014, 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. A number of sampling locations for each medium are selected using available meteorological, land use, and water use data. Two types of samples are obtained. 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 station contribution will be at the highest concentration.

Prior to station operation, samples were collected and analyzed to determine the amount of radioactivity present in the area. The resulting values are used as a "pre-operational baseline." Analysis results from the indicator samples are compared to 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 Global Dosimetry Solutions, Inc. 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 2014 airborne results were similar 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, 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. The cesium-137 activity was present in the control and indicator locations and is attributable to global fallout from past nuclear weapons testing and nuclear accidents such as Chernobyl. Shoreline sediment, which may provide a direct exposure pathway, contained no station related radionuclides. Naturally occurring radionuclides beryllium, potassium, radium and thorium were detected at average environmental levels. The terrestrial exposure pathway includes milk and food products. Iodine-131 was not detected in any 2014 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 man-made radionuclides were detected in food product samples. Consistent with historical data, naturally occurring potassium-40 was detected in milk and food products. The direct exposure pathway measures environmental radiation doses using TLDs. TLD results have remained relatively constant over the years.

During 2014, 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 2014 was 0.036 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 also demonstrate the adequacy of radioactive effluent controls at Surry Power Station.

2. PROGRAM DESCRIPTION

2.1 Introduction

This report documents the 2014 Surry Power Station operational Radiological Environmental Monitoring Program (REMP). The Dominion 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 is 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. Global Dosimetry Solutions Incorporated 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 2014 and satisfies the following objectives of the program:

- To provide measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposure of the maximum exposed member of the public resulting from station operations.

- To supplement the radiological effluent monitoring program by verifying that radioactive effluents are within allowable limits.

- To identify changes in radioactivity in the environment.

- To verify that station operations have no detrimental effect on the health and safety of the public.

2.2 Sampling and Analysis Program

Table 2-1 summarizes the 2014 sampling program for Surry Power Station. All samples listed in Table 2-1 are taken at indicator locations except those labeled "control." Dominion personnel collect all samples listed in Table 2-1.

Table 2-2 summarizes the analysis program conducted by Teledyne Brown Engineering and Global Dosimetry Solutions for Surry Power Station. All samples, with the exception of the TLDs, are shipped to Teledyne Brown Engineering, located in Knoxville, TN, for analysis. The TLDs are shipped to Global Dosimetry Solutions, located in Costa Mesa, CA, for processing.

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

Table 2-1

SURRY - 2014

RADIOLOGICAL SAMPLING STATIONS

DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance Miles	Direction	Degrees	Collection Frequency	Remarks
Environmental	Control	(00)	-	-	-	Quarterly	Onsite (Stored in a 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 mile
	Route 633	(21)	4.9	SW	227°	Quarterly	Apx. 5 mile
	Alliance	(22)	5.1	WSW	247°	Quarterly	Apx. 5 mile
	Surry	(23)	7.7	WSW	256°	Quarterly	Population Center
	Route 636 and 637	(24)	4.0	W	270°	Quarterly	Apx. 5 mile
	Scotland Wharf	(25)	5.0	WNW	284°	Quarterly	Apx. 5 mile
	Jamestown	(26)	6.3	NW	308°	Quarterly	Apx. 5 mile
	Colonial Parkway	(27)	3.8	NNW	333°	Quarterly	Apx. 5 mile
	Route 617 and 618	(28)	4.9	NNW	340°	Quarterly	Apx. 5 mile
	Kingsmill	(29)	4.6	N	2°	Quarterly	Apx. 5 mile
	Williamsburg	(30)	7.8	N	0°	Quarterly	Population Center
	Kingsmill North	(31)	5.5	NNE	12°	Quarterly	Apx. 5 mile
	Budweiser	(32)	5.8	NNE	27°	Quarterly	Population Center
	Water Plant	(33)	5.0	NE	46°	Quarterly	Apx. 5 mile

Table 2-1

SURRY - 2014
RADIOLOGICAL SAMPLING STATIONS
DISTANCE AND DIRECTION FROM UNIT NO. 1

Sample Media	Location	Station	Distance Miles	Direction	Degrees	Collection Frequency	Remarks
Environmental	BASF	(34)	5.1	ENE	70°	Quarterly	Apx. 5 mile
TLDs	Lee Hall	(35)	7.1	ENE	75°	Quarterly	Population Center
	Goose Island	(36)	5.1	E	90°	Quarterly	Apx. 5 mile
	Fort Eustis	(37)	4.9	ESE	104°	Quarterly	Apx. 5 mile
	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 mile
	Route 628	(43)	5.1	S	177°	Quarterly	Apx. 5 mile
Air Charcoal	Surry Station	(SS)	0.3	NNE	18°	Weekly	Site boundary location with highest D/Q
and **Particulate**	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	Hog Island Reserve	(HIR)	0.6	N	7°	Semi-Annually	
Sediment	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)	1.3	NNW	341°	Semi-Annually	

Table 2-1

SURRY - 2014

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	
	Williams	(WMS)	27.5	S	175°	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	
	Lawne's Creek	(LC)	2.4	SE	131°	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	Brock's Farm	(BROCK)	3.8	S	183°	Annually	
(Corn, Peanuts, Soybeans)	Slade's Farm	(SLADE)	3.2	S	179°	Annually	

Table 2-2

SURRY - 2014

SAMPLE ANALYSIS PROGRAM

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD*	REPORT UNITS
Thermoluminescent Dosimetry (TLD)	Quarterly	Gamma Dose	2	mR/Std. Month
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	
		Co-58	15	
		Fe-59	30	
		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	
		Co-58	15	
		Fe-59	30	
		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 - 2014

SAMPLE ANALYSIS PROGRAM

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	Sr-89	NA	pCi/L
	Composite of CP monthly sample	Sr-90	NA	
Oysters	Semi-Annually	Gamma Isotopic		pCi/kg - wet
		Mn-54	130	
		Co-58	130	
		Fe-59	260	
		Co-60	130	
		Zn-65	260	
		Cs-134	130	
		Cs-137	150	
Clams	Semi-Annually	Gamma Isotopic		pCi/kg - wet
		Mn-54	130	
		Co-58	130	
		Fe-59	260	
		Co-60	130	
		Zn-65	260	
		Cs-134	130	
		Cs-137	150	
Crabs	Annually	Gamma Isotopic		pCi/kg - wet
		Mn-54	130	
		Co-58	130	
		Fe-59	260	
		Co-60	130	
		Zn-65	260	
		Cs-134	130	
		Cs-137	150	

Footnotes located at end of table.

Table 2-2

SURRY - 2014

SAMPLE ANALYSIS PROGRAM

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD*	REPORT UNITS
Fish	Semi-Annually	Gamma Isotopic		pCi/kg - wet
		Mn-54	130	
		Co-58	130	
		Fe-59	260	
		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 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

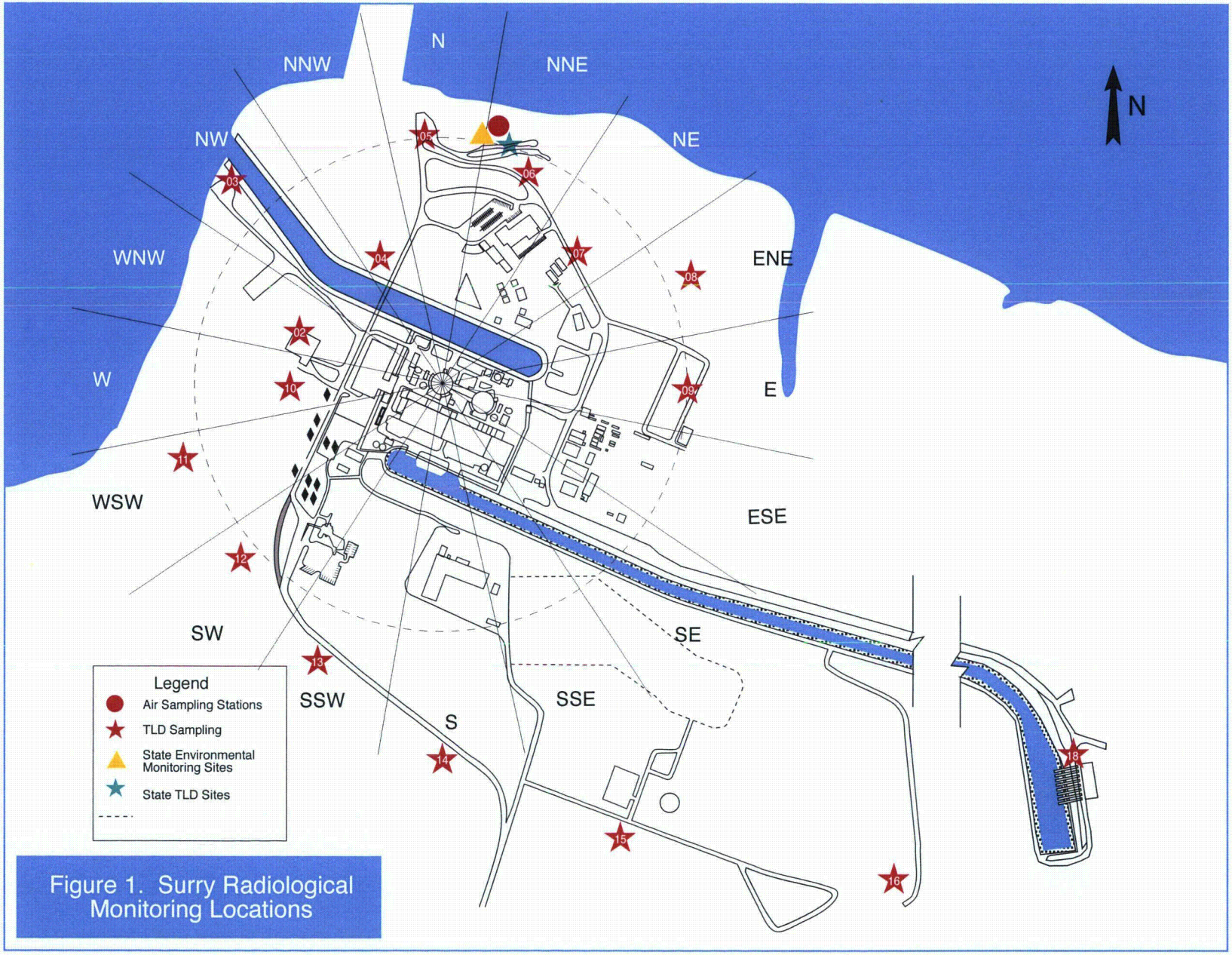


Figure 1. Surry Radiological Monitoring Locations

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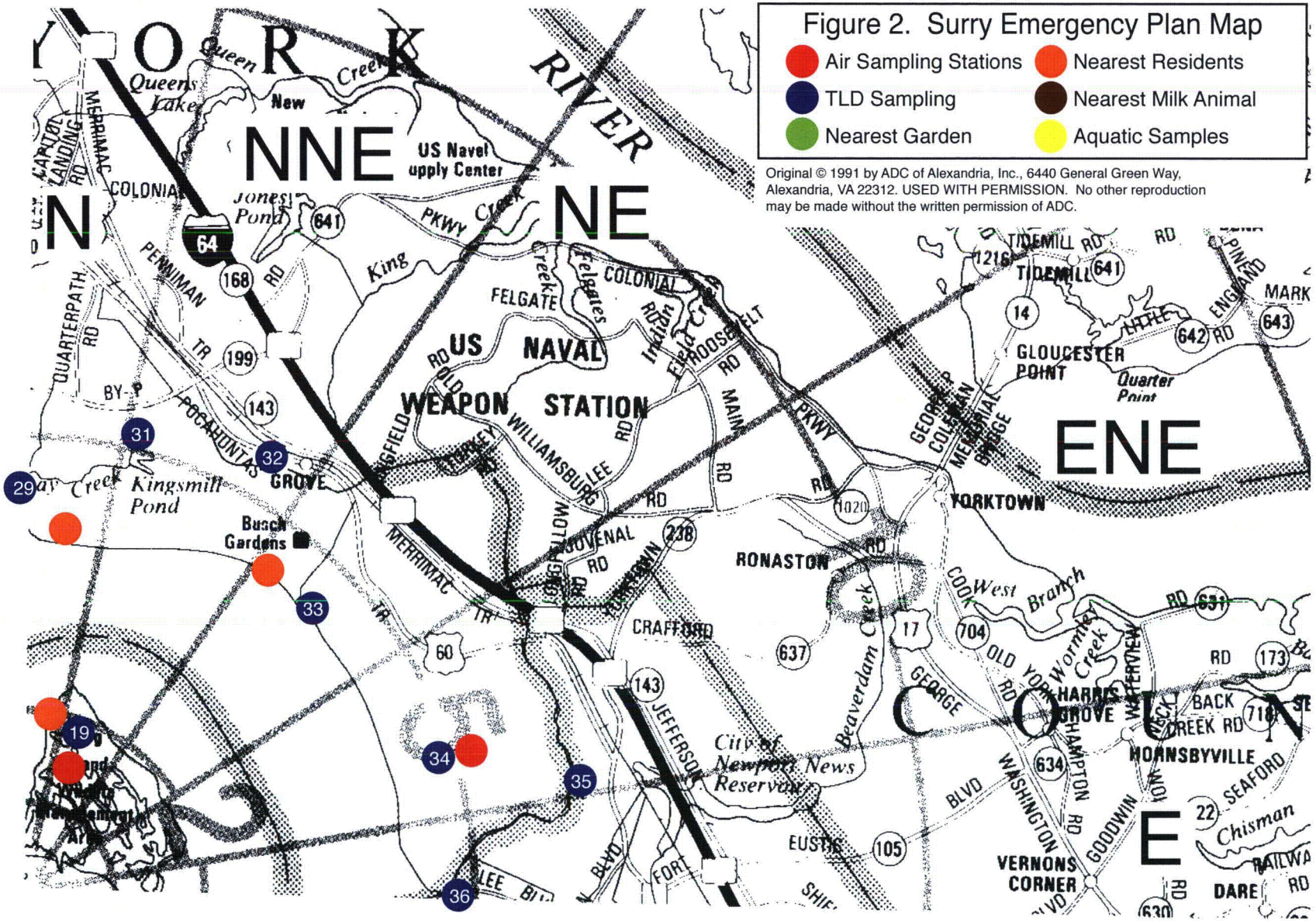
Figure 2. Surry Emergency Plan Map
Air Sampling Stations
Nearest Residents
TLD Sampling
Nearest Milk Animal
Nearest Garden
Aquatic Samples
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NNE
NE
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RIVER
US Naval upply Center
US NAVAL WEAPON STATION
YORKTOWN
GLOUCESTER POINT
RONASTON
CRAFFORD
HORNSBYVILLE
VERNONS CORNER
City of Newport News Reservoir
Kingsmill Pond
Busch Gardens
Jones Pond
Queens Lake
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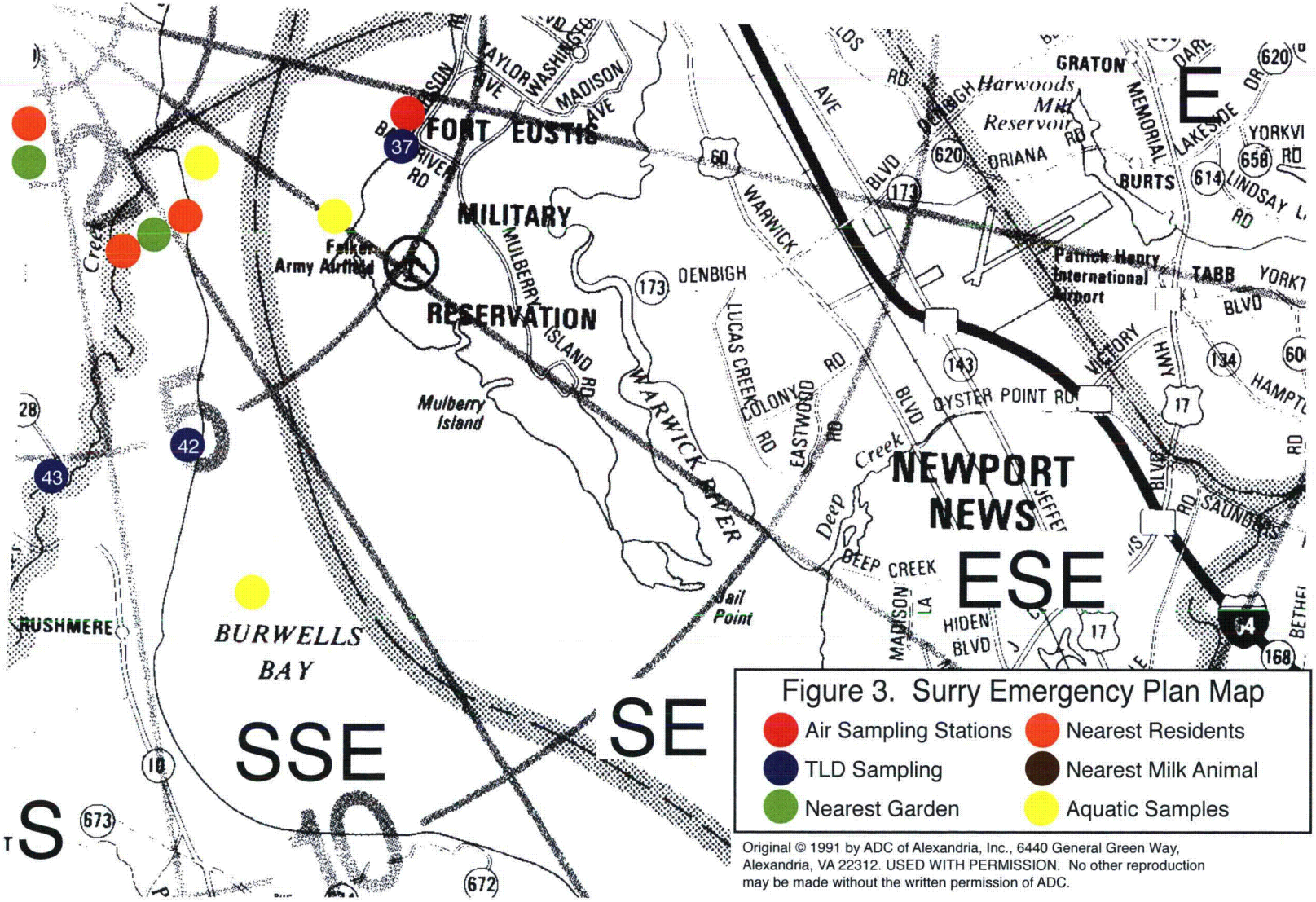


Figure 3. Surry Emergency Plan Map

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

Graphics No. CB3309A

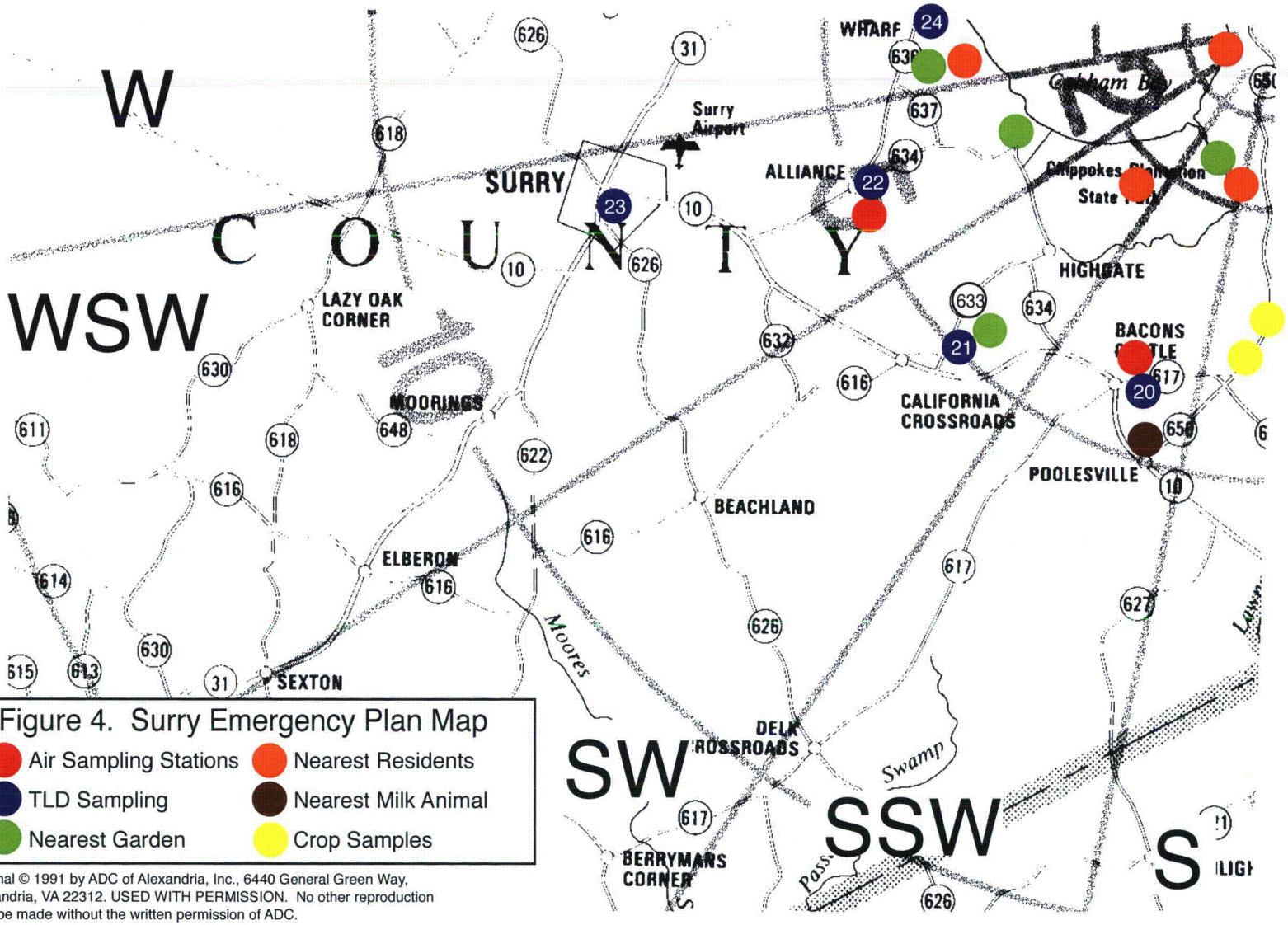
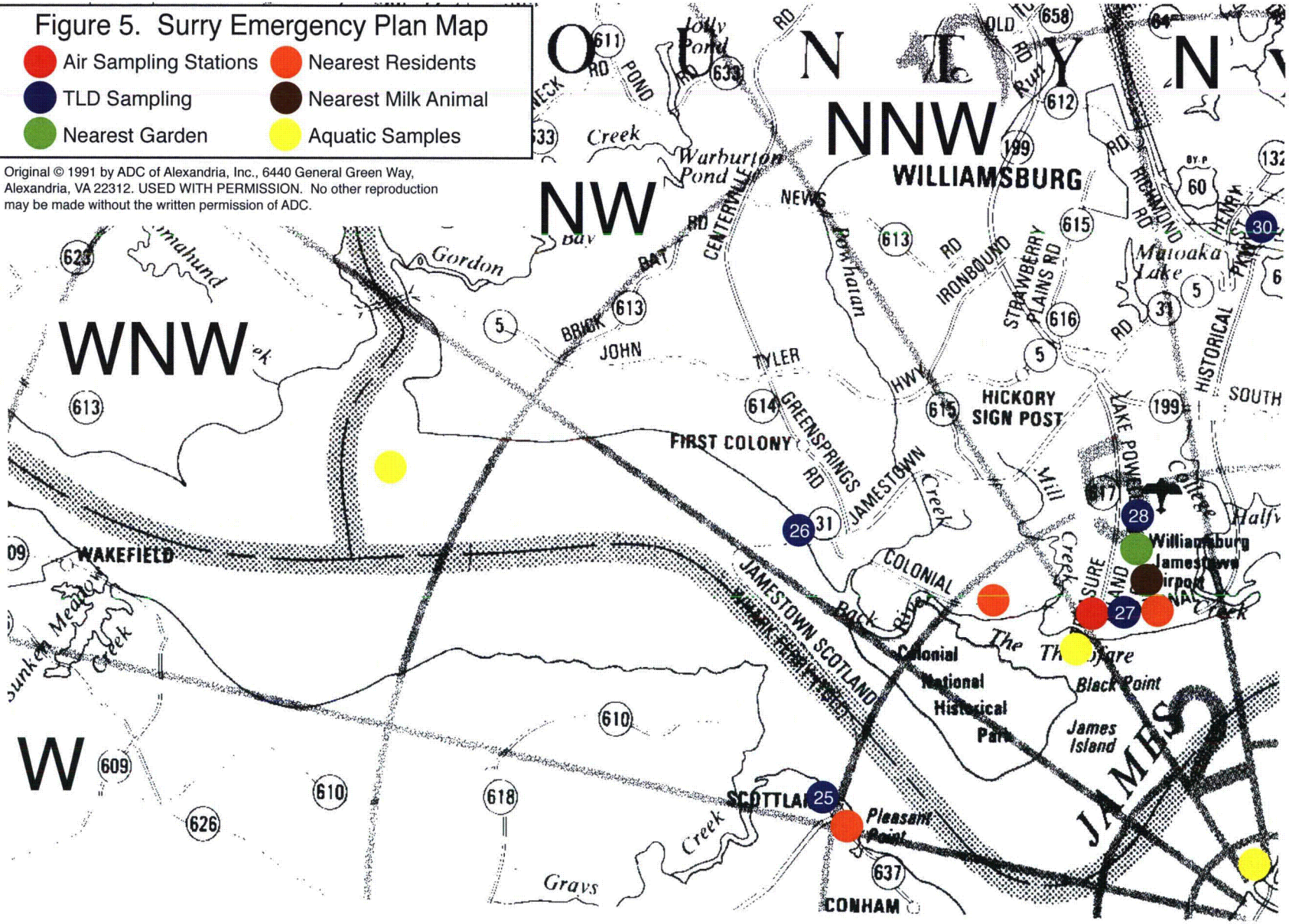


Figure 4. Surry Emergency Plan Map

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

Figure 5. Surry Emergency Plan Map

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



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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 given in Section 4.

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Surry Power Station, Surry County, Virginia - 2014
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Medium or Pathway Sampled (Units)	Analysis Type	Analysis Total No.	LLD	Indicator Locations Mean Range	Location with Highest Mean Name	Location with Highest Mean Distance Direction	Location with Highest Mean Mean Range	Control Locations Mean Range	Non-Routine Reported Measurements
Direct Radiation *TLD (mR/ Std Month)*	**Gamma**	164	2	**5.7 (151/152) (4.0 - 8.0)**	**STA-9**	**0.3 mi E**	**7.9 (4/4) (7.8 - 8.0)**	**6.0 (12/12) (5.0 - 7.9)**	0
Air Particulate *(1E-3 pCi/m3)*	**Gross Beta**	416	10	**14.3 (363/364) (3.69 - 33.1)**	**BC**	**4.5 mi SSW**	**17.0 (52/52) (3.69 - 27.0)**	**14.3 (52/52) (8.39 - 34.1)**	0
	Gamma	32							
	Be-7	32		**115 (28/28) (71.2 - 167)**	**BC**	**4.5 mi SSW**	**135 (4/4) (98.4 - 167)**	**105 (4/4) (82.1 - 124)**	0
	K-40	32		**14.9 (2/28) (11.5 - 18.2)**	**ALL**	**5.1 mi WSW**	**18.2 (1/4) (18.2 - 18.2)**	< LLD	0
	Cs-134	32	50	< LLD	N/A		< LLD	< LLD	0
	Cs-137	32	60	< LLD	N/A		< LLD	< LLD	0
Air Iodine *(1E-3 pCi/m3)*	**I-131**	416	70	< LLD	N/A		< LLD	< LLD	0
Milk *(pCi/Liter)*	**Strontium**	4							
	Sr-89	4		< LLD	N/A		< LLD	N/A	0
	Sr-90	4		**1.56 (2/4) (1.26 - 1.85)**	**CP**	**3.7 mi NNW**	**1.56 (2/4) (1.26 - 1.85)**	N/A	0
	Gamma	36							
	K-40	36		**1295 (24/24) (891 - 1560)**	**EPPS**	**4.8 mi SSW**	**1298 (12/12) (891 - 1560)**	**1275 (12/12) (1120 - 1460)**	0
	I-131	36	1	< LLD	N/A		< LLD	< LLD	0
	Cs-134	36	15	< LLD	N/A		< LLD	< LLD	0
	Cs-137	36	18	< LLD	N/A		< LLD	< LLD	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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Medium or Pathway Sampled (Units)	Analysis Type	Analysis Total No.	LLD	Indicator Locations Mean Range	Location with Highest Mean Name	Location with Highest Mean Distance Direction	Location with Highest Mean Mean Range	Control Locations Mean Range	Non-Routine Reported Measurements
Milk *(pCi/Liter)*	**Gamma**	36							
	Ba-140	36	60	< LLD	N/A		< LLD	< LLD	0
	La-140	36	15	< LLD	N/A		< LLD	< LLD	0
	Th-228	36		<LLD	**WMS**	**27.5 mi S**	**27.3 (1/12) (27.3 - 27.3)**	**27.3 (1/12) (27.3 - 27.3)**	0
Food Products *(pCi/kg wet)*	**Gamma**	3							
	K-40	3		**8167 (3/3) (4180 - 13900)**	**Slade**	**3.2 mi S**	**13900 (1/1) (13900-13900)**	N/A	0
	I-131	3	60	< LLD	N/A		< LLD	N/A	0
	Cs-134	3	60	< LLD	N/A		< LLD	N/A	0
	Cs-137	3	80	< LLD	N/A		< LLD	N/A	0
Well Water *(pCi/Liter)*	**H-3**	12	2000	< LLD	N/A		< LLD	N/A	0
	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

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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Medium or Pathway Sampled (Units)	Analysis Type	Analysis Total No.	LLD	Indicator Locations Mean Range	Location with Highest Mean Name	Location with Highest Mean Distance Direction	Location with Highest Mean Mean Range	Control Locations Mean Range	Non-Routine Reported Measurements
Well Water *(pCi/Liter)*	**Gamma**	12							
	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
River Water *(pCi/Liter)*	**H-3**	8	2000	< LLD	N/A		< LLD	N/A	0
	Gamma	24							
	K-40	24		**102 (6/12) (49.9 - 121)**	**SD**	**0.4 mi NW**	**102 (6/12) (49.9 - 121)**	**75.7 (4/12) (47.2 - 105)**	0
	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

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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Medium or Pathway Sampled (Units)	Analysis Type	Analysis Total No.	LLD	Indicator Locations Mean Range	Location with Highest Mean Name	Location with Highest Mean Distance Direction	Location with Highest Mean Mean Range	Control Locations Mean Range	Non-Routine Reported Measurements
River Water *(pCi/Liter)*	**Gamma**	24							
	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
	Th-228	24		**9.00 (1/12) (9.00 - 9.00)**	**SW**	**4.9 mi WNW**	**9.57 (1/12) (9.57 - 9.57)**	< LLD	0
	Th-232	24		**10.7 (1/12) (10.7 - 10.7)**	**SD**	**0.4 mi NW**	**10.7 (1/12) (10.7 - 10.7)**	< LLD	0
Silt *(pCi/kg dry)*	**Gamma**	4							
	Be-7	4		**2110 (1/2) (2110 - 2110)**	**SD**	**1.3 mi NNW**	**2110 (1/2) (2110 - 2110)**	< LLD	0
	K-40	4		**17700 (2/2) (15200-20200)**	**SD**	**1.3 mi NNW**	**17700 (2/2) (15200-20200)**	**16050 (2/2) (12800-19300)**	0
	Cs-134	4	150	< LLD	N/A		< LLD	< LLD	0
	Cs-137	4	180	**189 (2/2) (147 - 230)**	**CHIC**	**11.2 mi WNW**	**248 (2/2) (199 - 297)**	**248 (2/2) (199 - 297)**	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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Medium or Pathway Sampled (Units)	Analysis Type	Analysis Total No.	LLD	Indicator Locations Mean Range	Location with Highest Mean Name	Location with Highest Mean Distance Direction	Location with Highest Mean Mean Range	Control Locations Mean Range	Non-Routine Reported Measurements
Silt *(pCi/kg dry)*	**Gamma**	4							
	Ra-226	4		**2520 (1/2) (2520 - 2520)**	**CHIC**	**11.2 mi WNW**	**3440 (1/2) (3440 - 3440)**	**3440 (1/2) (3440 - 3440)**	0
	Th-228	4		**1445 (2/2) (1090 - 1800)**	**CHIC**	**11.2 mi WNW**	**1540 (2/2) (1300 - 1780)**	**1540 (2/2) (1300 - 1780)**	0
	Th-232	4		**1190 (2/2) (1090 - 1290)**	**CHIC**	**11.2 mi WNW**	**1330 (2/2) (1140 - 1520)**	**1330 (2/2) (1140 - 1520)**	0
Shoreline Sediment *(pCi/kg dry)*	**Gamma**	4							
	K-40	4		**7205 (2/2) (6520 - 7890)**	**HIR**	**0.6 mi N**	**7205 (2/2) (6520 - 7890)**	**3175 (2/2) (1580 - 4770)**	0
	Cs-134	4	150	< LLD	N/A		< LLD	< LLD	0
	Cs-137	4	180	< LLD	N/A		< LLD	< LLD	0
	Ra-226	4		< LLD	**CHIC**	**11.2 mi WNW**	**1770 (1/2) (1770 - 1770)**	**1770 (1/2) (1770 - 1770)**	0
	Th-228	4		**98.5 (2/2) (95.0 - 102)**	**CHIC**	**11.2 mi WNW**	**1840 (2/2) (1290 - 2390)**	**1840 (2/2) (1290 - 2390)**	0
	Th-232	4		< LLD	**CHIC**	**11.2 mi WNW**	**1930 (2/2) (1410 - 2450)**	**1930 (2/2) (1410 - 2450)**	0
Fish *(pCi/kg wet)*	**Gamma**	4							
	K-40	4		**2093 (4/4) (1230 - 2590)**	**SD**	**1.3 mi NNW**	**2093 (4/4) (1230 - 2590)**	N/A	0
	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

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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Medium or Pathway Sampled (Units)	Analysis Type	Analysis Total No.	LLD	Indicator Locations Mean Range	Location with Highest Mean Name	Location with Highest Mean Distance Direction	Location with Highest Mean Mean Range	Control Locations Mean Range	Non-Routine Reported Measurements
Fish *(pCi/kg wet)*	**Gamma**	4							
	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
Oysters *(pCi/kg wet)*	**Gamma**	6							
	K-40	6		**938 (5/6) (595 - 1560)**	**LC**	**2.4 mi SE**	**1270 (1/2) (1270 - 1270)**	N/A	0
	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
Clams *(pCi/kg wet)*	**Gamma**	6							
	K-40	6		**381 (1/4) (381 - 381)**	**CHIC**	**11.2 mi WNW**	**736 (1/2) (736 - 736)**	**736 (1/2) (736 - 736)**	0
	Mn-54	6	130	< LLD	N/A		< LLD	< LLD	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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Medium or Pathway Sampled (Units)	Analysis Type	Total No.	LLD	Indicator Locations Mean Range	Location with Highest Mean Name	Distance Direction	Mean Range	Control Locations Mean Range	Non-Routine Reported Measurements
Clams *(pCi/kg wet)*	**Gamma**	6							
	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	N/A	0
Crabs *(pCi/kg wet)*	**Gamma**	1							
	K-40	1		**1530 (1/1) (1530 - 1530)**	**SD**	**1.3 mi NNW**	**1530 (1/1) (1530 - 1530)**	N/A	0
	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

3.2 Analytical Results of 2014 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.

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. Cow 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

Surry Power Station, Surry County, Virginia - 2014

mR/Std Month ± 2 Sigma

STATION NUMBER	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	AVERAGE ± 2 SIGMA
02	6.6 ± 0.4	6.7 ± 0.8	7.0 ± 1.0	7.3 ± 0.5	6.9 ± 0.6
03	6.5 ± 0.2	6.4 ± 0.1	6.6 ± 0.6	6.4 ± 0.7	6.5 ± 0.2
04	5.9 ± 0.7	6.1 ± 0.7	6.1 ± 1.4	6.1 ± 0.5	6.1 ± 0.2
05	6.5 ± 0.7	6.2 ± 0.4	6.4 ± 0.9	6.5 ± 1.0	6.4 ± 0.3
06	6.1 ± 0.7	6.2 ± 0.4	6.4 ± 0.8	6.3 ± 0.8	6.3 ± 0.3
07	6.4 ± 0.8	6.1 ± 0.4	6.6 ± 1.0	6.6 ± 1.3	6.4 ± 0.5
08	5.7 ± 0.8	5.7 ± 0.5	5.9 ± 1.0	6.0 ± 1.1	5.8 ± 0.3
09	8.0 ± 0.7	7.8 ± 0.4	7.9 ± 1.0	7.9 ± 0.7	7.9 ± 0.2
10	6.1 ± 0.6	5.9 ± 0.3	6.4 ± 1.4	6.5 ± 0.8	6.2 ± 0.6
11	5.3 ± 0.4	5.3 ± 0.1	5.2 ± 0.9	5.5 ± 0.7	5.3 ± 0.3
12	5.5 ± 0.6	5.4 ± 0.3	5.7 ± 0.7	5.6 ± 0.7	5.6 ± 0.3
13	6.3 ± 0.4	5.9 ± 0.5	6.4 ± 0.7	6.5 ± 0.4	6.3 ± 0.5
14	6.1 ± 0.6	5.9 ± 0.5	6.1 ± 0.8	6.2 ± 1.2	6.1 ± 0.3
15	6.3 ± 0.6	6.2 ± 0.4	6.4 ± 0.6	6.9 ± 0.8	6.5 ± 0.6
16	5.6 ± 0.4	5.7 ± 0.3	5.8 ± 0.6	5.8 ± 1.0	5.7 ± 0.2
18	4.6 ± 0.4	4.8 ± 0.3	4.9 ± 0.6	4.7 ± 0.8	4.8 ± 0.3
19	5.3 ± 0.3	5.2 ± 0.4	5.0 ± 0.7	5.6 ± 0.9	5.3 ± 0.5
20	4.9 ± 0.7	4.9 ± 0.6	4.8 ± 0.5	4.8 ± 1.1	4.9 ± 0.1
21	5.2 ± 0.6	5.0 ± 0.4	4.8 ± 0.8	5.0 ± 0.3	5.0 ± 0.3
22	4.4 ± 0.8	4.2 ± 0.3	4.5 ± 0.5	5.0 ± 0.3	4.5 ± 0.7
23	5.9 ± 0.9	6.0 ± 0.8	6.1 ± 1.1	6.0 ± 0.4	6.0 ± 0.2
24	4.9 ± 0.4	4.7 ± 0.4	4.9 ± 0.5	5.1 ± 0.4	4.9 ± 0.3
25	6.1 ± 0.6	6.1 ± 0.6	6.4 ± 0.9	6.2 ± 0.7	6.2 ± 0.3
26	6.2 ± 0.8	6.3 ± 0.5	6.0 ± 1.1	6.1 ± 0.6	6.2 ± 0.3
27	5.2 ± 1.3	4.8 ± 0.3	4.8 ± 0.7	5.0 ± 0.7	5.0 ± 0.4
28	4.8 ± 0.8	4.6 ± 0.5	4.5 ± 0.9	5.0 ± 0.8	4.7 ± 0.4
29	4.3 ± 0.8	4.4 ± 0.2	4.4 ± 0.8	4.6 ± 0.5	4.4 ± 0.3
30	4.9 ± 0.6	4.7 ± 0.6	4.7 ± 1.1	4.8 ± 0.6	4.8 ± 0.2
31	4.2 ± 0.6	4.0 ± 0.3	4.0 ± 0.8	4.2 ± 0.4	4.1 ± 0.2
32	A	4.9 ± 0.3	5.2 ± 0.5	5.3 ± 0.8	5.1 ± 0.4
33	4.8 ± 0.7	4.6 ± 0.4	4.7 ± 0.7	4.8 ± 0.5	4.7 ± 0.2
34	5.5 ± 0.7	5.4 ± 0.2	5.4 ± 0.1	5.2 ± 0.7	5.4 ± 0.3
35	6.1 ± 0.6	6.1 ± 0.4	6.4 ± 0.4	6.5 ± 0.9	6.3 ± 0.4
36	6.4 ± 0.5	6.3 ± 0.4	6.2 ± 0.5	6.4 ± 0.7	6.3 ± 0.2
37	5.0 ± 0.7	5.2 ± 0.5	5.1 ± 0.8	5.7 ± 0.5	5.3 ± 0.6
38	7.7 ± 0.6	7.1 ± 0.3	7.5 ± 0.7	7.5 ± 1.2	7.5 ± 0.5
39-C	5.1 ± 0.7	5.0 ± 0.3	5.0 ± 0.4	5.3 ± 0.9	5.1 ± 0.3
40-C	5.5 ± 0.9	5.3 ± 0.5	5.1 ± 1.0	5.8 ± 1.4	5.4 ± 0.6
41-C	7.7 ± 0.8	7.3 ± 0.5	7.3 ± 0.5	7.9 ± 0.9	7.6 ± 0.6
42	5.6 ± 0.3	5.3 ± 0.4	5.3 ± 0.5	6.1 ± 1.3	5.6 ± 0.8
43	5.0 ± 0.5	4.7 ± 0.3	4.7 ± 0.2	5.2 ± 1.3	4.9 ± 0.5

A - TLD found missing at collection.

TABLE 3-3: GROSS BETA CONCENTRATION IN FILTERED AIR

Surry Power Station, Surry County, Virginia - 2014

1.0E-3 pCi/m3 ± 2 Sigma

COLLECTION DATE	SAMPLING LOCATIONS SS	HIR	BC	ALL	CP	BASF	FE	NN-C
January 07	17.4 ± 3.03	9.29 ± 2.52	13.2 ± 2.80	13.0 ± 2.77	11.9 ± 2.71	10.9 ± 2.62	11.2 ± 2.66	15.5 ± 2.87
January 14	15.9 ± 2.79	15.1 ± 2.75	16.3 ± 2.86	18.6 ± 2.93	16.5 ± 2.88	13.1 ± 2.65	14.4 ± 2.74	18.4 ± 2.94
January 21	14.3 ± 2.84	13.0 ± 2.80	18.4 ± 3.11	17.9 ± 3.03	14.9 ± 2.88	16.8 ± 2.97	7.64 ± 2.42	14.9 ± 2.85
January 28	13.4 ± 2.81	10.8 ± 2.71	17.0 ± 3.08	15.2 ± 2.93	17.2 ± 3.05	12.0 ± 2.76	14.6 ± 2.89	12.6 ± 2.76
February 04	18.9 ± 2.92	14.8 ± 2.76	23.1 ± 3.20	21.2 ± 3.05	17.2 ± 2.85	18.4 ± 2.90	18.9 ± 2.94	16.2 ± 2.77
February 11	18.5 ± 2.99	19.1 ± 3.09	27.0 ± 3.48	24.0 ± 3.28	24.1 ± 3.31	22.7 ± 3.23	24.3 ± 3.31	22.8 ± 3.20
February 18	17.0 ± 3.06	17.1 ± 3.15	20.9 ± 3.33	19.3 ± 3.19	13.5 ± 2.93	17.6 ± 3.11	18.6 ± 3.17	15.4 ± 2.98
February 25	11.3 ± 2.59	10.0 ± 2.58	16.8 ± 2.97	11.3 ± 2.59	10.8 ± 2.60	10.2 ± 2.55	10.9 ± 2.60	12.8 ± 2.68
March 04	16.1 ± 2.78	21.6 ± 3.12	24.3 ± 3.06	21.2 ± 2.84	23.9 ± 3.01	17.7 ± 2.69	19.7 ± 2.80	17.3 ± 2.66
March 11	14.9 ± 2.99	11.3 ± 2.83	19.5 ± 3.58	16.8 ± 3.41	17.0 ± 3.43	15.5 ± 3.31	12.8 ± 3.18	11.9 ± 3.09
March 17	9.73 ± 2.86	9.66 ± 2.90	19.1 ± 3.50	12.6 ± 3.06	13.2 ± 3.13	12.4 ± 3.05	10.9 ± 2.97	12.5 ± 3.04
March 24	12.9 ± 2.69	9.13 ± 2.50	15.4 ± 2.91	12.9 ± 2.71	12.9 ± 2.74	10.6 ± 2.56	13.1 ± 2.72	11.1 ± 2.58
Qtr. Avg. ± 2 s.d.	**15.0 ± 5.66**	**13.4 ± 8.32**	**19.3 ± 7.98**	**17.0 ± 8.11**	**16.1 ± 8.55**	**14.8 ± 7.78**	**15.4 ± 8.76**	**15.1 ± 6.63**
April 01	13.9 ± 2.53	10.4 ± 2.38	15.2 ± 2.68	13.2 ± 2.51	13.7 ± 2.56	12.4 ± 2.47	12.4 ± 2.48	11.0 ± 2.37
April 08	10.8 ± 2.73	10.2 ± 2.74	12.2 ± 2.90	10.9 ± 2.74	11.7 ± 2.82	11.0 ± 2.76	9.68 ± 2.69	9.39 ± 2.63
April 15	11.9 ± 2.69	11.8 ± 2.73	18.7 ± 3.13	14.4 ± 2.85	14.9 ± 2.90	14.7 ± 2.88	11.2 ± 2.69	11.6 ± 2.68
April 22	13.8 ± 2.56	15.1 ± 2.67	18.1 ± 2.88	18.0 ± 2.83	17.8 ± 2.85	12.9 ± 2.53	16.6 ± 2.76	14.8 ± 2.63
April 29	10.3 ± 1.82	8.17 ± 1.75	3.69 ± 1.55	12.0 ± 1.89	10.5 ± 1.86	10.6 ± 1.84	11.4 ± 1.89	10.4 ± 1.81
May 06	11.4 ± 2.54	11.4 ± 2.58	15.3 ± 2.82	10.1 ± 2.47	12.7 ± 2.66	9.73 ± 2.45	9.77 ± 2.46	14.3 ± 2.70
May 13	18.9 ± 3.05	14.9 ± 2.88	21.3 ± 3.23	20.8 ± 3.16	19.5 ± 3.12	18.6 ± 3.04	20.5 ± 3.14	16.9 ± 2.93
May 20	13.3 ± 2.73	11.5 ± 2.66	15.8 ± 2.92	14.7 ± 2.82	14.7 ± 2.86	15.5 ± 2.87	11.7 ± 2.67	12.1 ± 2.65
May 27	12.1 ± 2.73	11.8 ± 2.77	16.2 ± 3.04	13.6 ± 2.83	11.6 ± 2.75	11.6 ± 2.73	13.2 ± 2.82	11.2 ± 2.68
June 03	7.78 ± 2.47	7.11 ± 2.47	10.9 ± 2.70	10.6 ± 2.65	10.3 ± 2.65	8.79 ± 2.57	8.23 ± 2.51	8.39 ± 2.49
June 10	12.3 ± 2.58	9.98 ± 2.48	14.4 ± 2.78	13.8 ± 2.69	11.4 ± 2.57	10.7 ± 2.51	10.9 ± 2.52	10.3 ± 2.46
June 17	8.69 ± 2.47	7.29 ± 2.40	11.6 ± 2.78	10.8 ± 2.73	11.6 ± 2.66	9.91 ± 2.53	10.2 ± 2.56	13.9 ± 2.72
June 24	14.0 ± 2.91	15.4 ± 3.01	17.7 ± 3.16	20.4 ± 3.24	15.1 ± 2.91	15.1 ± 2.90	20.9 ± 3.20	16.9 ± 2.97
Qtr. Avg. ± 2 s.d.	**12.2 ± 5.57**	**11.2 ± 5.53**	**14.7 ± 8.87**	**14.1 ± 7.19**	**13.5 ± 5.63**	**12.4 ± 5.66**	**12.8 ± 8.07**	**12.4 ± 5.47**

TABLE 3-3: GROSS BETA CONCENTRATION IN FILTERED AIR

Surry Nuclear Power Station, Surry County, Virginia - 2014

1.0E-3 pCi/m3 ± 2 Sigma

COLLECTION DATE	SAMPLING LOCATIONS SS	HIR	BC	ALL	CP	BASF	FE	NN
July 01	11.9 ± 2.64	9.35 ± 2.50	17.2 ± 2.96	12.4 ± 2.65	11.9 ± 2.64	10.9 ± 2.55	12.0 ± 2.61	10.3 ± 2.49
July 08	10.8 ± 2.54	11.9 ± 2.63	14.3 ± 2.80	11.3 ± 2.58	12.0 ± 2.64	11.0 ± 2.58	A	12.9 ± 2.65
July 15	13.4 ± 2.70	14.5 ± 2.79	17.6 ± 2.97	14.4 ± 2.74	13.7 ± 2.72	13.8 ± 2.72	11.6 ± 3.44	14.9 ± 2.73
July 22	10.2 ± 2.49	9.36 ± 2.47	13.5 ± 2.72	11.6 ± 2.57	9.69 ± 2.45	11.1 ± 2.53	13.8 ± 2.72	11.6 ± 2.51
July 29	10.5 ± 2.58	12.8 ± 2.74	13.2 ± 2.75	10.9 ± 2.58	11.9 ± 2.65	11.4 ± 2.62	15.8 ± 2.85	12.8 ± 2.67
August 05	10.4 ± 2.54	10.1 ± 2.55	9.15 ± 2.49	11.7 ± 2.64	11.9 ± 2.62	11.4 ± 2.60	9.90 ± 2.49	8.85 ± 2.38
August 12	15.3 ± 2.89	17.0 ± 3.01	21.2 ± 3.23	20.3 ± 3.12	16.4 ± 2.95	15.7 ± 2.91	18.6 ± 3.03	17.3 ± 2.94
August 19	13.4 ± 2.78	13.5 ± 2.81	18.0 ± 3.05	14.2 ± 2.81	13.3 ± 2.77	14.6 ± 2.82	17.2 ± 2.96	15.7 ± 2.85
August 26	11.1 ± 2.57	10.4 ± 2.57	14.4 ± 2.82	14.1 ± 2.75	15.4 ± 2.86	12.1 ± 2.64	14.1 ± 2.75	12.3 ± 2.60
September 02	14.3 ± 2.80	13.3 ± 2.78	13.7 ± 2.81	12.4 ± 2.68	14.1 ± 2.78	13.4 ± 2.73	11.9 ± 2.63	13.6 ± 2.73
September 10	8.96 ± 2.30	8.85 ± 2.30	13.2 ± 2.58	11.1 ± 2.42	10.2 ± 2.38	7.82 ± 2.23	9.10 ± 2.30	12.2 ± 24.5
September 16	11.3 ± 2.79	9.18 ± 2.65	12.6 ± 2.91	10.4 ± 2.73	9.57 ± 2.67	10.2 ± 2.70	12.5 ± 2.86	11.5 ± 2.74
September 23	19.4 ± 3.11	18.6 ± 3.08	26.4 ± 3.51	17.0 ± 2.99	17.8 ± 3.05	17.3 ± 3.02	18.7 ± 3.08	17.0 ± 2.96
September 29	12.5 ± 3.11	12.1 ± 3.09	13.7 ± 3.23	11.5 ± 3.04	13.7 ± 3.21	11.3 ± 3.02	10.5 ± 2.98	13.9 ± 3.18
Qtr. Avg. ± 2 s.d.	**12.4 ± 5.35**	**12.2 ± 6.00**	**15.6 ± 8.54**	**13.1 ± 5.49**	**13.0 ± 4.89**	**12.3 ± 4.88**	**13.5 ± 6.41**	**13.2 ± 4.83**
October 07	14.9 ± 2.65	14.5 ± 2.64	15.8 ± 2.72	14.2 ± 2.58	13.1 ± 2.55	11.6 ± 2.43	14.2 ± 2.56	14.8 ± 2.55
October 14	18.0 ± 2.88	18.1 ± 2.92	24.4 ± 3.24	19.1 ± 2.93	15.7 ± 2.77	17.8 ± 2.88	18.6 ± 2.91	18.7 ± 2.91
October 21	8.35 ± 2.46	10.4 ± 2.62	13.9 ± 2.84	10.6 ± 2.59	11.2 ± 2.65	9.47 ± 2.53	11.3 ± 2.63	8.79 ± 2.44
October 28	13.4 ± 2.81	9.71 ± 2.62	16.1 ± 3.01	12.3 ± 2.75	10.9 ± 2.68	11.6 ± 2.69	12.8 ± 2.76	12.7 ± 2.74
November 04	21.5 ± 3.09	18.2 ± 2.93	20.7 ± 3.09	21.4 ± 3.07	21.5 ± 3.08	17.4 ± 2.84	20.1 ± 2.99	20.1 ± 2.95
November 10	16.6 ± 3.30	15.6 ± 3.27	20.3 ± 3.55	17.0 ± 3.31	13.9 ± 3.16	18.1 ± 3.38	19.7 ± 3.45	17.9 ± 3.32
November 18	14.8 ± 2.67	8.81 ± 2.37	17.4 ± 2.85	12.5 ± 2.55	11.2 ± 2.49	11.9 ± 2.52	12.3 ± 2.53	13.9 ± 2.59
November 25	20.8 ± 3.03	17.6 ± 2.89	25.4 ± 3.30	20.7 ± 3.02	17.1 ± 2.84	20.8 ± 3.03	20.8 ± 3.03	20.4 ± 2.96
December 01	10.3 ± 2.90	10.2 ± 2.92	15.0 ± 3.20	-0.90 ± 2.06	10.7 ± 2.91	13.6 ± 3.07	12.7 ± 3.03	15.1 ± 3.13
December 08	18.1 ± 2.97	17.4 ± 2.95	21.3 ± 3.18	21.1 ± 3.12	15.0 ± 2.82	16.5 ± 2.88	33.1 ± 3.67	0.69 ± 1.80
December 16	14.7 ± 2.61	12.8 ± 2.52	19.9 ± 2.91	16.9 ± 2.72	12.9 ± 2.53	14.8 ± 2.60	17.4 ± 2.74	34.1 ± 3.44
December 23	11.8 ± 2.68	12.3 ± 2.74	16.2 ± 2.96	15.2 ± 2.87	11.7 ± 2.69	12.7 ± 2.73	17.5 ± 2.99	14.5 ± 2.80
December 30	10.9 ± 2.53	11.9 ± 2.60	16.0 ± 2.85	11.3 ± 2.56	10.3 ± 2.50	9.51 ± 2.43	11.0 ± 2.52	12.1 ± 2.55
Qtr. Avg. ± 2 s.d.	**14.9 ± 8.02**	**13.7 ± 6.87**	**18.6 ± 7.29**	**16.0 ± 7.86**	**13.5 ± 6.41**	**14.3 ± 7.15**	**17.0 ± 11.9**	**16.9 ± 12.8**
Ann. Avg. ± 2 s.d	**13.6 ± 6.62**	**12.6 ± 6.81**	**17.0 ± 8.86**	**15.0 ± 7.62**	**13.9 ± 6.69**	**13.4 ± 6.61**	**14.7 ± 9.39**	**14.3 ± 8.45**

TABLE 3-4: IODINE-131 CONCENTRATION IN FILTERED AIR

Surry Power Station, Surry County, Virginia - 2014

1.0E-3 pCi/m3 ± 2 Sigma

COLLECTION DATE	SAMPLING LOCATIONS							
	SS	HIR	BC	ALL	CP	BASF	FE	NN-C
January 07	3.94 ± 27.3	3.86 ± 26.7	3.93 ± 27.2	3.90 ± 27.0	3.48 ± 21.9	3.42 ± 21.5	3.45 ± 21.6	3.37 ± 21.1
January 14	-16.4 ± 18.1	-16.4 ± 18.1	-16.7 ± 18.5	-16.3 ± 18.0	-9.89 ± 20.4	-9.67 ± 19.9	-9.68 ± 20.0	-9.55 ± 19.7
January 21	0.65 ± 20.5	0.67 ± 20.9	0.67 ± 21.0	0.65 ± 20.4	-11.5 ± 22.3	-11.4 ± 22.0	-11.4 ± 22.0	-11.2 ± 21.7
January 28	2.03 ± 17.9	2.08 ± 18.3	2.11 ± 18.5	2.05 ± 18.0	3.56 ± 29.3	3.53 ± 29.1	3.51 ± 28.9	3.46 ± 28.5
February 04	0.02 ± 18.7	0.02 ± 19.3	0.02 ± 19.3	0.02 ± 18.8	18.5 ± 18.5	18.3 ± 18.3	18.4 ± 18.4	18.1 ± 18.1
February 11	-19.6 ± 23.6	-20.2 ± 24.4	-20.3 ± 24.5	19.7 ± 23.7	2.46 ± 19.2	2.44 ± 19.0	2.43 ± 19.0	2.39 ± 18.7
February 18	8.11 ± 18.8	8.45 ± 19.6	8.39 ± 19.5	8.16 ± 19.0	-7.37 ± 21.8	-7.29 ± 21.5	-7.30 ± 21.6	-7.14 ± 21.1
February 25	11.1 ± 19.8	11.5 ± 20.5	11.5 ± 20.4	11.1 ± 19.8	7.41 ± 19.6	7.38 ± 19.5	7.35 ± 19.4	7.18 ± 19.0
March 04	-18.4 ± 33.0	-18.9 ± 33.9	-16.5 ± 29.7	-15.9 ± 28.6	4.96 ± 31.9	4.90 ± 31.6	4.92 ± 31.7	4.83 ± 31.1
March 11	-23.3 ± 15.0	-23.8 ± 15.3	-26.0 ± 16.8	-25.8 ± 16.6	-9.00 ± 17.2	-8.84 ± 16.8	-8.90 ± 17.0	-8.74 ± 16.6
March 17	7.05 ± 19.3	7.20 ± 19.7	7.33 ± 20.0	7.12 ± 19.4	-8.88 ± 19.8	-8.76 ± 19.6	-8.78 ± 19.6	-8.65 ± 19.3
March 24	1.62 ± 23.1	1.66 ± 23.6	1.70 ± 24.1	1.64 ± 23.4	-10.6 ± 26.0	-10.4 ± 25.5	-10.4 ± 25.6	-10.2 ± 25.1
April 01	-4.32 ± 15.8	-4.39 ± 16.1	-4.49 ± 16.5	-4.34 ± 15.9	0.48 ± 15.6	0.47 ± 15.4	0.47 ± 15.5	0.46 ± 15.1
April 08	11.9 ± 19.0	12.2 ± 19.4	12.3 ± 19.7	11.9 ± 19.0	-1.23 ± 19.7	-1.21 ± 19.5	-1.22 ± 19.5	-1.19 ± 19.0
April 15	-4.87 ± 16.7	-4.98 ± 17.1	-5.07 ± 17.3	-4.91 ± 16.8	4.59 ± 23.7	4.55 ± 23.5	4.56 ± 23.5	4.46 ± 23.0
April 22	0.22 ± 29.4	0.23 ± 30.0	0.23 ± 30.6	0.23 ± 29.8	16.0 ± 21.2	15.7 ± 20.8	15.8 ± 20.9	15.5 ± 20.6
April 29	-14.1 ± 16.5	-14.3 ± 16.7	-14.4 ± 16.9	-14.1 ± 16.6	-1.97 ± 14.3	-1.93 ± 14.0	-1.95 ± 14.2	-1.90 ± 13.8
May 06	15.5 ± 25.8	15.8 ± 26.3	15.9 ± 26.5	15.5 ± 25.9	-2.90 ± 26.3	-2.85 ± 25.7	-2.85 ± 25.8	-2.81 ± 25.5
May 13	7.52 ± 14.6	7.65 ± 14.9	7.70 ± 15.0	7.52 ± 14.6	-12.3 ± 15.8	-12.0 ± 15.5	-12.1 ± 15.6	-11.8 ± 15.3
May 20	1.05 ± 29.2	1.07 ± 29.7	1.07 ± 29.9	1.05 ± 29.3	-12.9 ± 33.8	-12.7 ± 33.1	-12.7 ± 33.2	-12.4 ± 32.5
May 27	5.10 ± 16.2	5.21 ± 16.6	5.30 ± 16.9	5.12 ± 16.3	13.2 ± 17.6	13.0 ± 17.5	13.0 ± 17.4	12.8 ± 17.1
June 03	2.74 ± 28.4	2.83 ± 29.1	2.79 ± 29.0	2.74 ± 28.4	-3.64 ± 28.6	-3.65 ± 28.6	-3.60 ± 28.3	-3.53 ± 27.7
June 10	-8.54 ± 28.2	-8.75 ± 28.9	-8.88 ± 29.3	-8.63 ± 28.5	38.7 ± 29.8	38.5 ± 29.6	38.3 ± 29.4	37.6 ± 28.9
June 17	-3.97 ± 19.6	-4.01 ± 19.8	-4.22 ± 20.9	-4.23 ± 20.9	-2.57 ± 16.7	-2.53 ± 16.5	-2.54 ± 16.5	-2.46 ± 16.0
June 24	4.01 ± 24.5	4.05 ± 24.7	4.09 ± 25.0	3.97 ± 24.3	7.58 ± 25.0	7.53 ± 24.9	7.48 ± 24.7	7.37 ± 24.3

TABLE 3-4: IODINE-131 CONCENTRATION IN FILTERED AIR

Surry Power Station, Surry County, Virginia - 2014

1.0E-3 pCi/m3 ± 2 Sigma

COLLECTION DATE	SAMPLING LOCATIONS SS	HIR	BC	ALL	CP	BASF	FE	NN-C
July 01	-5.45 ± 22.5	-5.51 ± 22.8	-5.43 ± 22.5	-5.34 ± 22.1	31.9 ± 20.8	31.5 ± 20.5	31.2 ± 20.4	31.0 ± 20.2
July 08	45.5 ± 34.5	45.9 ± 34.8	46.4 ± 35.2	45.4 ± 34.4	34.8 ± 36.2	34.7 ± 36.1	A	33.7 ± 35.0
July 15	1.69 ± 26.5	1.72 ± 27.0	1.73 ± 27.2	1.67 ± 26.3	12.4 ± 26.3	12.3 ± 26.1	16.3 ± 34.4	12.0 ± 25.3
July 22	-1.25 ± 27.7	-1.28 ± 28.4	-1.26 ± 28.1	-1.24 ± 27.6	9.88 ± 23.6	9.81 ± 23.4	9.94 ± 23.7	9.47 ± 22.6
July 29	-15.1 ± 19.2	-15.3 ± 19.6	-15.1 ± 19.4	-14.9 ± 19.0	-10.6 ± 19.1	-10.6 ± 19.1	-10.6 ± 19.0	-10.4 ± 18.7
August 05	-28.8 ± 30.7	-29.3 ± 31.2	-29.3 ± 31.2	-29.1 ± 31.0	-0.04 ± 29.5	-0.04 ± 29.6	-0.04 ± 29.1	-0.04 ± 28.3
August 12	-2.73 ± 21.5	-2.76 ± 21.8	-2.75 ± 21.8	-2.68 ± 21.2	3.44 ± 22.3	3.42 ± 22.2	3.37 ± 21.8	3.31 ± 21.5
August 19	-6.92 ± 21.1	-7.00 ± 21.4	-6.97 ± 21.3	-6.84 ± 20.9	2.70 ± 17.7	2.67 ± 17.5	2.65 ± 17.4	2.61 ± 17.2
August 26	0.51 ± 33.7	0.52 ± 34.4	0.53 ± 34.6	0.51 ± 33.6	-25.1 ± 42.1	-24.8 ± 41.5	-24.6 ± 41.2	-23.9 ± 40.0
September 02	-15.1 ± 20.3	-15.4 ± 20.7	-15.5 ± 20.8	-15.0 ± 20.2	2.29 ± 23.8	2.28 ± 23.7	2.26 ± 23.5	2.25 ± 23.3
September 10	-11.7 ± 38.5	-11.8 ± 38.6	-11.9 ± 39.0	-11.6 ± 38.1	8.54 ± 39.3	8.51 ± 39.1	8.42 ± 38.7	8.25 ± 38.0
September 16	4.43 ± 15.7	4.45 ± 15.8	4.51 ± 16.0	4.42 ± 15.7	14.8 ± 33.8	14.7 ± 33.6	14.8 ± 33.7	14.3 ± 32.7
September 23	3.67 ± 21.1	3.68 ± 21.2	3.76 ± 21.7	3.66 ± 21.1	5.59 ± 23.0	5.55 ± 22.9	5.53 ± 22.8	5.42 ± 22.4
September 29	14.7 ± 37.8	14.7 ± 37.7	14.9 ± 38.4	14.5 ± 37.4	-22.3 ± 34.1	-21.9 ± 33.4	-21.9 ± 33.4	-21.7 ± 33.1
October 07	3.46 ± 19.1	3.48 ± 19.3	3.51 ± 19.4	3.39 ± 18.7	-0.70 ± 15.5	-0.68 ± 15.1	-0.67 ± 15.1	-0.66 ± 14.7
October 14	3.47 ± 22.3	3.53 ± 22.7	3.52 ± 22.6	3.43 ± 22.0	6.38 ± 25.8	6.33 ± 25.6	6.30 ± 25.4	6.22 ± 25.1
October 21	11.8 ± 25.6	12.0 ± 25.9	12.0 ± 26.1	11.7 ± 25.3	-7.33 ± 24.6	-7.25 ± 24.3	-7.21 ± 24.2	-7.01 ± 23.6
October 28	1.31 ± 6.37	1.32 ± 6.44	1.34 ± 6.51	1.30 ± 6.35	-5.05 ± 7.43	-4.98 ± 7.33	-4.96 ± 7.30	-4.91 ± 7.22
November 04	-7.71 ± 17.2	-7.77 ± 17.4	-7.86 ± 17.6	-7.63 ± 17.1	-2.41 ± 13.7	-2.38 ± 13.6	-2.37 ± 13.5	-2.31 ± 13.2
November 10	-11.1 ± 25.0	-11.2 ± 25.2	-11.4 ± 25.5	-11.0 ± 24.8	9.68 ± 21.1	9.64 ± 21.0	9.58 ± 20.9	9.37 ± 20.4
November 18	25.2 ± 25.6	25.5 ± 25.9	25.8 ± 26.2	25.2 ± 25.6	-22.4 ± 27.3	-22.2 ± 27.0	-22.0 ± 26.8	-21.6 ± 26.4
November 25	-8.69 ± 34.7	-8.77 ± 35.0	-8.84 ± 35.3	-8.64 ± 34.5	19.8 ± 38.2	19.7 ± 38.0	19.7 ± 37.9	40.2 ± 40.6
December 01	2.68 ± 16.1	2.70 ± 16.3	2.70 ± 16.2	2.64 ± 15.9	5.43 ± 16.2	5.39 ± 16.1	5.41 ± 27.1	5.28 ± 15.7
December 08	13.8 ± 15.6	13.9 ± 15.7	14.1 ± 15.9	13.8 ± 15.5	-1.93 ± 12.1	-1.91 ± 11.9	-1.91 ± 11.9	-1.87 ± 11.7
December 16	6.76 ± 15.7	6.82 ± 15.9	6.91 ± 16.1	6.72 ± 15.6	-1.32 ± 9.23	-1.29 ± 9.04	-1.30 ± 9.06	-1.27 ± 8.90
December 23	7.98 ± 30.9	8.12 ± 31.4	8.10 ± 31.3	7.94 ± 30.7	2.64 ± 34.9	2.60 ± 34.4	2.61 ± 34.4	2.56 ± 33.8
December 30	-9.20 ± 23.2	-9.27 ± 23.3	-9.32 ± 23.5	-9.18 ± 23.1	-2.99 ± 19.4	-2.94 ± 19.1	-2.95 ± 19.2	-2.87 ± 18.6

A - Air sampler found inoperable

TABLE 3-5: GAMMA EMITTER CONCENTRATION IN FILTERED AIR

Surry Power Station, Surry County, Virginia - 2014

1.0E-3 pCi/m3 ± 2 Sigma

SAMPLING LOCATIONS	NUCLIDE	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	AVERAGE ± 2 SIGMA
SS	Cs-134	0.39 ± 0.81	0.88 ± 0.73	0.20 ± 0.55	0.51 ± 0.71	
	Cs-137	0.52 ± 0.84	0.11 ± 0.72	0.16 ± 0.44	0.24 ± 0.50	
	Be-7	113 ± 25.5	118 ± 26.2	94.9 ± 18.5	74.2 ± 19.0	100 ± 39.7
	K-40			11.5 ± 6.52		
HIR	Cs-134	0.65 ± 1.06	0.69 ± 0.74	0.40 ± 0.62	0.64 ± 0.78	
	Cs-137	0.55 ± 1.06	0.36 ± 0.76	-0.40 ± 0.62	0.25 ± 0.47	
	Be-7	117 ± 31.2	91.2 ± 26.4	116 ± 23.0	78.5 ± 23.5	101 ± 38.0
BC	Cs-134	0.49 ± 0.74	0.44 ± 0.72	0.39 ± 0.62	-0.12 ± 0.91	
	Cs-137	-0.09 ± 0.65	-0.05 ± 0.69	-0.78 ± 0.58	-0.33 ± 0.74	
	Be-7	167 ± 27.3	154 ± 28.5	122 ± 20.6	98.4 ± 28.8	135 ± 62.1
ALL	Cs-134	0.53 ± 0.57	0.77 ± 1.14	0.46 ± 0.75	0.64 ± 0.75	
	Cs-137	-0.11 ± 0.56	0.44 ± 1.13	-0.17 ± 0.73	0.52 ± 0.67	
	Be-7	89.7 ± 20.1	132 ± 30.8	94.1 ± 21.8	71.2 ± 19.8	96.8 ± 51.0
	K-40			18.2 ± 11.5		
CP	Cs-134	0.15 ± 0.69	-0.39 ± 0.78	0.42 ± 0.60	-0.45 ± 1.15	
	Cs-137	0.20 ± 0.66	0.26 ± 0.84	0.13 ± 0.56	0.15 ± 0.98	
	Be-7	167 ± 29.6	167 ± 29.1	110 ± 18.3	85.6 ± 32.8	132 ± 82.4
BASF	Cs-134	0.53 ± 0.77	0.41 ± 1.30	-0.80 ± 0.71	0.09 ± 0.74	
	Cs-137	0.04 ± 0.78	1.03 ± 1.14	-0.30 ± 0.57	0.60 ± 0.63	
	Be-7	120 ± 23.4	149 ± 33.4	92.0 ± 23.9	116 ± 25.6	119 ± 46.7
FE	Cs-134	0.46 ± 0.70	1.85 ± 1.39	-0.51 ± 0.52	-0.53 ± 1.17	
	Cs-137	-0.50 ± 0.71	0.46 ± 1.07	0.39 ± 0.51	0.21 ± 1.04	
	Be-7	106 ± 25.3	134 ± 36.0	126 ± 26.0	109 ± 27.1	119 ± 26.9
NN-C	Cs-134	-0.89 ± 1.32	0.13 ± 0.67	0.08 ± 0.60	-0.07 ± 0.61	
	Cs-137	-0.23 ± 1.27	0.02 ± 0.62	0.24 ± 0.61	0.06 ± 0.53	
	Be-7	124 ± 30.0	116 ± 26.7	97.6 ± 27.9	82.1 ± 22.6	105 ± 37.6

TABLE 3-6: GAMMA EMITTER AND STRONTIUM CONCENTRATIONS IN MILK

Surry Power Station, Surry County, Virginia - 2014

pCi/Liter ± 2 Sigma

NUCLIDE	EPPS	COLONIAL PARKWAY	WILLIAMS-C
JANUARY			
Cs-134	-9.07 ± 5.37	2.46 ± 3.41	-7.86 ± 4.72
Cs-137	1.18 ± 5.24	0.29 ± 3.53	0.31 ± 4.71
Ba-140	25.5 ± 27.8	-10.2 ± 21.2	-3.14 ± 23.3
La-140	2.29 ± 7.78	-0.50 ± 4.54	-0.82 ± 5.53
I-131	0.02 ± 0.45	0.29 ± 0.45	-0.39 ± 0.45
K-40	1230 ± 174	1240 ± 147	1280 ± 164
FEBRUARY			
Cs-134	-1.26 ± 3.13	-2.63 ± 3.35	-4.63 ± 2.81
Cs-137	-4.13 ± 3.23	1.26 ± 2.97	0.69 ± 2.73
Ba-140	-1.85 ± 18.4	-2.44 ± 14.5	-7.41 ± 12.9
La-140	-3.27 ± 4.35	-2.26 ± 4.83	-0.32 ± 4.74
I-131	0.17 ± 0.47	0.03 ± 0.32	-0.04 ± 0.35
K-40	1280 ± 132	1330 ± 108	1120 ± 118
MARCH			
Cs-134	-4.81 ± 3.45	-0.80 ± 2.99	-2.37 ± 3.86
Cs-137	-1.52 ± 3.54	0.16 ± 2.49	-0.81 ± 3.69
Ba-140	7.68 ± 17.2	-9.37 ± 12.9	-1.08 ± 18.5
La-140	1.65 ± 4.91	0.60 ± 3.42	1.31 ± 5.81
I-131	0.22 ± 0.51	0.13 ± 0.50	-0.47 ± 0.48
K-40	1240 ± 120	1190 ± 116	1120 ± 141
Sr-89		3.98 ± 3.08	
Sr-90		0.35 ± 0.41	
APRIL			
Cs-134	-1.15 ± 2.72	-5.41 ± 3.86	-6.11 ± 3.13
Cs-137	2.10 ± 2.81	3.09 ± 4.16	3.54 ± 3.16
Ba-140	-0.45 ± 14.0	-1.04 ± 20.2	1.87 ± 15.3
La-140	2.20 ± 3.70	-5.39 ± 5.75	-0.30 ± 4.15
I-131	0.06 ± 0.50	0.37 ± 0.50	-0.15 ± 0.48
K-40	1240 ± 109	1150 ± 134	1260 ± 113

TABLE 3-6: GAMMA EMITTER AND STRONTIUM CONCENTRATIONS IN MILK

Surry Power Station, Surry County, Virginia - 2014

pCi/Liter ± 2 Sigma

NUCLIDE	EPPS	COLONIAL PARKWAY	WILLIAMS-C
MAY			
Cs-134	1.54 ± 4.12	-4.31 ± 4.08	-9.19 ± 4.61
Cs-137	1.34 ± 4.52	-1.49 ± 4.16	2.74 ± 4.49
Ba-140	9.32 ± 23.0	18.8 ± 19.5	8.61 ± 21.5
La-140	2.89 ± 5.34	5.08 ± 5.40	-1.25 ± 6.26
I-131	-0.24 ± 0.34	0.01 ± 0.35	-0.39 ± 0.33
K-40	1520 ± 183	1270 ± 164	1270 ± 140
Th-228			27.3 ± 14.1
JUNE			
Cs-134	-8.89 ± 3.55	3.63 ± 4.98	-5.63 ± 5.06
Cs-137	-0.39 ± 3.26	-0.88 ± 5.05	-1.76 ± 4.75
Ba-140	6.02 ± 19.1	-17.4 ± 26.5	1.50 ± 21.0
La-140	2.41 ± 5.42	8.17 ± 7.26	2.29 ± 6.92
I-131	-0.09 ± 0.34	-0.09 ± 0.32	-0.16 ± 0.30
K-40	1560 ± 135	1450 ± 157	1230 ± 177
Sr-89		-1.86 ± 2.82	
Sr-90		1.26 ± 0.40	
JULY			
Cs-134	-3.47 ± 5.26	-4.46 ± 5.02	0.17 ± 4.17
Cs-137	-1.11 ± 5.15	-0.03 ± 4.54	-1.85 ± 4.43
Ba-140	-19.0 ± 25.2	16.4 ± 21.9	-1.17 ± 19.3
La-140	-1.23 ± 6.88	-0.67 ± 5.73	-2.58 ± 6.60
I-131	-0.08 ± 0.23	-0.34 ± 0.39	-0.31 ± 0.32
K-40	1410 ± 196	1280 ± 151	1460 ± 197
AUGUST			
Cs-134	-2.89 ± 2.93	0.42 ± 2.60	1.65 ± 2.85
Cs-137	-0.17 ± 3.99	1.09 ± 2.85	1.97 ± 2.63
Ba-140	-3.59 ± 18.0	16.4 ± 19.2	-2.92 ± 17.9
La-140	-0.09 ± 6.45	2.48 ± 4.91	0.69 ± 5.74
I-131	-0.46 ± 0.39	0.16 ± 0.41	-0.05 ± 0.38
K-40	1400 ± 156	1390 ± 101	1320 ± 92.4

TABLE 3-6: GAMMA EMITTER AND STRONTIUM CONCENTRATIONS IN MILK

Surry Power Station, Surry County, Virginia - 2014

pCi/Liter ± 2 Sigma

NUCLIDE	EPPS	COLONIAL PARKWAY	WILLIAMS-C
SEPTEMBER			
Cs-134	-3.63 ± 3.48	-2.81 ± 3.72	0.48 ± 4.00
Cs-137	-1.72 ± 3.83	2.61 ± 4.26	1.01 ± 3.81
Ba-140	-10.2 ± 24.0	10.0 ± 26.2	14.7 ± 25.7
La-140	-0.12 ± 7.38	-2.40 ± 8.78	-2.76 ± 6.79
I-131	-0.99 ± 0.49	0.10 ± 0.54	-0.41 ± 0.50
K-40	1300 ± 138	1230 ± 142	1350 ± 119
Sr-89		3.06 ± 2.71	
Sr-90		1.85 ± 0.54	
OCTOBER			
Cs-134	-5.19 ± 5.69	0.68 ± 3.64	-6.48 ± 5.29
Cs-137	1.30 ± 5.95	2.62 ± 4.10	-0.79 ± 5.10
Ba-140	11.6 ± 31.4	16.0 ± 19.9	0.36 ± 27.3
La-140	-1.74 ± 8.17	1.58 ± 6.64	-11.9 ± 10.1
I-131	-0.16 ± 0.25	-0.18 ± 0.24	-0.05 ± 0.25
K-40	1320 ± 188	1200 ± 159	1330 ± 214
NOVEMBER			
Cs-134	2.28 ± 3.90	-4.37 ± 3.08	-3.43 ± 3.03
Cs-137	1.74 ± 4.17	0.40 ± 3.17	1.20 ± 3.34
Ba-140	6.79 ± 17.8	-4.63 ± 13.9	-7.20 ± 16.6
La-140	-2.49 ± 5.65	-2.19 ± 3.89	1.12 ± 4.68
I-131	-0.70 ± 0.50	0.75 ± 0.51	-0.35 ± 0.52
K-40	1340 ± 150	1380 ± 117	1290 ± 143
DECEMBER			
Cs-134	-2.34 ± 4.19	1.71 ± 2.48	-1.83 ± 3.33
Cs-137	-2.07 ± 4.36	3.43 ± 2.68	0.35 ± 3.19
Ba-140	-26.9 ± 27.6	7.60 ± 18.4	7.24 ± 22.3
La-140	2.43 ± 6.77	-0.19 ± 4.31	8.03 ± 6.45
I-131	-0.17 ± 0.26	-0.38 ± 0.27	-0.28 ± 0.44
K-40	1240 ± 115	891 ± 117	1270 ± 113
Sr-89		1.85 ± 2.57	
Sr-90		0.85 ± 0.62	

TABLE 3-7: GAMMA EMITTER CONCENTRATION IN FOOD PRODUCTS

Surry Power Station, Surry County, Virginia - 2014

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	SAMPLE TYPE	ISOTOPE			
			Cs-134	**Cs-137**	**I-131**	**K-40**
BROCK FARM	10/28/2014	Corn	-13.0 ± 17.4	-4.03 ± 15.7	5.98 ± 35.8	4180 ± 563
			Cs-134	**Cs-137**	**I-131**	**K-40**
	10/28/2014	Peanuts	-6.77 ± 15.9	12.1 ± 17.8	8.06 ± 29.3	6420 ± 662
			Cs-134	**Cs-137**	**I-131**	**K-40**
SLADE FARM	12/4/2014	Soybeans	-0.88 ± 9.63	0.21 ± 9.81	0.65 ± 18.3	13900 ± 605

TABLE 3-8: GAMMA EMITTER AND TRITIUM CONCENTRATIONS IN WELL WATER

Surry Power Station, Surry County, Virginia - 2014

pCi/Liter ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
SS	3/4/2014	-1.70 ± 2.91	-0.07 ± 2.66	-4.10 ± 6.26	-2.31 ± 2.67	-4.07 ± 7.00
	6/17/2014	-0.36 ± 3.01	0.02 ± 3.34	8.05 ± 7.01	-2.99 ± 3.18	2.57 ± 8.00
	9/2/2014	-0.02 ± 1.79	-0.08 ± 1.95	5.65 ± 3.54	0.35 ± 1.88	-4.32 ± 3.59
	12/8/2014	0.84 ± 3.46	0.17 ± 3.28	3.16 ± 7.03	-0.77 ± 2.62	1.24 ± 6.87
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	3/4/2014	0.70 ± 2.89	4.03 ± 5.13	0.06 ± 0.60	-2.23 ± 3.34	-2.46 ± 3.36
	6/17/2014	0.65 ± 3.40	3.75 ± 5.67	-0.53 ± 0.33	-6.08 ± 3.48	3.99 ± 3.38
	9/2/2014	0.72 ± 1.88	0.46 ± 3.40	-0.28 ± 0.38	1.15 ± 1.87	-0.23 ± 1.92
	12/8/2014	0.49 ± 3.22	0.22 ± 5.87	-0.44 ± 0.21	3.64 ± 6.03	2.75 ± 3.87
		Ba-140	**La-140**	**H-3**		
	3/4/2014	1.68 ± 14.0	-1.26 ± 3.96	668 ± 591		
	6/17/2014	2.58 ± 15.7	-1.99 ± 5.23	-84.0 ± 746		
	9/2/2014	1.90 ± 9.98	-0.40 ± 3.25	-116 ± 810		
	12/8/2014	2.77 ± 14.7	1.32 ± 3.97	-93.5 ± 753		
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
HIR	3/4/2014	-6.92 ± 3.35	-0.54 ± 3.70	-2.79 ± 6.69	0.45 ± 3.70	-5.27 ± 7.48
	6/17/2014	0.26 ± 2.18	-1.26 ± 2.64	0.22 ± 5.14	-2.40 ± 3.01	1.10 ± 5.37
	9/2/2014	0.58 ± 3.06	-1.74 ± 2.98	0.14 ± 6.61	-1.12 ± 3.22	-1.80 ± 6.30
	12/8/2014	-3.82 ± 4.74	-0.33 ± 4.52	3.08 ± 9.46	0.48 ± 4.80	-6.88 ± 10.9
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	3/4/2014	-1.67 ± 3.51	0.90 ± 5.70	0.09 ± 0.57	1.09 ± 3.80	0.83 ± 3.48
	6/17/2014	-0.72 ± 2.40	0.94 ± 4.49	0.00 ± 0.35	-0.22 ± 2.78	0.24 ± 2.74
	9/2/2014	2.20 ± 3.15	0.66 ± 4.76	-0.91 ± 0.41	-4.15 ± 2.84	-0.69 ± 2.78
	12/8/2014	-0.15 ± 4.64	0.57 ± 8.69	-0.17 ± 0.17	2.98 ± 5.41	1.24 ± 5.37
		Ba-140	**La-140**	**H-3**		
	3/4/2014	-0.39 ± 16.4	2.43 ± 4.55	197 ± 551		
	6/17/2014	-4.78 ± 11.8	-2.48 ± 3.16	-280 ± 717		
	9/2/2014	0.85 ± 13.7	-4.22 ± 5.53	44.7 ± 831		
	12/8/2014	4.32 ± 17.5	0.98 ± 6.08	185 ± 788		

TABLE 3-8: GAMMA EMITTER AND TRITIUM CONCENTRATIONS IN WELL WATER

Surry Power Station, Surry County, Virginia - 2014

pCi/Liter ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
CS	3/4/2014	-0.19 ± 2.37	0.71 ± 2.34	-4.82 ± 5.07	0.15 ± 2.47	2.02 ± 5.08
	6/17/2014	-3.03 ± 3.04	-1.16 ± 2.99	4.21 ± 5.88	-0.95 ± 3.07	-3.57 ± 6.79
	9/2/2014	-1.65 ± 2.67	-2.26 ± 2.44	-0.29 ± 4.60	1.44 ± 2.41	-1.93 ± 5.01
	12/8/2014	-0.88 ± 2.79	-0.80 ± 2.60	-0.40 ± 5.90	-0.89 ± 2.80	-9.09 ± 6.42
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	3/4/2014	-1.02 ± 2.45	-1.18 ± 4.00	-0.11 ± 0.15	0.80 ± 2.72	-0.50 ± 2.39
	6/17/2014	-0.13 ± 3.29	3.97 ± 5.35	-0.06 ± 0.33	1.63 ± 4.07	-0.44 ± 3.15
	9/2/2014	1.91 ± 2.43	-1.00 ± 4.99	0.02 ± 0.42	-1.77 ± 2.80	0.34 ± 2.87
	12/8/2014	0.57 ± 2.82	-1.74 ± 4.98	-0.49 ± 0.22	-2.21 ± 3.09	1.56 ± 2.95
		Ba-140	**La-140**	**H-3**		
	3/4/2014	-1.73 ± 11.5	0.20 ± 3.66	847 ± 598		
	6/17/2014	1.37 ± 14.4	1.43 ± 4.20	630 ± 865		
	9/2/2014	4.10 ± 14.3	-1.06 ± 4.17	235 ± 854		
	12/8/2014	8.99 ± 10.9	-0.55 ± 3.37	62.2 ± 777		

TABLE 3-9: GAMMA EMITTER AND TRITIUM CONCENTRATIONS IN RIVER WATER

Surry Power Station, Surry County, Virginia - 2014

pCi/Liter ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
SD	1/14/2014	-1.32 ± 2.84	-1.94 ± 3.15	-0.46 ± 6.26	-0.33 ± 3.43	-4.98 ± 7.16
	2/11/2014	-0.42 ± 1.95	0.69 ± 2.13	-0.91 ± 4.21	1.00 ± 2.17	1.03 ± 4.12
	3/17/2014	-0.91 ± 3.33	-1.14 ± 3.71	-0.15 ± 8.11	-0.33 ± 3.73	-2.27 ± 8.80
	4/7/2014	1.31 ± 2.09	0.43 ± 1.93	0.81 ± 4.28	-1.94 ± 2.19	-2.86 ± 4.59
	5/13/2014	1.15 ± 2.76	0.59 ± 2.71	-0.31 ± 5.90	-0.32 ± 2.63	-4.64 ± 5.27
	6/10/2014	0.06 ± 1.10	-1.29 ± 1.10	-0.46 ± 2.09	0.84 ± 1.03	1.37 ± 2.62
	7/8/2014	0.34 ± 2.67	-1.86 ± 3.15	2.19 ± 6.22	-1.05 ± 2.67	-7.22 ± 6.53
	8/12/2014	-0.74 ± 1.08	-0.36 ± 1.14	0.67 ± 2.25	0.74 ± 1.15	-3.71 ± 2.56
	9/10/2014	0.27 ± 1.78	-0.25 ± 2.09	5.44 ± 4.25	0.58 ± 1.61	-4.17 ± 4.42
	10/14/2014	-1.71 ± 2.01	-0.55 ± 2.23	-2.95 ± 4.41	-0.23 ± 1.79	2.81 ± 4.32
	11/10/2014	2.95 ± 3.56	0.00 ± 3.41	1.74 ± 6.65	1.77 ± 3.48	6.94 ± 6.99
	12/8/2014	-0.21 ± 2.40	-0.10 ± 2.05	1.07 ± 4.23	2.12 ± 2.66	-0.24 ± 4.74
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	1/14/2014	-1.66 ± 3.20	1.01 ± 5.64	0.45 ± 5.58	-2.91 ± 3.23	1.38 ± 3.11
	2/11/2014	0.50 ± 2.10	-1.73 ± 3.47	0.97 ± 4.17	2.12 ± 1.89	-1.00 ± 2.18
	3/17/2014	-2.62 ± 3.84	1.77 ± 6.48	-0.52 ± 6.06	1.43 ± 3.43	-1.63 ± 3.82
	4/7/2014	1.85 ± 2.18	-1.69 ± 3.48	0.56 ± 4.28	-2.38 ± 2.57	0.55 ± 2.11
	5/13/2014	2.75 ± 3.13	-1.74 ± 4.91	-0.19 ± 5.15	-5.28 ± 3.43	-2.75 ± 2.84
	6/10/2014	0.32 ± 1.14	1.17 ± 2.03	-0.91 ± 2.06	0.53 ± 1.61	0.28 ± 1.23
	7/8/2014	-1.07 ± 3.00	-0.40 ± 5.39	-4.40 ± 5.67	-3.98 ± 2.87	2.03 ± 3.06
	8/12/2014	-0.16 ± 1.18	-0.34 ± 1.99	-1.14 ± 2.09	-3.84 ± 1.16	-1.00 ± 1.16
	9/10/2014	-0.05 ± 2.07	-1.53 ± 3.53	-0.40 ± 5.37	-0.28 ± 2.17	0.34 ± 1.88
	10/14/2014	-0.53 ± 2.07	0.76 ± 3.87	-3.51 ± 6.39	0.87 ± 2.15	0.12 ± 1.93
	11/10/2014	0.04 ± 3.62	1.23 ± 6.98	-2.29 ± 5.75	-2.74 ± 3.70	-1.25 ± 3.69
	12/8/2014	0.64 ± 2.20	-0.55 ± 4.20	-2.03 ± 3.47	-4.41 ± 2.63	-0.72 ± 2.60
		Ba-140	**La-140**	**H-3**	**K-40**	**Th-228**
	1/14/2014	3.38 ± 15.7	-2.08 ± 3.73			
	2/11/2014	3.27 ± 9.63	-2.30 ± 3.36			
	3/17/2014	-8.24 ± 19.3	-7.44 ± 7.35	71.2 ± 856		
	4/7/2014	4.42 ± 10.6	1.31 ± 3.47			
	5/13/2014	-3.38 ± 12.6	-2.21 ± 3.60			
	6/10/2014	3.42 ± 5.72	0.10 ± 1.49	225 ± 627	49.9 ± 26.6	
	7/8/2014	-3.22 ± 15.6	3.40 ± 5.34		120 ± 64.0	
	8/12/2014	-1.86 ± 5.58	-0.53 ± 1.92		93.7 ± 29.6	
	9/10/2014	6.27 ± 13.5	-0.63 ± 3.76	0.00 ± 1150	119 ± 42.6	
	10/14/2014	17.7 ± 14.0	-2.28 ± 4.01		121 ± 38.4	9.00 ± 6.33
	11/10/2014	-1.54 ± 17.0	-3.64 ± 6.26			
	12/8/2014	1.14 ± 9.68	-0.30 ± 2.21	-570 ± 956	110 ± 47.2	
		Th-232				
	10/14/2014	10.7 ± 6.52				

TABLE 3-9: GAMMA EMITTER AND TRITIUM CONCENTRATIONS IN RIVER WATER

Surry Power Station, Surry County, Virginia - 2014

pCi/Liter ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPES				
		Mn-54	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**
SW-C	1/14/2014	-0.16 ± 3.26	-1.93 ± 3.55	-2.62 ± 5.24	3.16 ± 2.48	-4.36 ± 5.47
	2/11/2014	-1.63 ± 2.32	0.21 ± 2.36	1.04 ± 4.64	-0.22 ± 2.17	-1.86 ± 5.40
	3/17/2014	1.32 ± 2.77	0.20 ± 2.76	1.58 ± 5.45	0.00 ± 2.37	-8.24 ± 5.67
	4/8/2014	0.92 ± 2.34	-1.13 ± 2.39	1.28 ± 5.11	0.58 ± 2.47	-8.62 ± 4.99
	5/13/2014	-1.29 ± 2.87	0.80 ± 2.88	0.64 ± 4.98	4.27 ± 2.72	-5.11 ± 6.10
	6/10/2014	0.52 ± 1.03	-0.17 ± 1.03	-0.25 ± 2.26	-0.16 ± 0.99	-6.80 ± 2.46
	7/8/2014	3.25 ± 2.60	1.49 ± 2.56	-3.77 ± 5.46	-4.29 ± 2.64	-9.28 ± 5.94
	8/12/2014	1.92 ± 1.20	0.70 ± 1.28	0.39 ± 2.55	0.48 ± 1.26	-3.76 ± 2.51
	9/10/2014	-0.71 ± 2.17	-0.10 ± 2.28	-2.31 ± 5.04	0.60 ± 2.01	1.14 ± 5.80
	10/14/2014	-1.34 ± 1.70	-0.07 ± 2.00	-4.81 ± 4.03	0.65 ± 1.81	-2.26 ± 4.38
	11/10/2014	0.74 ± 2.58	-0.44 ± 2.50	-2.56 ± 5.75	-1.04 ± 2.97	-6.30 ± 5.91
	12/8/2014	2.43 ± 2.53	0.71 ± 2.57	4.46 ± 5.44	-0.08 ± 2.82	-6.47 ± 5.70
		Nb-95	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**
	1/14/2014	1.27 ± 3.36	-0.46 ± 6.56	-1.01 ± 5.69	1.02 ± 3.31	-1.79 ± 3.88
	2/11/2014	1.97 ± 2.47	-3.37 ± 3.91	2.64 ± 5.18	-5.06 ± 2.77	1.15 ± 2.66
	3/17/2014	3.46 ± 2.80	-5.63 ± 4.87	-2.28 ± 5.92	-0.06 ± 5.27	-0.63 ± 2.72
	4/8/2014	1.39 ± 2.37	2.94 ± 4.14	0.21 ± 4.86	-3.93 ± 2.81	-0.69 ± 2.59
	5/13/2014	-0.71 ± 2.80	1.24 ± 5.12	-2.19 ± 5.58	-4.89 ± 3.52	1.35 ± 3.19
	6/10/2014	-0.42 ± 1.10	1.01 ± 1.94	-0.89 ± 2.01	-0.17 ± 1.23	0.26 ± 1.13
	7/8/2014	1.56 ± 2.80	-1.94 ± 4.49	-5.02 ± 4.98	-4.66 ± 2.90	2.06 ± 2.81
	8/12/2014	0.09 ± 1.30	-0.90 ± 2.24	0.05 ± 2.59	-2.67 ± 1.40	0.65 ± 1.33
	9/10/2014	1.37 ± 2.40	1.97 ± 4.07	-0.36 ± 6.05	1.18 ± 2.32	1.47 ± 2.16
	10/14/2014	0.10 ± 1.95	1.87 ± 3.41	-0.80 ± 5.56	-0.17 ± 3.08	-0.18 ± 1.80
	11/10/2014	0.36 ± 2.55	3.21 ± 4.46	-6.27 ± 5.24	-3.70 ± 3.10	0.84 ± 3.00
	12/8/2014	0.91 ± 2.70	-2.48 ± 4.68	-0.44 ± 3.40	-1.38 ± 3.49	0.22 ± 2.90
		Ba-140	**La-140**	**H-3**	**K-40**	**Th-228**
	1/14/2014	-6.16 ± 16.4	-1.44 ± 3.27			
	2/11/2014	-4.87 ± 13.3	0.54 ± 3.98			
	3/17/2014	-4.00 ± 15.4	-1.94 ± 3.86	-19.4 ± 841		
	4/8/2014	2.64 ± 12.0	-1.37 ± 3.73			
	5/13/2014	8.73 ± 15.1	-0.23 ± 4.06			
	6/10/2014	-0.38 ± 5.34	-0.45 ± 1.62	303 ± 637		
	7/8/2014	6.49 ± 13.4	1.85 ± 3.92			
	8/12/2014	-0.93 ± 6.60	0.72 ± 1.82		47.2 ± 28.6	
	9/10/2014	-7.08 ± 16.1	0.95 ± 4.60	-642 ± 995	105 ± 41.9	
	10/14/2014	4.90 ± 11.9	1.48 ± 3.80		70.9 ± 46.8	9.57 ± 4.76
	11/10/2014	-6.18 ± 13.7	0.93 ± 4.62			
	12/8/2014	-5.52 ± 10.9	1.90 ± 3.00	-596 ± 953	79.8 ± 50.8	

TABLE 3-10: GAMMA EMITTER CONCENTRATIONS IN SILT

Surry Power Station, Surry County, Virginia - 2014

pCi/kg (dry) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Cs-134	**Cs-137**	**K-40**	**Th-232**	**Th-228**
SD	3/11/2014	35.6 ± 53.8	147 ± 73.0	15200 ± 1420	1090 ± 194	1090 ± 116
	9/10/2014	16.5 ± 63.2	230 ± 116	20200 ± 2120	1290 ± 258	1800 ± 181
		Ra-226	**Be-7**			
	3/11/2014	2520 ± 1630				
	9/10/2014		2110 ± 809			
		Cs-134	**Cs-137**	**K-40**	**Th-232**	**Th-228**
CHIC-C	3/11/2014	-10.9 ± 59.0	297 ± 85.6	12800 ± 1450	1140 ± 185	1300 ± 140
	9/10/2014	29.4 ± 54.3	199 ± 87.8	19300 ± 1880	1520 ± 306	1780 ± 165
		Ra-226				
	3/11/2014					
	9/10/2014	3440 ± 2050				

TABLE 3-11: GAMMA EMITTER CONCENTRATIONS IN SHORELINE SEDIMENT

Surry Power Station, Surry County, Virginia - 2014

pCi/kg (dry) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Cs-134	**Cs-137**	**K-40**	**Th-228**	**Th-232**
HIR	2/11/2014	10.8 ± 24.0	7.81 ± 22.4	7890 ± 838	95.0 ± 50.9	
	8/19/2014	-19.3 ± 20.0	-5.42 ± 18.2	6520 ± 781	102 ± 69.3	
CHIC-C	2/11/2014	132 ± 44.3	-31.1 ± 43.8	4770 ± 894	2390 ± 139	2450 ± 244
	8/19/2014	-14.8 ± 28.9	-7.89 ± 29.1	1580 ± 473	1290 ± 88.8	1410 ± 125
		Ra-226				
	2/11/2014					
	8/19/2014	1770 ± 968				

TABLE 3-12: GAMMA EMITTER CONCENTRATION IN FISH

Surry Power Station, Surry County, Virginia - 2014

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATION	COLLECTION DATE	SAMPLE TYPE	ISOTOPE			
			K-40	**Mn-54**	**Co-58**	**Fe-59**
SD	4/8/2014	Catfish	2590 ± 703	9.12 ± 32.9	13.8 ± 30.5	62.8 ± 67.5
	4/8/2014	White Perch	1230 ± 1150	4.11 ± 35.7	-30.8 ± 47.7	-26.7 ± 71.1
	10/7/2014	Catfish	2120 ± 991	1.84 ± 36.0	6.91 ± 39.7	-52.4 ± 86.9
	10/7/2014	White Perch	2430 ± 1310	-38.5 ± 62.7	-3.43 ± 69.4	10.4 ± 156
			Co-60	**Zn-65**	**Cs-134**	**Cs-137**
	4/8/2014	Catfish	15.4 ± 29.3	27.4 ± 67.7	-25.6 ± 33.7	10.8 ± 35.5
	4/8/2014	White Perch	0.73 ± 40.1	-25.3 ± 66.2	-0.53 ± 35.6	-49.1 ± 35.9
	10/7/2014	Catfish	22.2 ± 31.4	-78.8 ± 106	-6.33 ± 41.3	0.61 ± 36.8
	10/7/2014	White Perch	-21.4 ± 53.1	36.5 ± 137	-13.4 ± 79.1	51.0 ± 68.9

TABLE 3-13: GAMMA EMITTER CONCENTRATIONS IN OYSTERS

Surry Power Station, Surry County, Virginia - 2014

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE			
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
POS	3/12/2014	-0.14 ± 23.0	-43.9 ± 28.1	30.3 ± 53.5	13.7 ± 20.9
	9/10/2014	-10.5 ± 40.4	-12.3 ± 48.9	-53.5 ± 87.2	25.8 ± 43.2
		Zn-65	**Cs-134**	**Cs-137**	**K-40**
	3/12/2014	-14.7 ± 51.0	-15.1 ± 25.9	9.47 ± 24.5	595 ± 461
	9/10/2014	-62.9 ± 104	27.5 ± 49.4	18.0 ± 42.2	1560 ± 1010
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
MP	3/12/2014	19.1 ± 26.0	18.0 ± 29.8	16.3 ± 52.9	5.92 ± 19.3
	9/10/2014	14.4 ± 21.7	-2.70 ± 29.2	-14.2 ± 56.5	25.1 ± 28.5
		Zn-65	**Cs-134**	**Cs-137**	**K-40**
	3/12/2014	-5.11 ± 54.2	-18.0 ± 36.5	21.1 ± 28.9	618 ± 454
	9/10/2014	-24.9 ± 57.1	9.59 ± 28.2	-7.86 ± 30.3	646 ± 642
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
LC	3/12/2014	6.04 ± 11.9	4.42 ± 13.4	-5.24 ± 29.0	-8.79 ± 12.3
	9/10/2014	-8.01 ± 26.0	-18.0 ± 29.9	41.9 ± 63.5	19.3 ± 25.0
		Zn-65	**Cs-134**	**Cs-137**	**K-40**
	3/13/2013	-26.1 ± 25.4	9.74 ± 12.5	3.45 ± 11.5	
	9/10/2014	-0.56 ± 62.5	13.4 ± 30.8	-21.1 ± 29.1	1270 ± 608

TABLE 3-14: GAMMA EMITTER CONCENTRATIONS IN CLAMS

Surry Power Station, Surry County, Virginia - 2014

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE			
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
JI	3/11/2014	6.28 ± 20.3	-7.23 ± 20.8	11.4 ± 41.3	-2.70 ± 17.7
	9/10/2014	0.63 ± 34.1	-33.6 ± 31.8	52.5 ± 74.1	-1.77 ± 29.5
		Zn-65	**Cs-134**	**Cs-137**	**K-40**
	3/11/2014	-19.2 ± 41.7	1.09 ± 20.8	-1.33 ± 18.5	
	9/10/2014	5.59 ± 70.7	-1.41 ± 38.1	-14.4 ± 35.0	
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
SD	3/11/2014	1.98 ± 19.6	-8.86 ± 20.3	-42.6 ± 50.8	-5.96 ± 16.5
	9/10/2014	-18.2 ± 29.2	-7.23 ± 33.2	-53.5 ± 75.8	-2.83 ± 28.5
		Zn-65	**Cs-134**	**Cs-137**	**K-40**
	3/11/2014	-30.1 ± 38.5	-29.3 ± 19.1	-0.93 ± 19.1	381 ± 342
	9/10/2014	-89.5 ± 85.5	-12.2 ± 43.3	10.1 ± 36.9	
		Mn-54	**Co-58**	**Fe-59**	**Co-60**
CHIC-C	3/11/2014	3.44 ± 18.8	-3.95 ± 22.8	21.3 ± 50.5	14.9 ± 19.0
	9/10/2014	-4.42 ± 34.1	9.23 ± 37.0	-7.86 ± 86.8	13.8 ± 25.0
		Zn-65	**Cs-134**	**Cs-137**	**K-40**
	3/11/2014	-87.2 ± 45.0	-37.7 ± 22.3	-4.12 ± 19.2	
	9/10/2014	-54.7 ± 88.8	-17.8 ± 40.6	-15.6 ± 35.0	736 ± 566

TABLE 3-15: GAMMA EMITTER CONCENTRATIONS IN CRABS

Surry Power Station, Surry County, Virginia - 2014

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE			
		K-40	**Mn-54**	**Co-58**	**Fe-59**
SD	6/10/2014	1530 ± 630	15.5 ± 30.5	-14.9 ± 30.9	59.1 ± 54.3
		Co-60	**Zn-65**	**Cs-134**	**Cs-137**
		-3.84 ± 28.5	-73.1 ± 64.2	-22.5 ± 34.6	25.0 ± 31.5

4. DISCUSSION OF RESULTS

Data from the radiological analyses of environmental media collected during 2014 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 2014 was from external sources, such as fallout from nuclear weapons tests (cesium-137) and naturally occurring radionuclides. Naturally occurring nuclides such as beryllium-7, potassium-40, radium-226, thorium-228 and thorium-232 were detected in numerous samples.

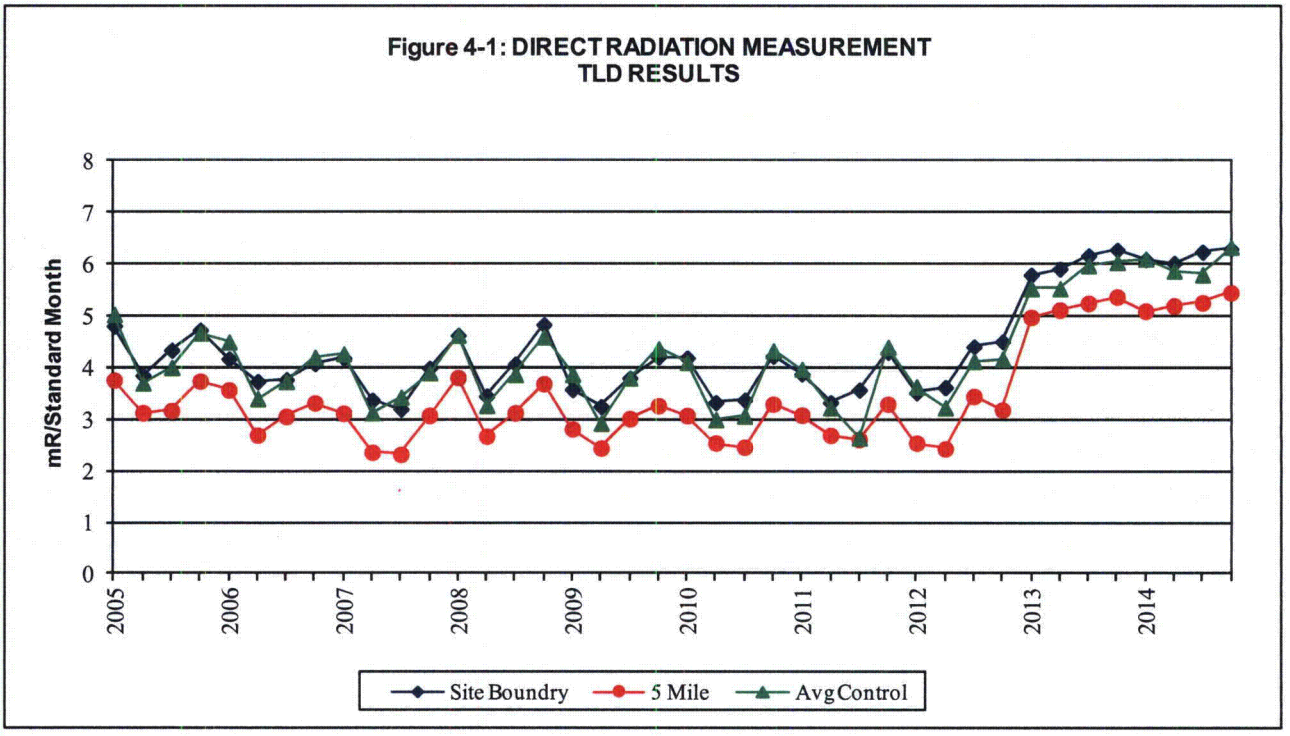
The following is a discussion and summary of the results of the environmental measurements taken during the 2014 reporting period.

4.1 Gamma Exposure Rate

A thermoluminescent dosimeter (TLD) is an inorganic crystal used to detect ambient radiation. Two TLDs, made of CaF and LiF elements and specifically designed for environmental monitoring, are deployed at each sampling location. TLDs are placed in two concentric rings around the station. The inner ring is located 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. Figure 4-1 shows a historical trend of TLD exposure rate measurements, comparing the average of indicator TLDs located near the site boundary and at 5 miles to the average of all control TLD locations. Control and indicator averages indicate a steady relationship. In 2013, Panasonic UD-814 environmental TLDs replaced Harshaw environmental TLDs that were used since 2001. Benchmarking showed that Panasonic UD-814 TLDs were the industry best environmental TLD with improved precision over the Harshaw TLDs. Along with implementing new environmental

TLDs in 2013, an improved method for calculating control dosimeter dose was implemented to estimate transit dose. A program review found that control dosimeters cannot be used directly to assess the transit dose, since control dosimeters also accrue dose from cosmic radiation while stored in the shielded storage cask/cave. Therefore, additional calculations must be made in order to determine the transit dose component. This transit dose component was determined by processing the control dosimeters, and subtracting out the monitoring period storage dose. Previously, control dosimeters were assumed to be a direct measurement of transit dose which resulted in a non-conservative (lower) result of reported field doses. The field dose with the replacement TLDs is higher than that of the previously used TLDs as the greater precision and accuracy of the replacement TLD along with improved control dosimeter dose provides a more representative response to ambient radiation.



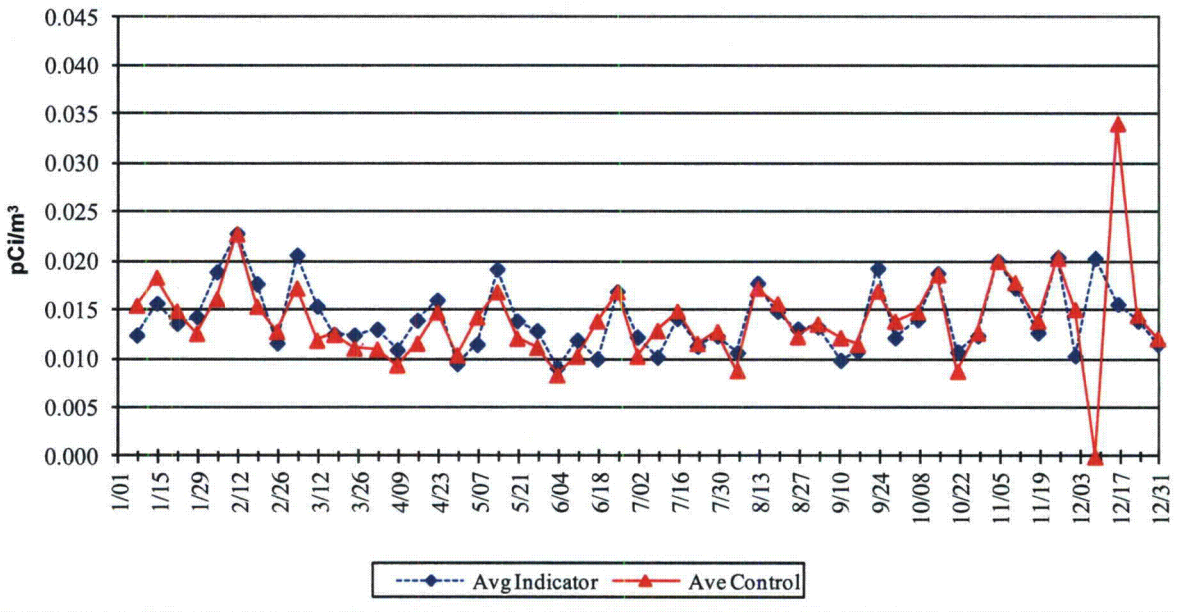
4.2 Airborne Gross Beta

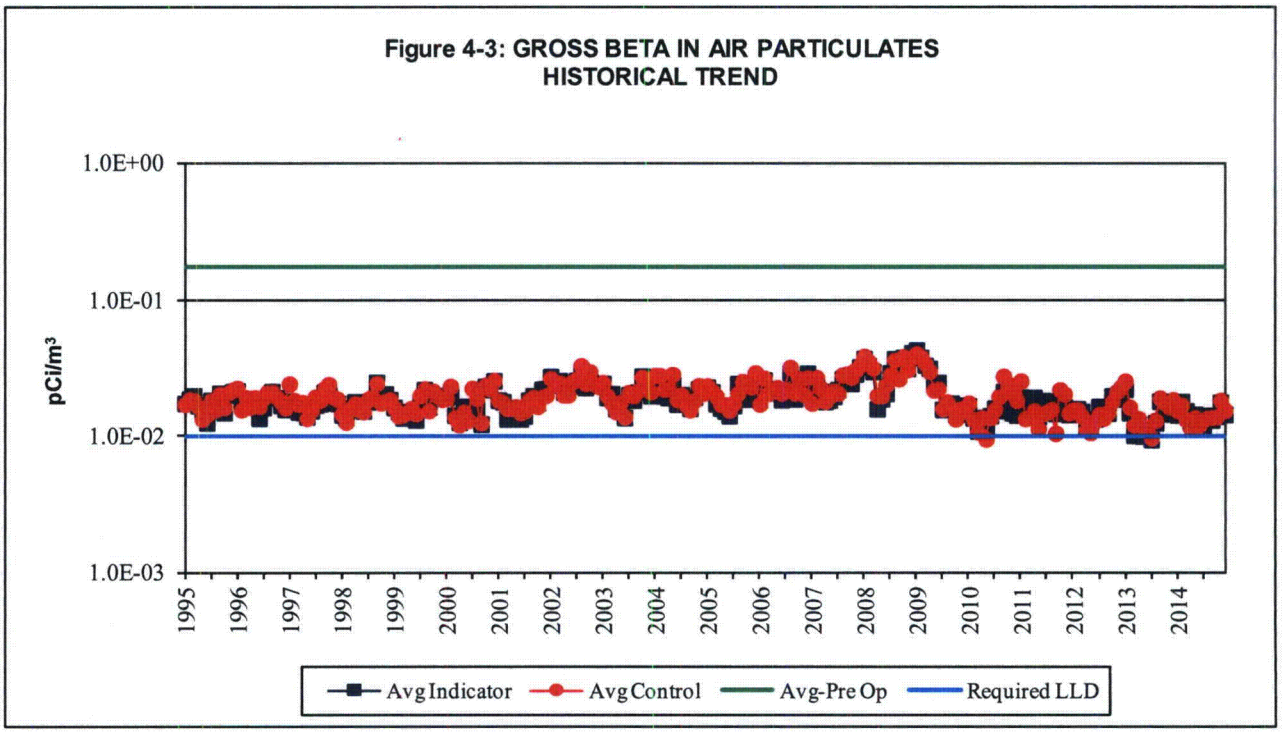
Air is continuously sampled by passing it through glass fiber particulate filters. The filters collect airborne particulate radionuclides. Once a week the samples are collected and analyzed for gross beta activity. Results of the weekly gross beta analyses are presented in Table 3-3. A review of the results from control and indicator locations continues to show no significant variation in measured activities (see Figure 4-2 and 4-3). This indicates that any station contribution is

not measurable. As evident in Figure 4-2, the control gross beta concentrations deviated from the norm for the sampling periods of December 1-8 and 8-16. The gross beta concentration was less than the minimum detectable concentration for the period December 1-8. The sample particulate filter was not as loaded with material (lighter in color) as typically found, however, the sampler was fully functional. For the sampling period December 8-16, the sample particulate filter was loaded with more material than typically found. This may explain the higher than usual gross beta concentration. Historically, gross beta concentrations of this magnitude are not atypical.

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 with the exception of the Chernobyl accident in 1986, airborne gross beta results have remained steady.

Figure 4-2: 2014 GROSS BETA IN AIR PARTICULATES





4.3 Airborne Radioiodine

Air is also continuously sampled for radioiodines by passing it 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. These results are similar to pre-operational data and the results of samples taken prior to and after the 1986 accident in the Soviet Union at Chernobyl and the Fukushima Daiichi nuclear incident in 2011.

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 potassium-40 and beryllium-7, which is produced by cosmic processes. No man-made radionuclides were identified. These analyses confirm the lack of station effects.

4.5 Cow Milk

Analysis of milk samples is generally the most sensitive indicator of fission product existence in the terrestrial environment. This, in combination with the fact that consumption of milk is significant, results in this pathway usually being the most critical from the plant release viewpoint. This pathway also shows measurable amounts of nuclear weapons testing fallout. Therefore, this media needs to be carefully evaluated when trying to determine if there is any station effect.

Results of gamma spectroscopy indicate no detectable station related radioactivity in the milk samples. In years past, cesium-137 had been detected sporadically. The occurrences were attributed to residual global fallout from past atmospheric weapons testing. Cs-137 was not detected at a level above the LLD in 2014.

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 two of the composite samples at an average concentration of 1.56 pCi/L. Sr-90 is not a component of the station radiological effluents and is a product of nuclear weapons testing fallout which has been well documented.

4.6 Food Products

Three samples were collected and analyzed by gamma spectroscopy. The results of the analyses are presented in Table 3-7. As expected, naturally occurring potassium-40 was detected in all samples. The average concentration is consistent with that observed in previous years. No station related radioactivity was detected.

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 and analyzes for gamma radiation and for tritium. The results of these analyses are presented in Table 3-8. Consistent with past monitoring, no station related radioactivity was detected. No gamma emitting isotopes were detected during the pre-operational period.

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

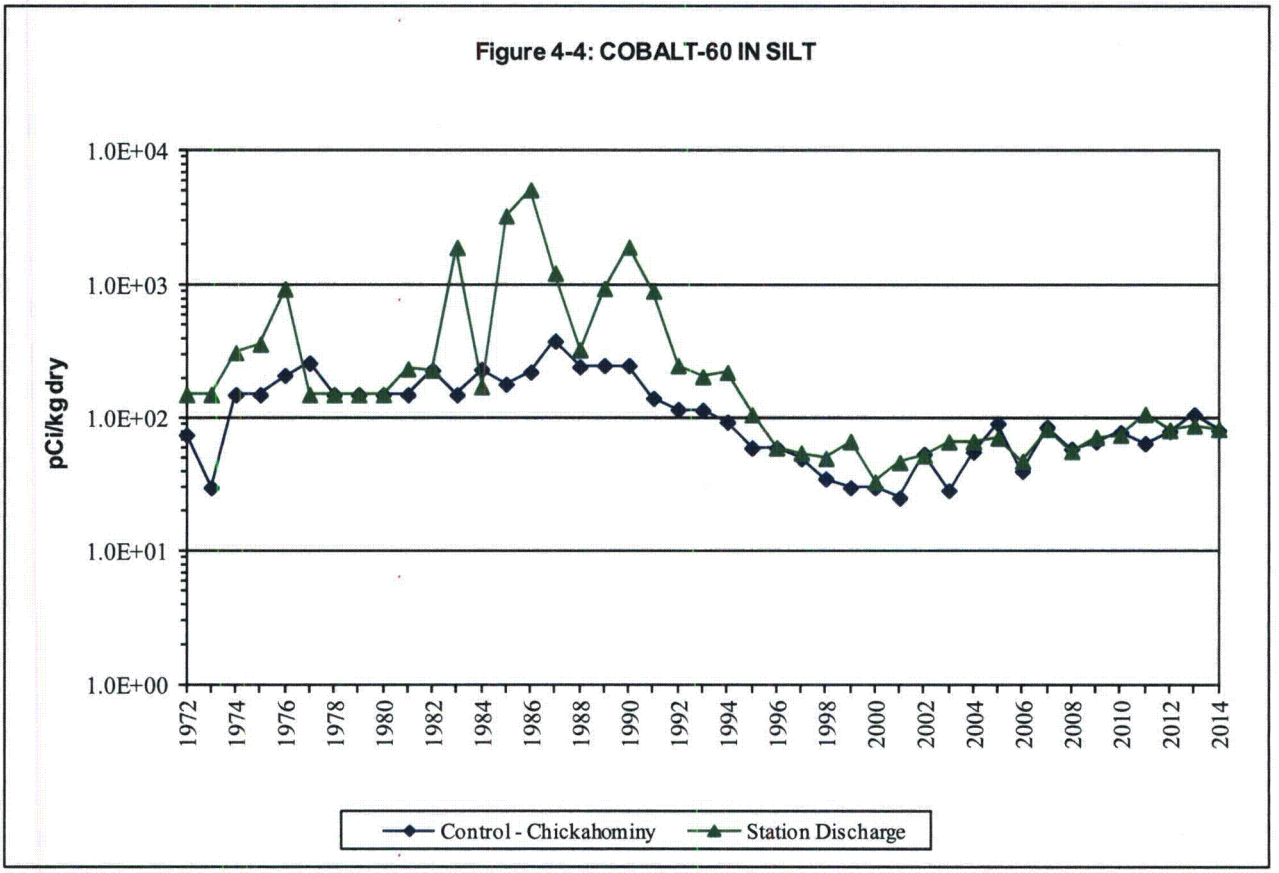
monthly samples are also composited and analyzed for tritium on a quarterly basis. Tritium was not detected and, with the exception of natural products, no other gamma emitters were detected. The naturally occurring radionuclides detected were potassium-40, thorium-228 and thorium-232. No station related radioactivity was detected.

4.9 Silt

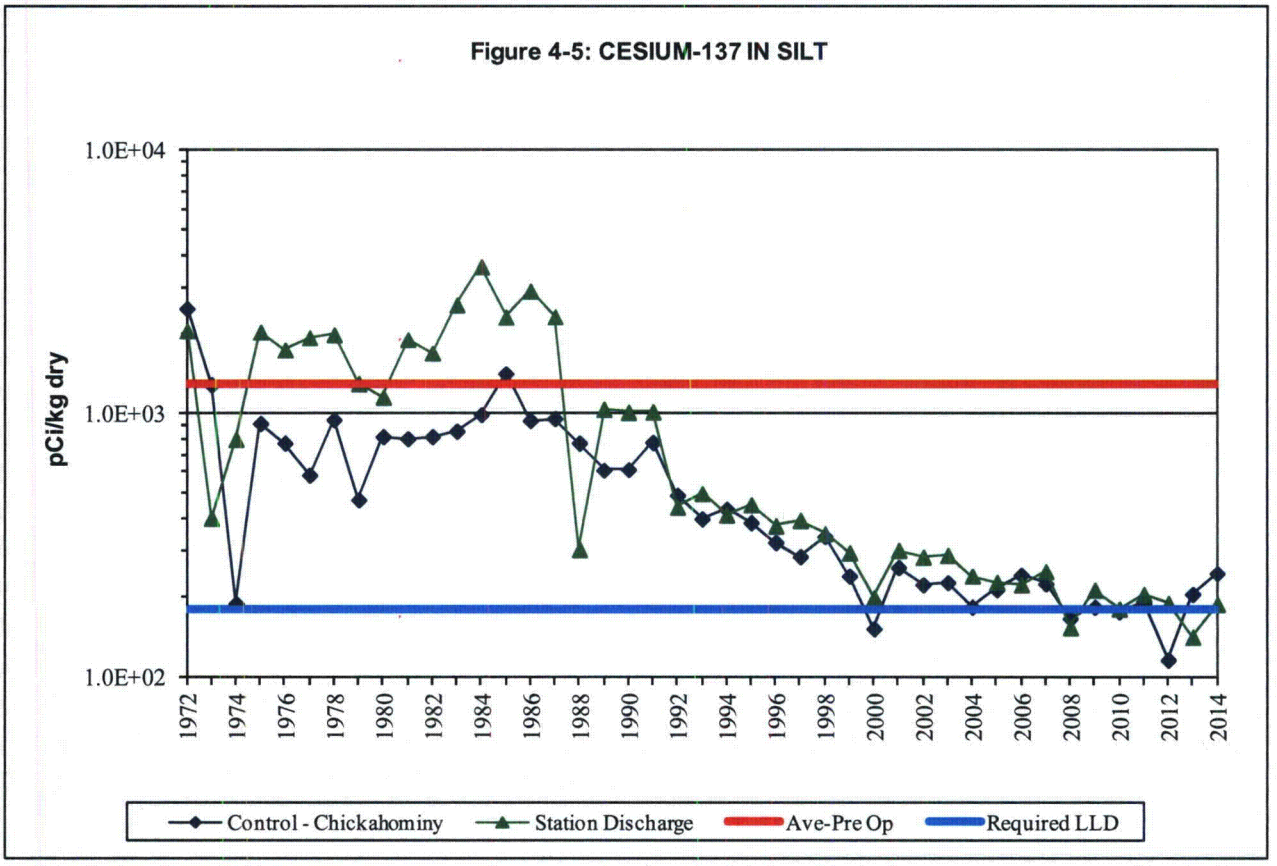
Silt is sampled to evaluate any buildup of radionuclides in the environment due to the operation of the station. Sampling of this pathway provides a good indication of the dispersion effects of effluents to the river. Buildup of radionuclides in silt could indirectly lead to increasing radioactivity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

Samples of silt are collected from two locations, one upstream and one downstream of the station. The results of the gamma spectroscopy analyses are presented in Table 3-10. Naturally occurring potassium-40, radium-226, thorium-228 and thorium-232 were detected. Historically, cobalt-60 has been detected in samples obtained from the indicator location (SD). Cobalt-60 has not been detected since 2003. Trend graphs of cobalt-60 and cesium-137 in silt appear in Figures 4-4 and 4-5.

Cesium-137 was detected, as expected, in both the control and indicator samples. The levels detected indicate a continual decreasing trend seen for over a decade. The detection of cesium-137 in both the control and indicator samples and decreasing levels indicate that the presence of cesium-137 is the result of accumulation and runoff into the river of residual weapons testing fallout. Its global presence has been well documented. During the pre-operational period, cesium-137 was detected in most silt samples with an average concentration as indicated in Figure 4-5. In 2014, cesium-137 was detected with an average indicator location concentration of 189 pCi/kg and an average control location concentration of 248 pCi/kg. These activities continue to represent fallout from nuclear weapons testing. Both indicator and control cesium-137 activities trend closely as shown in Figure 4-5.



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 2014.



4.10 Shoreline Sediment

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

The naturally occurring radionuclides potassium-40, radium-226, thorium-228 and thorium-232 were detected at concentrations equivalent to normal background activities. The activities of these radionuclides indicate a steady trend. There were no radionuclides attributable to the operation of the station found in any 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. These results are the same as those seen over the last decade. No activity was observed in this media except for naturally occurring potassium-40.

4.12 Oysters

Oysters were collected from three different locations. The results of the oyster analyses are presented in Table 3-13.

There were no gamma emitting radionuclides detected in oysters sampled except for naturally occurring potassium-40. No station related radioactivity has been detected in this media since 1991. The absence of station related radionuclides is attributable to the replacement of steam generators in 1982 and past improvements made to liquid effluent treatment systems.

4.13 Clams

Clams are analyzed from three different locations. The results of the gamma spectroscopy analyses are presented in Table 3-14. Like oysters, no station related radioactivity was detected. Naturally occurring potassium-40 was detected.

4.14 Crabs

A crab sample was collected in June from the station discharge canal 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 were detected in the sample. This is consistent with pre-operational data and data collected over the past decade.

5. PROGRAM EXCEPTIONS

There were two REMP exceptions for scheduled sampling and analysis during 2014.

1. The 1st quarter indicator environmental TLD #32 was missing when TLDs were collected. Therefore, there was no gamma dose evaluation available at this location for the 1st quarter.
2. The Fort Eustis air sampler was inoperable for the sampling period of 7/01/14 to 7/08/14. The sampler housing was found dislodged, but still tethered by the electrical conduit, from the power pole to which it was mounted. The high winds from the remnants of hurricane Arthur are suspected to have caused this damage. As a result, the required lower limits of detection were unattainable for gross beta and iodine-131 due to insufficient sample volume collection.

6. CONCLUSIONS

The results of the 2014 Radiological Environmental Monitoring Program for Surry Power Station have been presented in previous sections. This section presents conclusions for each pathway.

- **Direct Radiation Exposure Pathway** - Control and indicator location averages continue to indicate a steady relationship and trend over the long term.

- **Airborne Exposure Pathway** - Analysis of charcoal cartridge samples for radioiodines indicated no positive activity was detected. Quarterly gamma isotopic analyses of the composite particulate samples identified only naturally occurring beryllium-7 and potassium-40. Air particulate gross beta concentrations at all of the indicator locations for 2014 trend well with the control location.

- **Milk** - Milk samples are an important indicator measuring the effect of radioactive iodine and radionuclides in airborne releases. Cesium-137 and iodine-131 were not detected in any of the thirty-six samples. Naturally occurring potassium-40 was detected at a similar level when compared to the averages of the previous years.

  Strontium-90 was detected in two samples at an average concentration of 1.56 pCi/L. Strontium-90 is not a component of station effluents, but rather, a product of nuclear weapons testing fallout.

- **Food Products** - As expected, naturally occurring potassium-40 was detected in all three samples. In the past, cesium-137 has occasionally been detected in these samples and is attributable to global fallout from past nuclear weapons testing. Cesium-137 was not detected in any of the three samples collected in 2014.

- **Well Water** - Well water samples were analyzed and the analyses indicated that there were no man-made radionuclides present. This trend is consistent throughout the monitoring period. No radioactivity attributable to the operation of the station was identified.

- **River Water** - River water samples were analyzed for gamma emitting radionuclides and tritium. Only the naturally occurring gamma emitting radionuclides potassium-40, thorium-228 and thorium-232 were detected. Tritium was not detected.

- **Silt** - Cesium-137 was detected in both the control and indicator samples. The presence of cesium-137 is attributable to residual weapons testing fallout; its presence has been well documented. Cobalt-60 has not been

detected since 2003.

- **Shoreline Sediment** - Naturally occurring radionuclides were detected at concentrations equivalent to normal background activities. There were no radionuclides attributable to the operation of Surry Power Station found in any sample.

Aquatic Biota

- **Fish** - As expected, naturally occurring potassium-40 was detected. There were no other gamma emitting radionuclides detected in any of the fish samples.

- **Oysters and Clams** – Other than naturally occurring potassium-40, there were no other gamma emitting radionuclides detected in any of the oyster or clam samples.

- **Crabs** – Naturally occurring potassium-40 was detected. No other gamma emitting radionuclides were detected.

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References

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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.

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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.

APPENDICES

APPENDIX A: LAND USE CENSUS

Year 2014

*LAND USE CENSUS**

Surry Power Station, Surry County, Virginia

January 1 to December 31, 2014 Page 1 of 1

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	2.3 @ 221°	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 2014

INTRODUCTION

This appendix covers the Interlaboratory Comparison Program (ICP) of Teledyne Brown Engineering (TBE). TBE use QA/QC samples provided by Eckert & Ziegler Analytics, Inc., Environmental Resource Associates (ERA) and the Mixed Analyte Performance Evaluation Program (MAPEP) to monitor the quality of analytical processing associated with the REMP. Each provider has a documented Quality Assurance program and the capability to prepare Quality Control materials traceable to the National Institute of Standards and Technology (NIST). The providers supply the samples to TBE, and upon receipt, the laboratories perform the analyses in a normal manner. The results are then reported to the provider for evaluation. The suite of QA/QC samples is designed to provide sample media and radionuclide combinations that are offered by the providers and included in the REMP and typically includes:

- milk for gamma nuclides and low-level iodine-131 analyses,
- milk for Sr-89 and Sr-90 analyses,
- water for gamma nuclides, low-level iodine-131, and gross beta analyses,
- water for tritium, Sr-89, and Sr-90 analyses,
- cartridge for I-131 analyses,
- air filter for gamma nuclide, gross beta, and Sr-90 analyses.

The accuracy of each result reported to Eckert & Ziegler Analytics, Inc. is measured by the ratio of the TBE result to the known value. Accuracy for all other results is based on statistically derived acceptance ranges calculated by the providers. An investigation is undertaken whenever the ratio or reported result fell outside of the acceptance range.

RESULTS

The TBE ICP results are included in the following tables for the first through the fourth quarters of 2014. Four analyses did not meet the acceptance criteria. TBE initiated non-conformance reports (NCRs) to document and address the analyses. The results of the NCRs are as follows.

1. NCR 14-04, MAPEP filter sample 14-RdF30 failed Sr-90. The TBE value of 0.822 Bq/sample was lower than the known value of 1.18 Bq/sample, failing below the lower acceptance limit of 0.83 Bq/sample. The rerun result was still low, but fell within the lower acceptance range of 0.836. The rerun result was statistically the same number as the original result. No cause could be found for the slightly low results.
2. NCR 14-08, ERA water sample RAD-99 failed I-131. The TBE value of 15.8 pCi/L was lower than the known value of 20.3 pCi/L, failing below the lower acceptance limit of 16.8. The result was evaluated as failed with a found to

known ratio of 0.778. No cause could be found for the slightly low result. All ERA I-131 evaluations since 2004 have been acceptable.

3. NCR 14-09, MAPEP filter sample 14-RdF31 failed Sr-90. The TBE value of 0.310 Bq/sample was lower than the known value of 0.703 Bq/sample. The high gravimetric yield of 117% (typical yields of 60% to 70%) could indicate a larger than normal amount of calcium in the filter and could account for the low activity.
4. NCR 14-09, MAPEP filter sample 14-GrF31 failed Gross Alpha. The TBE value of 0.153 Bq/sample was lower than the known value of 0.53 Bq/sample. The AP sample was counted on the wrong side. The AP was flipped over and recounted with acceptable results.

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Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2014	E10854	Milk	Sr-89	pCi/L	95.1	91.7	1.04	A
			Sr-90	pCi/L	10.9	15.1	0.72	W
	E10855	Milk	I-131	pCi/L	96.6	99	0.98	A
			Ce-141	pCi/L	112	119	0.94	A
			Cr-51	pCi/L	449	491	0.91	A
			Cs-134	pCi/L	186	210	0.89	A
			Cs-137	pCi/L	250	253	0.99	A
			Co-58	pCi/L	248	268	0.93	A
			Mn-54	pCi/L	292	297	0.98	A
			Fe-59	pCi/L	230	219	1.05	A
			Zn-65	pCi/L	312	323	0.97	A
			Co-60	pCi/L	321	337	0.95	A
	E10857	Filter	Ce-141	pCi	53	53.9	0.98	A
			Cr-51	pCi	232	223	1.04	A
			Cs-134	pCi	100	95	1.05	A
			Cs-137	pCi	122	115	1.06	A
			Co-58	pCi	122	121	1.01	A
			Mn-54	pCi	135	135	1.00	A
			Fe-59	pCi	111	99	1.12	A
			Zn-65	pCi	140	147	0.95	A
			Co-60	pCi	187	153	1.22	W
	E10856	Charcoal	I-131	pCi	74.1	76.4	0.97	A
June 2014	E10913	Milk	Sr-89	pCi/L	85.9	91.3	0.94	A
			Sr-90	pCi/L	13.8	14.5	0.95	A
	E10914	Milk	I-131	pCi/L	86.5	90.9	0.95	A
			Ce-141	pCi/L	111	124	0.90	A
			Cr-51	pCi/L	255	253	1.01	A
			Cs-134	pCi/L	147	162	0.91	A
			Cs-137	pCi/L	123	120	1.03	A
			Co-58	pCi/L	105	112	0.94	A
			Mn-54	pCi/L	155	156	0.99	A
			Fe-59	pCi/L	106	102	1.04	A
			Zn-65	pCi/L	251	252	1.00	A
			Co-60	pCi/L	218	224	0.97	A

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Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2014	E10916	Filter	Ce-141	pCi	95.1	92.6	1.03	A
			Cr-51	pCi	215	190	1.13	A
			Cs-134	pCi	122	122	1.00	A
			Cs-137	pCi	95.1	89.8	1.06	A
			Co-58	pCi	88.7	84.1	1.05	A
			Mn-54	pCi	115	116	0.99	A
			Fe-59	pCi	72.6	76.7	0.95	A
			Zn-65	pCi	193	189	1.02	A
			Co-60	pCi	179	168	1.07	A
	E10915	Charcoal	I-131	pCi	85.6	85.2	1.00	A
September 2014	E10946	Milk	Sr-89	pCi/L	90.7	96.9	0.94	A
			Sr-90	pCi/L	14.0	16.4	0.85	A
	E10947	Milk	I-131	pCi/L	92.0	97.6	0.94	A
			Ce-141	pCi/L	117	126	0.93	A
			Cr-51	pCi/L	281	288	0.98	A
			Cs-134	pCi/L	141	158	0.89	A
			Cs-137	pCi/L	186	193	0.96	A
			Co-58	pCi/L	137	143	0.96	A
			Mn-54	pCi/L	138	142	0.97	A
			Fe-59	pCi/L	162	158	1.03	A
			Zn-65	pCi/L	75.2	73.0	1.03	A
			Co-60	pCi/L	286	297	0.96	A
	E10949	Filter	Ce-141	pCi	97.8	82.1	1.19	A
			Cr-51	pCi	212	188	1.13	A
			Cs-134	pCi	106	103	1.03	A
			Cs-137	pCi	131	126	1.04	A
			Co-58	pCi	85.7	93.0	0.92	A
			Mn-54	pCi	93	92	1.01	A
			Fe-59	pCi	113	103	1.10	A
			Zn-65	pCi	53	47.5	1.12	A
			Co-60	pCi	202	193	1.05	A
	E10948	Charcoal	I-131	pCi	83.9	89.8	0.93	A
December 2014	E11078	Milk	Sr-89	pCi/L	85.7	95.7	0.90	A
			Sr-90	pCi/L	12.9	15.6	0.83	A

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Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2014	E11079	Milk	I-131	pCi/L	85.9	95.1	0.90	A
			Ce-141	pCi/L	205	219	0.94	A
			Cr-51	pCi/L	402	406	0.99	A
			Cs-134	pCi/L	156	164	0.95	A
			Cs-137	pCi/L	194	198	0.98	A
			Co-58	pCi/L	122	130	0.94	A
			Mn-54	pCi/L	220	225	0.98	A
			Fe-59	pCi/L	183	175	1.05	A
			Zn-65	pCi/L	287	297	0.97	A
			Co-60	pCi/L	224	235	0.95	A
	E11081	Filter	Ce-141	pCi	96.4	102.0	0.95	A
			Cr-51	pCi	171	190	0.90	A
			Cs-134	pCi	73.1	76.9	0.95	A
			Cs-137	pCi	99.0	92.6	1.07	A
			Co-58	pCi	57.5	60.8	0.95	A
			Mn-54	pCi	107	105	1.02	A
			Fe-59	pCi	74.2	81.6	0.91	A
			Zn-65	pCi	144	139	1.04	A
			Co-60	pCi	114	110	1.04	A
	E11080	Charcoal	I-131	pCi	93.5	98.2	0.95	A

(a) Teledyne Brown Engineering reported result.

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

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

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

DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
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Month/Year	Identification Number	Media	Nuclide*	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2014	14-MaW30	Water	Am-241	Bq/L	0.764	0.720	0.504 - 0.936	A
			Cs-134	Bq/L	20.7	23.1	16.2 - 30 0	A
			Cs-137	Bq/L	28.0	28.9	20.2 - 37.6	A
			Co-57	Bq/L	26.5	27.5	19.3 - 35.8	A
			Co-60	Bq/L	15.6	16.0	11.2 - 20.8	A
			Mn-54	Bq/L	13.5	13.9	9.7 - 18.1	A
			Zn-65	Bq/L	-0.201		(1)	A
	14-RdF30	AP	Sr-90	Bq/sample	0.8220	1.18	0.83 - 1.53	N (2)
	14-GrF30	AP	Gr-A	Bq/sample	0.606	1.77	0.53 - 3.01	A
			Gr-B	Bq/sample	0.7507	0.77	0.39 - 1.16	A
September 2014	14-RdF31	AP	Sr-90	Bq/sample	0.310	0.703	0.492 - 0.914	N (3)
	14-GrF31	AP	Gr-A	Bq/sample	0.153	0.53	0.16 - 0.90	N (3)
			Gr-B	Bq/sample	0.977	1.06	0.53 - 1.59	A

* The MAPEP cross check isotope list has been reduced due to duplication of effort or analysis not being performed for clients.

(1) False positive test.

(2) AP, Sr-90 rerun was within the low range of the acceptqance criteria. The original and rerun results were statistically the same. No cause could be identified for the slightly low Sr-90 activity. NCR 14-04

(3) AP, Sr-90 gravimetric yield was very high at 117%. Could indicate larger than normal amounts of calcium in the AP. A second fuming HNO_3 separation would be required to remove the excess calcium; The Gross Alpha AP was counted on the wrong side. When flipped over and recounted the results were acceptable. NCR 14-09

(a) Teledyne Brown Engineering reported result.

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

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

ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
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Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2014	RAD-97	Water	Sr-89	pCi/L	38.25	36.7	27.5 - 43.6	A
			Sr-90	pCi/L	24.65	26.5	19.2 - 30.9	A
			Ba-133	pCi/L	89.1	87.9	74.0 - 96.7	A
			Cs-134	pCi/L	45.55	44.3	35.5 - 48.7	A
			Cs-137	pCi/L	91.15	89.1	80.2 - 101	A
			Co-60	pCi/L	65.10	64.2	57.8 - 73.1	A
			Zn-65	pCi/L	244	235	212 - 275	A
			Gr-A	pCi/L	45.65	61.0	31.9 - 75.8	A
			Gr-B	pCi/L	27.95	33.0	21.4 - 40.7	A
			I-131	pCi/L	23.75	25.7	21.3 - 30.3	A
			U-Nat	pCi/L	9.61	10.2	7.95 - 11.8	A
			H-3	pCi/L	8435	8770	7610 - 9650	A
	MRAD-20	Filter	Gr-A	pCi/filter	28.0	46.0	15.4 - 71.4	A
November 2014	RAD-99	Water	Sr-89	pCi/L	30.4	31.4	22.8 - 38.1	A
			Sr-90	pCi/L	18.6	21.8	15.6 - 25.7	A
			Ba-133	pCi/L	46.8	49.1	40.3 - 54.5	A
			Cs-134	pCi/L	88.0	89.8	73.7 - 98.8	A
			Cs-137	pCi/L	99.0	98.8	88.9 - 111	A
			Co-60	pCi/L	92.5	92.1	82.9 - 104	A
			Zn-65	pCi/L	325	310	279 - 362	A
			Gr-A	pCi/L	29.9	37.6	19.4 - 48.1	A
			Gr-B	pCi/L	27.5	27.4	17.3 - 35.3	A
			I-131	pCi/L	15.8	20.3	16.8 - 24.4	N (1)
			U-Nat	pCi/L	5.74	5.80	4.34 - 6.96	A
			H-3	pCi/L	6255	6880	5940 - 7570	A
	MRAD-21	Filter	Gr-A	pCi/filter	27.3	36.9	12.4 - 57.3	A

(1) The Iodine-131 was evaluated as failed with a ratio of 0.778. No cause could be found for the slighly low activity. TBE would evaluate this as acceptable with warning. A rerun was not possible due to I-131 decay. All ERA Iodine-131 evaluations since 2004 have been acceptable. NCR 14-08

(a) Teledyne Brown Engineering reported result.

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

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