VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 26, 2013

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

Serial No.	13-248
SS&L/JCP	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, 2012 through December 31, 2012, 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
NMSS36

Serial No. 13-248
Docket Nos.: 50-280
50-281
72-2
72-55

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

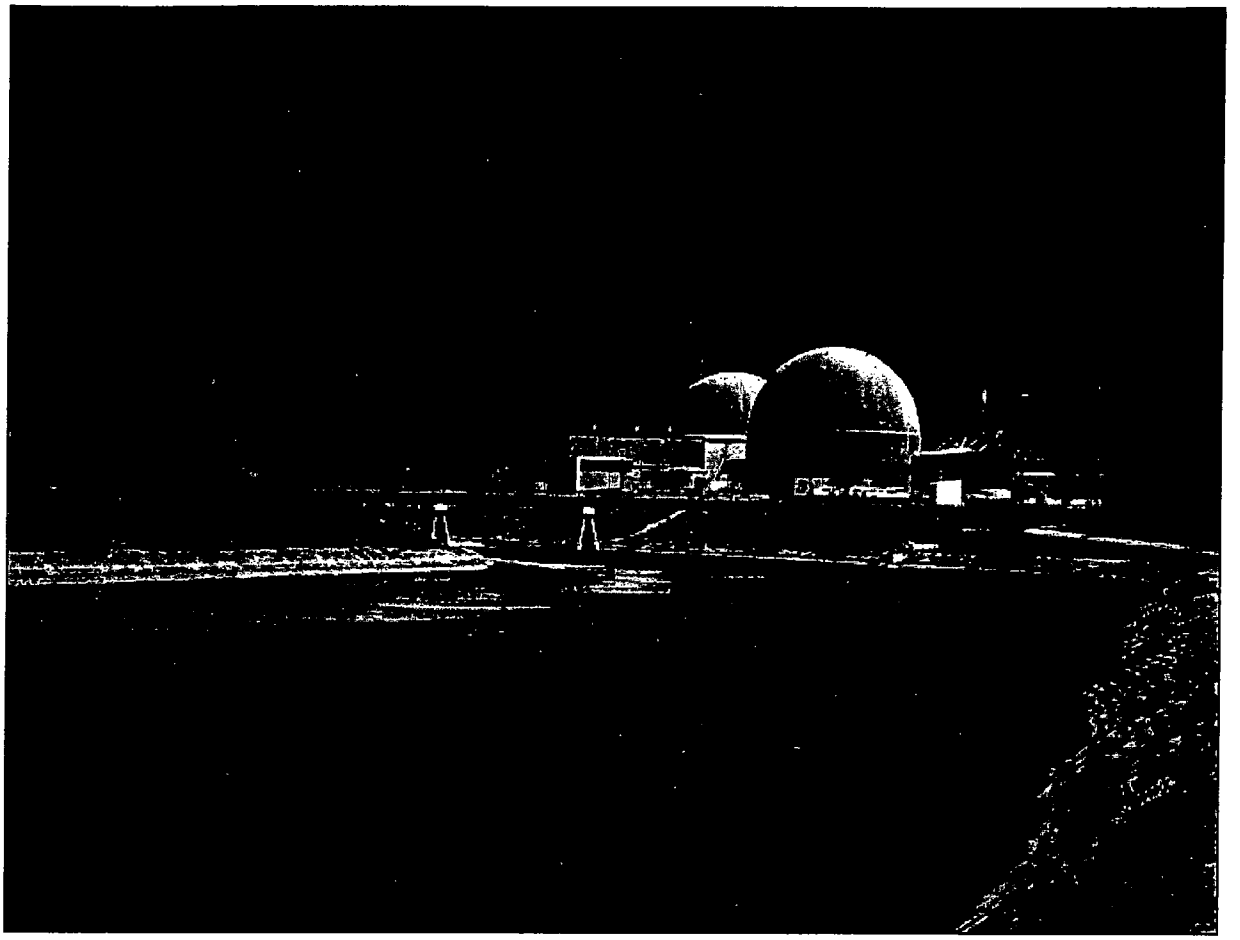
Serial No. 13-248
Docket Nos.: 50-280
50-281
72-2
72-55

ATTACHMENT 1

2012 Annual Radiological Environmental Operating Report

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

Surry Power Station



2012 Annual Radiological Environmental Operating Report

Dominion®

Dominion

Surry Power Station

Radiological Environmental Monitoring Program

January 1, 2012 to December 31, 2012

Annual Radiological Environmental Operating Report

Surry Power Station

January 1, 2012 to December 31, 2012

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
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.

1. EXECUTIVE SUMMARY

This document is a detailed report of the 2012 Surry Power Station Radiological Environmental Monitoring Program (REMP). Radioactivity levels from January 1 through December 31, 2012, 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 are used as reference data. Normal background radiation levels, or radiation present due to causes other than Surry Power Station, 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 causes such as the Chernobyl and Fukushima Daiichi accidents or natural variation.

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 2012 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 potassium-40, 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. Tritium was detected in one of eight river water samples at 6.7% of the USNRC reporting level, that sample being from the discharge canal. No other 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 such as potassium-40, thorium-228 and thorium-232 were detected at average environmental levels. The terrestrial exposure pathway includes milk and food products. Iodine-131 was not detected in any 2012 milk samples and has not been detected in milk prior to or since the 1986 Chernobyl accident. Strontium-90 was also not detected in milk samples in 2012. 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 2012, 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 2012 was 0.087 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 2012 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 2012 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 2012 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 - 2012

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 - 2012
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 - 2012

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	
Clams	Chickahominy River	(CHIC)	11.2	WNW	300°	Semi-Annually	Control Location
	Surry Station Discharge	(SD)	1.3	NNW	341°	Semi-Annually	
	Hog Island Point	(HIP)	2.4	NE	52°	Semi-Annually	
	Lawne's Creek	(LC)	2.4	SE	131°	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 - 2012

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	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	
Well Water	Quarterly	Tritium (H-3)	2000	pCi/L
		I-131	1	
		Gamma Isotopic		pCi/L
		Mn-54	15	
		Fe-59	30	
		Co-58	15	
		Co-60	15	
		Zn-65	30	
		Zr-95	30	
		Nb-95	15	
		Cs-134	15	
		Cs-137	18	
		Ba-140	60	
		La-140	15	

Footnotes located at end of table.

Table 2-2

SURRY - 2012

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

Footnotes located at end of table.

Table 2-2

SURRY - 2012

SAMPLE ANALYSIS PROGRAM

SAMPLE MEDIA	FREQUENCY	ANALYSIS	LLD*	REPORT UNITS
Fish	Semi-Annually	Gamma Isotopic		pCi/kg - wet
		Mn-54	130	
		Fe-59	260	
		Co-58	130	
		Co-60	130	
		Zn-65	260	
		Cs-134	130	
		Cs-137	150	
Food Products	Annually	Gamma Isotopic		pCi/kg - wet
		I-131	60	
		Cs-134	60	
		Cs-137	80	

Note: This table is not a complete listing of nuclides that can be detected and reported. Other peaks that ar 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

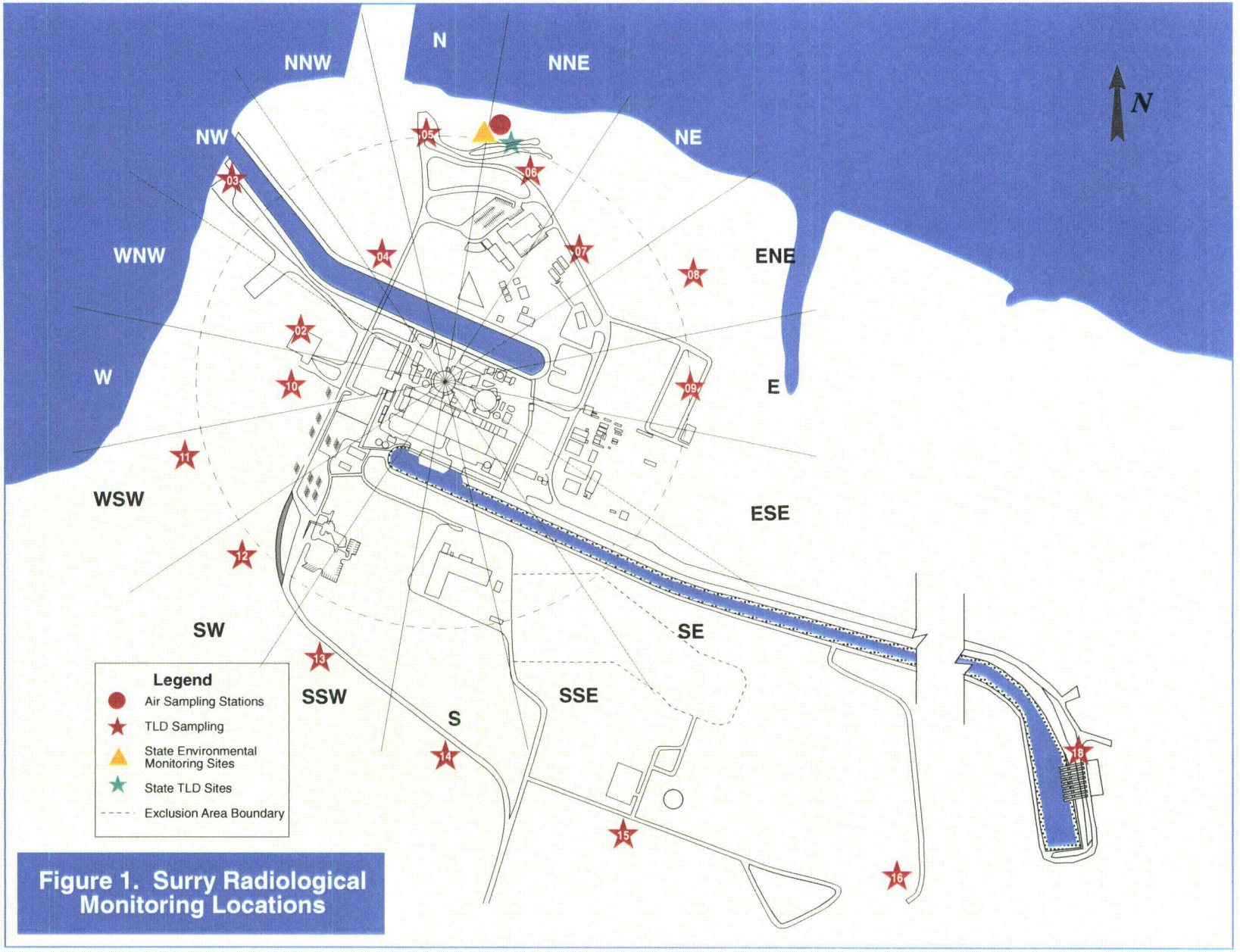


Figure 1. Surry Radiological Monitoring Locations

Graphics No. SV645F

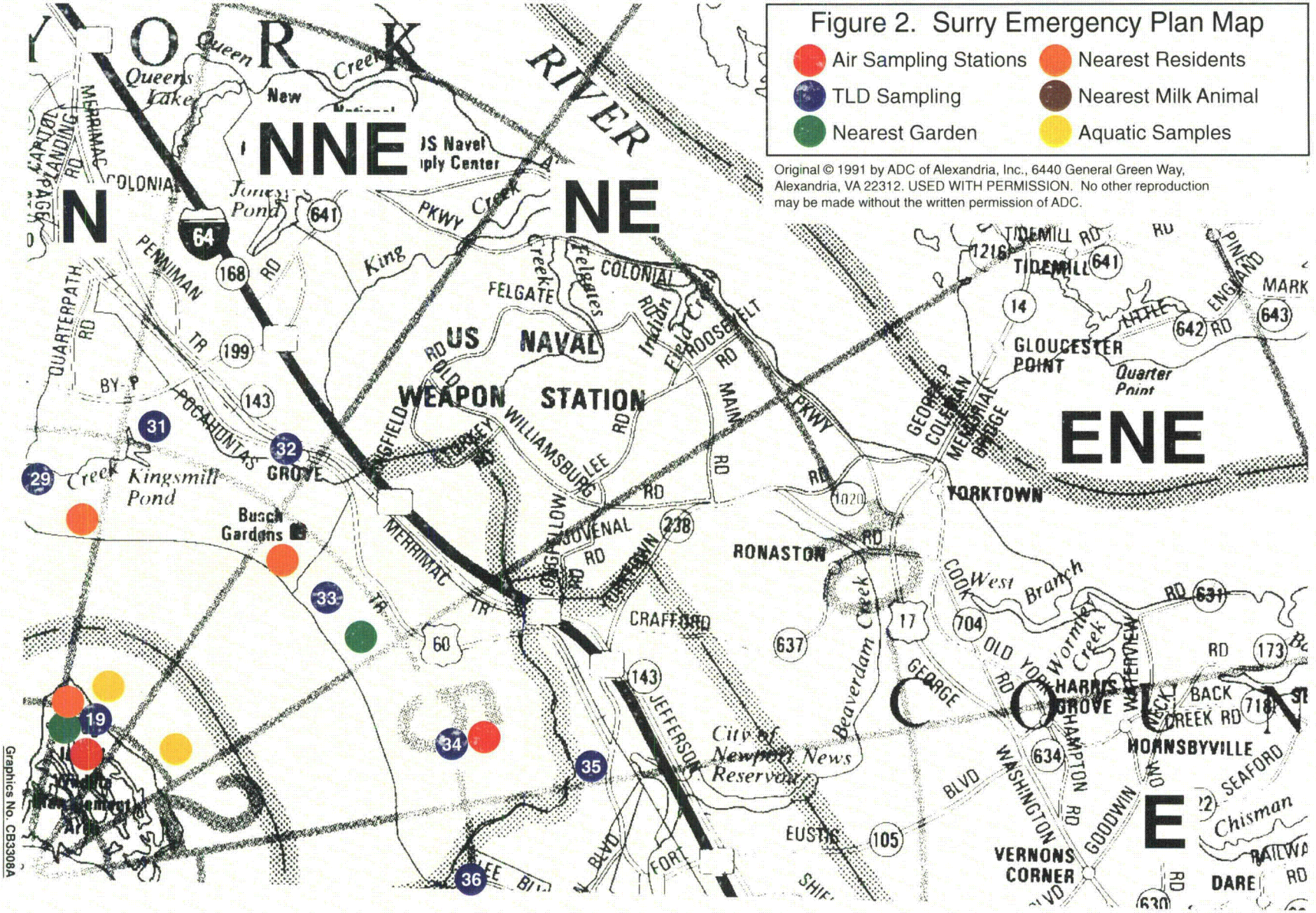


Figure 2. Surry Emergency Plan Map
Air Sampling Stations
TLD Sampling
Nearest Garden
Nearest Residents
Nearest Milk Animal
Aquatic Samples
Original © 1991 by ADC of Alexandria, Inc., 6440 General Green Way, Alexandria, VA 22312. USED WITH PERMISSION. No other reproduction may be made without the written permission of ADC.
NNE
NE
ENE
E
US NAVAL WEAPON STATION
YORKTOWN
GLOUCESTER POINT
RONASTON
CRAFFORD
HORNSBYVILLE
VERNONS CORNER
Queens Lake
Queen Creek
New
Jones Pond
King Creek
Felgates Creek
FELGATE
COLONIAL
PKWY
PENNIMAN RD
QUARTERPATH RD
POCAHONTAS TR
BY-P
OLD WILLIAMSBURG RD
MAIN RD
ROOSEVELT
Indian Field Cr
TIDEMILL RD
MARK
ENGLAND
Quarter Point
GEORGE P. COLEMAN MEMORIAL BRIDGE
Kingsmill Pond
Busch Gardens
GROVE
MERRIMAC TR
JOUVENAL RD
JEFFERSON
City of Newport News Reservoir
Beaverdam Creek
West Branch Cook
Wormley Creek
OLD YORK RD
HARRIS
BACK CREEK RD
WATERVIEW
HAMPTON RD
WASHINGTON BLVD
GOODWIN
SEAFORD
Chisman
DARE
EUSTIS
Graphics No. CB3308A

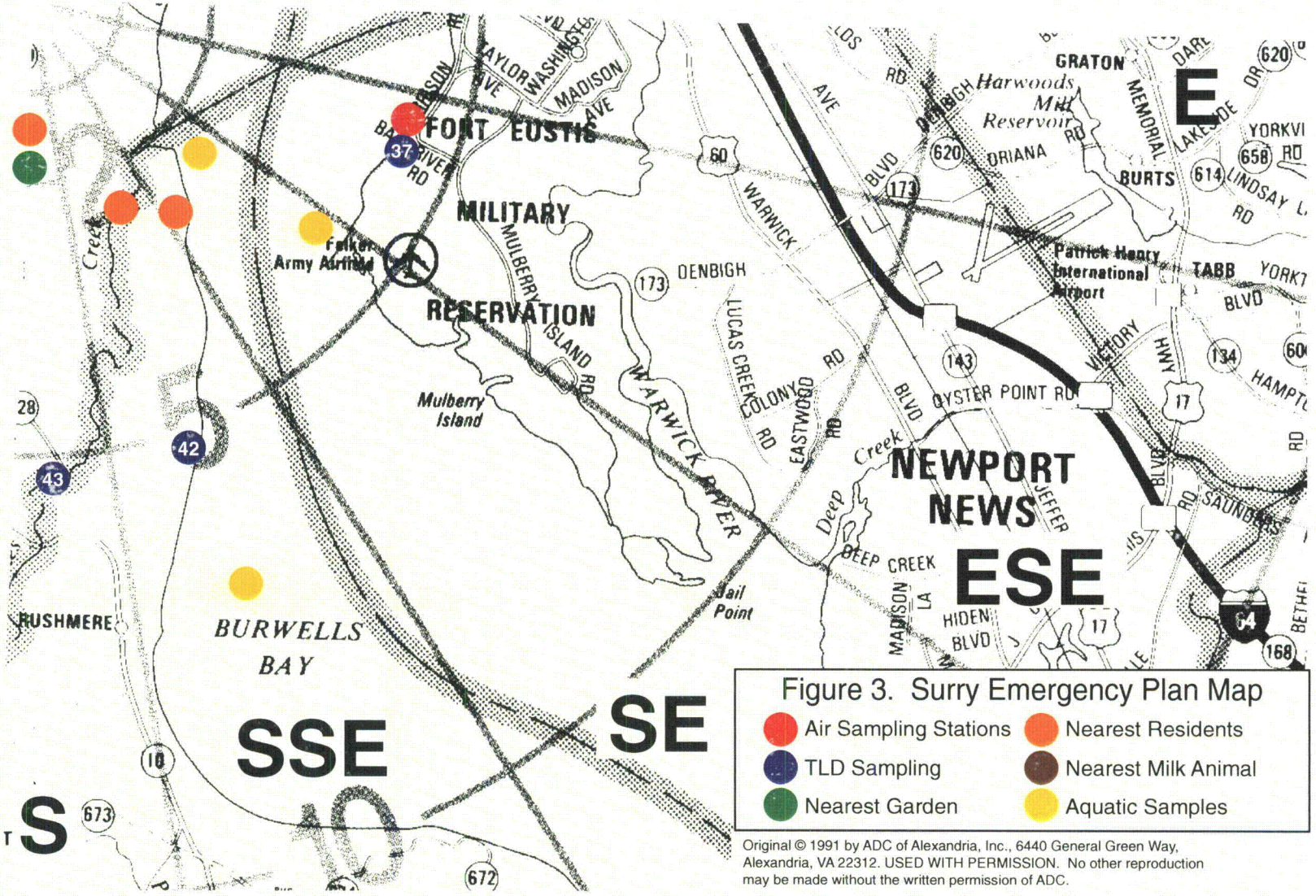


Figure 3. Surry Emergency Plan Map

Graphics No. CB3309A

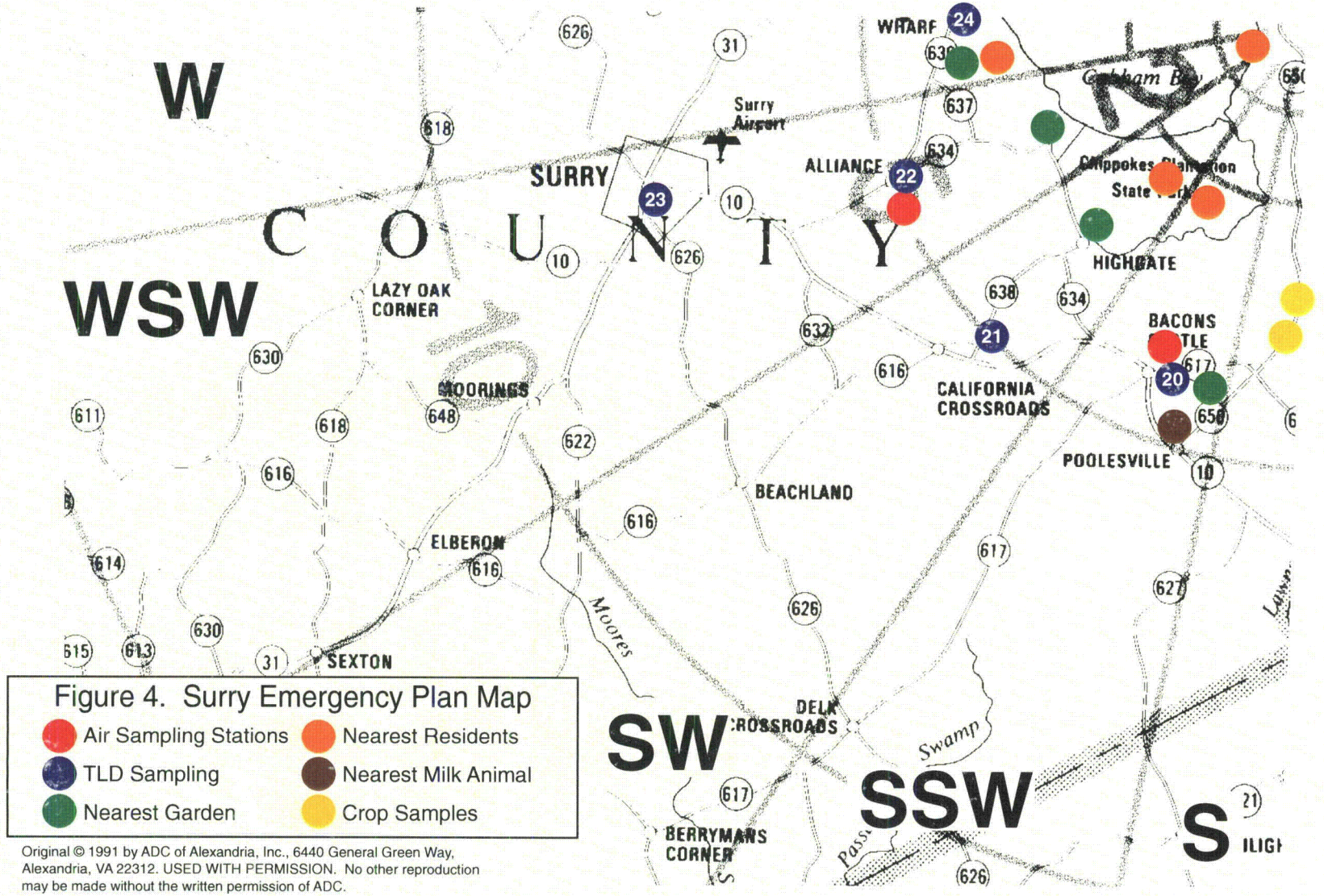
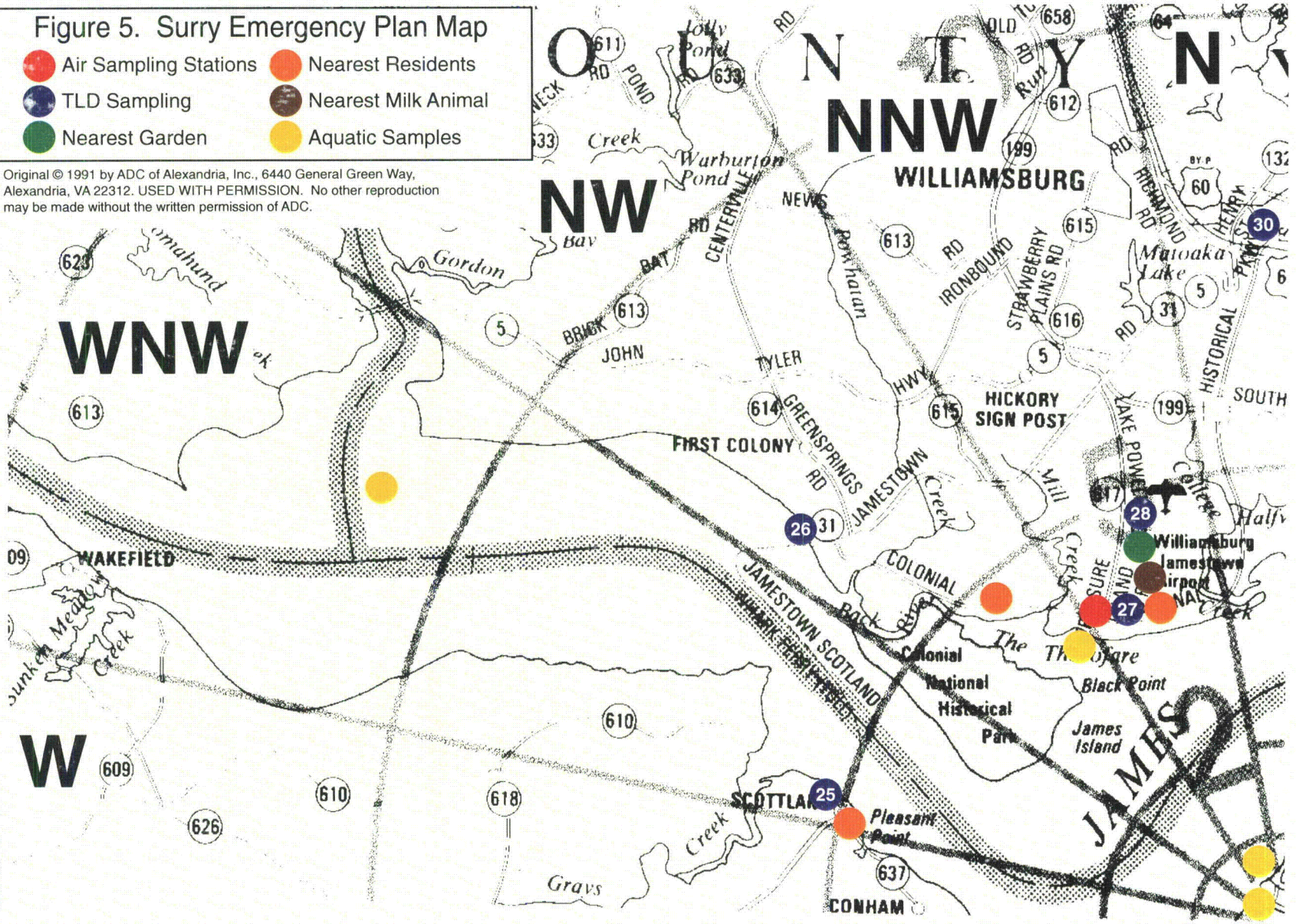


Figure 4. Surry Emergency Plan Map

- 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



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 - 2012
Docket No. 50-280-281 Page 1 of 7

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	**3.4 (149/152) (1.4 - 6.6)**	**STA-9**	**0.3 mi E**	**5.6 (4/4) (4.7 - 6.6)**	**3.8 (12/12) (2.0 - 6.0)**	0
Air Particulate *(1E-3 pCi/m3)*	**Gross Beta**	424	10	**15.7 (371/371) (3.40 - 39.2)**	**ALL**	**5.1 mi WSW**	**18.7 (53/53) (8.15 - 33.2)**	**15.4 (53/53) (4.99 - 41.1)**	0
	Gamma	32							
	Be-7	32		**139 (28/28) (76.3 - 197)**	**CP**	**3.8 mi NNW**	**169 (4/4) (155 - 190)**	**147 (4/4) (118 - 179)**	0
	K-40	32		**15.1 (4/28) (13.6 - 16.4)**	**BC**	**4.5 mi SSW**	**16.4 (1/4) (16.4 - 16.4)**	< 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**	424	70	< LLD	N/A		< LLD	< LLD	0
Milk *(pCi/Liter)*	**Strontium**	4							
	Sr-89	4		< LLD	N/A		< LLD	< LLD	0
	Sr-90	4		< LLD	N/A		< LLD	< LLD	0
	Gamma	36							
	K-40	36		**1360 (24/24) (1240 - 1620)**	**CP**	**3.7 mi NNW**	**1366 (12/12) (1250 - 1620)**	**1297 (12/12) (1180 - 1400)**	0
	Ac-228	36		**22.7 (1/24) (22.7 - 22.7)**	**EPPS**	**4.8 mi SSW**	**22.7 (1/24) (22.7 - 22.7)**	< LLD	0
	Th-228	36		**9.07 (1/24) (9.07 - 9.07)**	**EPPS**	**4.8 mi SSW**	**9.07 (1/24) (9.07 - 9.07)**	< LLD	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

Surry Power Station, Surry County, Virginia - 2012
Docket No. 50-280-281 Page 2 of 7

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
Food Products *(pCi/kg wet)*	**Gamma**	3							
	K-40	3		**7803 (3/3) (2920 - 14300)**	**Slade**	**3.2 mi S**	**14300 (1/1) (14300-14300)**	N/A	0
	Be-7	3		**178 (1/3) (178 - 178)**	**Slade**	**3.2 mi S**	**178 (1/1) (178 - 178)**	N/A	
	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							
	Th-228	12		**11.7 (1/12) (11.7 - 11.7)**	**CS**	**0.3 mi E**	**11.7 (1/4) (11.7 - 11.7)**	N/A	0
	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

Surry Power Station, Surry County, Virginia - 2012
Docket No. 50-280-281 Page 3 of 7

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)*	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	**2000 (1/4) (2000 - 2000)**	**SD**	**0.4 mi NW**	< LLD	N/A	0
	Gamma	24							
	K-40	24		**105 (9/12) (52.9 - 162)**	**SD**	**0.4 mi NW**	**105 (9/12) (52.9 - 162)**	**71.7 (3/12) (55.5 - 87.0)**	0
	Th-228	24		**10.3 (2/12) (4.85 - 15.7)**	**SD**	**0.4 mi NW**	**10.3 (2/12) (4.85 - 15.7)**	**5.22 (1/12) (5.22 - 5.22)**	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
	Zn-65	24	30	< LLD	N/A		< LLD	< LLD	0
	Nb-95	24	15	< LLD	N/A		< LLD	< LLD	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Surry Power Station, Surry County, Virginia - 2012
Docket No. 50-280-281 Page 4 of 7

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)*	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
Silt *(pCi/kg dry)*	**Gamma**	4							
	Be-7	4		**1770 (1/2) (1770 - 1770)**	**SD**	**1.3 mi NNW**	**1770 (1/2) (1770 - 1770)**	< LLD	0
	K-40	4		**18000 (2/2) (16300-19700)**	**SD**	**1.3 mi NNW**	**18000 (2/2) (16300-19700)**	**14800 (2/2) (13500-16100)**	0
	Cs-134	4	150	< LLD	N/A		< LLD	< LLD	0
	Cs-137	4	180	**190 (2/2) (167 - 213)**	**SD**	**1.3 mi NNW**	**190 (2/2) (167 - 213)**	**117 (2/2) (72.5 - 161)**	0
	Ra-226	4		**2860 (2/2) (2510 - 3210)**	**SD**	**1.3 mi NNW**	**2860 (2/2) (2510 - 3210)**	**2265 (2/2) (1640 - 2890)**	0
	Th-228	4		**1395 (2/2) (1240 - 1550)**	**SD**	**1.3 mi NNW**	**1395 (2/2) (1240 - 1550)**	**1230 (2/2) (1140 - 1320)**	0
	Th-232	4		**1075 (2/2) (1010 - 1140)**	**CHIC**	**11.2 mi WNW**	**1235 (2/2) (1070 - 1400)**	**1235 (2/2) (1070 - 1400)**	0
Shoreline Sediment *(pCi/kg dry)*	**Gamma**	4							
	K-40	4		**6850 (2/2) (6540 - 7160)**	**HIR**	**0.6 mi N**	**6850 (2/2) (6540 - 7160)**	**3550 (2/2) (1250 - 5850)**	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Surry Power Station, Surry County, Virginia - 2012
Docket No. 50-280-281 Page 5 of 7

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
Shoreline Sediment *(pCi/kg dry)*	Cs-134	4	150	< LLD	N/A		< LLD	< LLD	0
	Cs-137	4	180	< LLD	N/A		< LLD	< LLD	0
	Ra-226	4		**634 (1/2) (634 - 634)**	**CHIC**	**11.2 mi WNW**	**3620 (1/2) (3620 - 3620)**	**3620 (1/2) (3620 - 3620)**	0
	Ac-228	4		< LLD	**CHIC**	**11.2 mi WNW**	**268 (1/2) (268 - 268)**	**268 (1/2) (268 - 268)**	0
	Th-228	4		**63.8 (2/2) (51.9 - 75.6)**	**CHIC**	**11.2 mi WNW**	**1273 (2/2) (95.6 - 2450)**	**1273 (2/2) (95.6 - 2450)**	0
	Th-232	4		< LLD	**CHIC**	**11.2 mi WNW**	**2300 (1/2) (2300 - 2300)**	**2300 (1/2) (2300 - 2300)**	0
Fish *(pCi/kg wet)*	**Gamma**	4							
	K-40	4		**2950 (4/4) (2730 - 3280)**	**SD**	**1.3 mi NNW**	**2950 (4/4) (2730 - 3280)**	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
	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

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Surry Power Station, Surry County, Virginia - 2012
Docket No. 50-280-281 Page 6 of 7

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
Oysters *(pCi/kg wet)*	**Gamma**	4							
	K-40	4		**763 (2/4) (641 - 884)**	**POS**	**6.4 mi SSE**	**763 (2/4) (641 - 884)**	N/A	0
	Mn-54	4	130	< LLD	N/A		< LLD	N/A	0
	Fe-59	4	260	< LLD	N/A		< LLD	N/A	0
	Co-58	4	130	< LLD	N/A		< LLD	N/A	0
	Co-60	4	130	< LLD	N/A		< LLD	N/A	0
	Zn-65	4	260	< LLD	N/A		< LLD	N/A	0
	Cs-134	4	130	< LLD	N/A		< LLD	N/A	0
	Cs-137	4	150	< LLD	N/A		< LLD	N/A	0
Clams *(pCi/kg wet)*	**Gamma**	8							
	K-40	8		**661 (3/6) (385 - 856)**	**SD**	**1.3 mi NNW**	**865 (1/6) (856 - 856)**	**196 (2/2) (87.4 - 305)**	0
	Mn-54	8	130	< LLD	N/A		< LLD	< LLD	0
	Co-58	8	130	< LLD	N/A		< LLD	< LLD	0
	Fe-59	8	260	< LLD	N/A		< LLD	< LLD	0
	Co-60	8	130	< LLD	N/A		< LLD	< LLD	0
	Zn-65	8	260	< LLD	N/A		< LLD	< LLD	0
	Cs-134	8	130	< LLD	N/A		< LLD	< LLD	0
	Cs-137	8	150	< LLD	N/A		< LLD	< LLD	0

TABLE 3-1: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Surry Power Station, Surry County, Virginia - 2012
Docket No. 50-280-281 Page 7 of 7

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
Crabs *(pCi/kg wet)*	**Gamma**	1							
	K-40	1		**1800 (1/1) (1800 - 1800)**	**SD**	**1.3 mi NNW**	**1800 (1/1) (1800 - 1800)**	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 2012 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 - 2012

mR/Std Month ± 2 Sigma

STATION NUMBER	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	AVERAGE ± 2 SIGMA
02	4.0 ± 0.4	3.2 ± 0.5	4.8 ± 0.7	5.3 ± 1.7	4.3 ± 1.8
03	4.4 ± 1.3	4.0 ± 1.3	4.9 ± 0.2	4.6 ± 0.8	4.5 ± 0.8
04	3.3 ± 0.7	3.5 ± 0.6	4.8 ± 0.7	4.5 ± 0.9	4.0 ± 1.5
05	3.1 ± 1.6	4.1 ± 2.2	4.1 ± 0.5	4.3 ± 1.6	3.9 ± 1.1
06	3.5 ± 0.2	4.2 ± 1.4	4.6 ± 0.6	5.3 ± 0.5	4.4 ± 1.5
07	3.7 ± 0.8	4.3 ± 0.7	4.9 ± 1.1	4.8 ± 0.9	4.4 ± 1.1
08	4.0 ± 1.1	3.4 ± 0.5	4.2 ± 0.7	4.5 ± 0.2	4.0 ± 0.9
09	4.7 ± 0.7	5.0 ± 1.7	6.0 ± 0.5	6.6 ± 0.7	5.6 ± 1.8
10	3.6 ± 0.3	4.4 ± 0.7	4.8 ± 1.3	4.4 ± 1.5	4.3 ± 1.0
11	2.5 ± 0.1	2.7 ± 1.2	3.2 ± 0.4	3.4 ± 0.7	3.0 ± 0.8
12	2.9 ± 0.4	3.2 ± 1.0	3.8 ± 0.4	3.6 ± 0.9	3.4 ± 0.8
13	3.4 ± 0.6	3.7 ± 0.5	4.3 ± 0.6	5.0 ± 0.4	4.1 ± 1.4
14	3.6 ± 0.8	3.4 ± 0.8	4.2 ± 0.3	4.7 ± 0.6	4.0 ± 1.2
15	3.7 ± 0.5	4.0 ± 1.2	5.0 ± 0.8	4.9 ± 1.4	4.4 ± 1.3
16	3.5 ± 0.6	2.6 ± 0.3	4.0 ± 0.4	3.7 ± 0.4	3.5 ± 1.2
18	2.4 ± 0.6	2.2 ± 0.7	2.9 ± 0.8	2.5 ± 0.4	2.5 ± 0.6
19	2.3 ± 0.5	2.9 ± 1.6	3.3 ± 0.8	3.8 ± 0.9	3.1 ± 1.3
20	2.3 ± 0.6	2.0 ± 0.2	2.8 ± 1.1	3.0 ± 1.2	2.5 ± 0.9
21	2.6 ± 0.4	2.8 ± 1.3	3.2 ± 1.3	2.7 ± 0.6	2.8 ± 0.5
22	1.9 ± 0.9	1.4 ± 0.1	2.4 ± 0.9	2.0 ± 0.3	1.9 ± 0.8
23	3.7 ± 0.6	3.1 ± 0.4	4.5 ± 0.7	4.1 ± 0.6	3.9 ± 1.2
24	2.2 ± 0.8	2.1 ± 0.2	2.7 ± 0.9	2.6 ± 0.2	2.4 ± 0.6
25	3.4 ± 0.8	3.0 ± 0.4	3.9 ± 0.7	4.7 ± 0.5	3.8 ± 1.5
26	3.7 ± 0.7	3.9 ± 0.8	4.6 ± 0.5	4.8 ± 0.6	4.3 ± 1.1
27	2.0 ± 0.5	2.1 ± 0.4	2.8 ± 0.9	2.1 ± 0.5	2.3 ± 0.7
28	2.1 ± 0.6	1.6 ± 0.5	3.2 ± 0.5	2.6 ± 0.4	2.4 ± 1.4
29	2.1 ± 0.8	1.8 ± 0.5	2.8 ± 0.5	A	2.2 ± 1.0
30	2.0 ± 0.7	2.4 ± 0.4	3.0 ± 0.4	2.4 ± 0.6	2.5 ± 0.8
31	1.4 ± 0.3	1.4 ± 0.4	2.2 ± 0.5	1.8 ± 0.2	1.7 ± 0.8
32	2.9 ± 0.5	2.4 ± 0.4	3.5 ± 0.6	3.0 ± 1.8	3.0 ± 0.9
33	2.3 ± 0.6	2.2 ± 1.5	2.5 ± 0.8	2.4 ± 0.2	2.4 ± 0.3
34	2.6 ± 0.5	2.5 ± 0.4	3.4 ± 0.6	3.9 ± 0.7	3.1 ± 1.3
35	A	3.2 ± 0.8	4.6 ± 0.3	4.3 ± 0.8	4.0 ± 1.5
36	3.9 ± 1.2	A	4.2 ± 1.0	4.6 ± 1.4	4.2 ± 0.7
37	2.4 ± 0.8	2.1 ± 0.5	3.6 ± 1.5	3.3 ± 0.6	2.9 ± 1.4
38	4.8 ± 0.4	5.5 ± 0.5	5.8 ± 0.8	6.0 ± 1.1	5.5 ± 1.1
39-C	2.1 ± 0.6	2.0 ± 0.5	3.1 ± 0.9	3.3 ± 0.5	2.6 ± 1.3
40-C	3.2 ± 0.9	3.1 ± 1.1	3.3 ± 0.6	3.4 ± 1.0	3.3 ± 0.3
41-C	5.6 ± 1.1	4.6 ± 0.9	6.0 ± 0.8	5.8 ± 1.8	5.5 ± 1.2
42	2.9 ± 0.4	3.2 ± 1.2	3.7 ± 0.2	3.8 ± 0.5	3.4 ± 0.8
43	2.4 ± 0.4	2.5 ± 0.8	3.1 ± 0.4	2.9 ± 1.2	2.7 ± 0.7

A - TLD found missing at collection.

TABLE 3-3: GROSS BETA CONCENTRATION IN FILTERED AIR

Surry Power Station, Surry County, Virginia - 2012

1.0E-3 pCi/m3 ± 2 Sigma

COLLECTION DATE	SAMPLING LOCATIONS SS	HIR	BC	ALL	CP	BASF	FE	NN-C
January 03	15.2 ± 2.94	14.4 ± 2.90	15.3 ± 2.90	20.4 ± 3.13	16.9 ± 3.02	12.2 ± 3.06	12.5 ± 2.78	14.9 ± 2.85
January 10*	14.5 ± 3.14	19.6 ± 3.40	17.5 ± 2.96	19.2 ± 3.04	18.7 ± 3.05	14.0 ± 2.74	12.7 ± 2.73	13.1 ± 2.73
January 17	15.3 ± 2.64	7.80 ± 2.18	13.8 ± 2.75	15.0 ± 2.80	16.1 ± 2.91	12.2 ± 2.64	14.1 ± 2.82	15.3 ± 2.86
January 24	16.9 ± 2.85	10.0 ± 2.44	15.3 ± 2.76	19.1 ± 2.95	13.0 ± 2.65	13.9 ± 2.66	18.7 ± 2.99	16.4 ± 2.81
January 31	24.6 ± 3.32	8.22 ± 2.41	16.4 ± 2.90	23.6 ± 3.25	18.9 ± 3.07	14.2 ± 2.76	17.2 ± 3.00	18.2 ± 3.00
February 07	19.3 ± 3.01	10.9 ± 2.52	17.7 ± 2.92	22.5 ± 3.14	17.4 ± 2.95	14.2 ± 2.74	17.8 ± 2.96	16.6 ± 2.86
February 14	17.3 ± 2.94	8.11 ± 2.39	14.0 ± 2.75	18.1 ± 2.95	15.5 ± 2.87	12.2 ± 2.66	17.7 ± 2.99	14.7 ± 2.81
February 21	13.8 ± 2.72	7.23 ± 2.29	13.6 ± 2.70	18.5 ± 2.95	14.6 ± 2.80	14.0 ± 2.71	17.7 ± 2.98	14.7 ± 2.76
February 28	17.3 ± 2.84	11.5 ± 2.52	16.1 ± 2.81	22.9 ± 3.14	16.4 ± 2.85	15.3 ± 2.73	20.1 ± 3.05	16.4 ± 2.82
March 06	17.3 ± 2.87	9.66 ± 2.41	13.6 ± 2.68	17.5 ± 2.87	15.6 ± 2.82	13.5 ± 2.64	17.3 ± 2.92	14.2 ± 2.71
March 13	16.7 ± 3.17	9.34 ± 2.77	16.5 ± 3.18	20.2 ± 3.34	15.4 ± 3.15	14.4 ± 3.04	17.6 ± 3.28	15.1 ± 3.11
March 20	17.3 ± 3.05	10.7 ± 2.68	18.6 ± 3.13	21.1 ± 3.23	19.1 ± 3.19	16.4 ± 2.98	17.9 ± 3.15	16.0 ± 2.96
March 27	11.9 ± 2.81	7.70 ± 2.55	13.8 ± 2.93	15.8 ± 3.00	14.9 ± 3.01	9.78 ± 2.71	12.0 ± 2.91	10.5 ± 2.74
Qtr. Avg. ± 2 s.d.	**16.7 ± 6.09**	**10.4 ± 6.79**	**15.6 ± 3.46**	**19.5 ± 5.24**	**16.3 ± 3.63**	**13.6 ± 3.31**	**16.4 ± 5.26**	**15.1 ± 3.76**
April 03	10.3 ± 2.57	4.29 ± 2.18	7.93 ± 2.44	10.5 ± 2.56	10.2 ± 2.60	8.45 ± 2.45	12.9 ± 2.78	11.2 ± 2.61
April 10	17.0 ± 3.02	6.42 ± 2.40	19.1 ± 3.14	19.2 ± 3.12	18.1 ± 3.11	11.8 ± 2.71	17.5 ± 3.09	15.9 ± 2.94
April 17	11.5 ± 2.62	5.06 ± 2.19	11.9 ± 2.65	14.6 ± 2.77	12.2 ± 2.69	8.76 ± 2.44	11.9 ± 2.70	8.78 ± 2.46
April 24	10.5 ± 2.61	8.30 ± 2.45	11.4 ± 2.67	11.8 ± 2.67	10.7 ± 2.66	8.97 ± 2.49	9.79 ± 2.60	8.61 ± 2.46
May 01	15.7 ± 2.77	9.16 ± 2.36	15.9 ± 2.79	18.3 ± 2.89	17.0 ± 2.86	12.7 ± 2.57	19.9 ± 3.04	14.7 ± 2.70
May 08	14.7 ± 2.79	7.05 ± 2.31	11.1 ± 2.58	14.8 ± 2.79	10.9 ± 2.58	9.98 ± 2.49	13.0 ± 2.74	10.3 ± 2.54
May 15	17.1 ± 2.93	8.66 ± 2.44	14.3 ± 2.84	17.0 ± 2.92	15.2 ± 2.86	11.8 ± 2.63	15.7 ± 2.92	13.3 ± 2.75
May 22	7.70 ± 2.37	3.78 ± 2.08	8.39 ± 2.46	11.3 ± 2.57	9.53 ± 2.50	6.79 ± 2.29	11.0 ± 2.62	9.68 ± 2.51
May 29	6.77 ± 2.47	3.62 ± 2.25	9.54 ± 2.69	8.15 ± 2.53	9.99 ± 2.68	5.05 ± 2.34	7.67 ± 2.58	4.99 ± 2.37
June 05	16.4 ± 2.88	6.41 ± 2.29	12.1 ± 2.71	17.5 ± 2.92	15.5 ± 2.86	12.0 ± 2.63	13.1 ± 2.76	13.7 ± 2.76
June 12	12.4 ± 2.77	3.40 ± 2.20	10.7 ± 2.74	12.7 ± 2.76	10.9 ± 2.70	8.18 ± 2.50	9.93 ± 2.67	8.43 ± 2.52
June 19	10.5 ± 2.46	6.41 ± 2.17	9.06 ± 2.41	14.6 ± 2.68	11.2 ± 2.51	7.95 ± 2.28	10.5 ± 2.51	10.6 ± 2.48
June 26	22.1 ± 3.18	11.9 ± 2.62	20.1 ± 3.15	24.5 ± 3.27	24.9 ± 3.31	17.0 ± 2.89	20.0 ± 3.12	18.8 ± 2.98
Qtr. Avg. ± 2 s.d.	**13.3 ± 8.67**	**6.50 ± 5.06**	**12.4 ± 7.77**	**15.0 ± 8.68**	**13.6 ± 8.90**	**10.0 ± 6.17**	**13.3 ± 7.80**	**11.5 ± 7.40**

* SS and HIR samples collected January 9, 2012

TABLE 3-3: GROSS BETA CONCENTRATION IN FILTERED AIR

Surry Power Station, Surry County, Virginia - 2012

1.0E-3 pCi/m3 ± 2 Sigma

COLLECTION DATE	SAMPLING LOCATIONS SS	HIR	BC	ALL	CP	BASF	FE	NN-C
July 03	18.9 ± 2.95	11.4 ± 2.50	19.0 ± 2.91	24.8 ± 3.15	22.5 ± 3.06	18.1 ± 2.80	22.4 ± 3.23	18.4 ± 2.82
July 10	27.0 ± 3.42	13.1 ± 2.71	22.4 ± 3.27	29.3 ± 3.49	27.6 ± 3.46	19.4 ± 3.02	28.3 ± 3.51	20.9 ± 3.08
July 17	11.2 ± 2.57	7.40 ± 2.32	9.67 ± 2.54	13.8 ± 2.70	13.6 ± 2.75	10.8 ± 2.55	11.1 ± 2.63	8.22 ± 2.39
July 24	11.2 ± 2.66	5.61 ± 2.29	13.2 ± 2.83	13.1 ± 2.79	14.6 ± 2.86	12.8 ± 2.73	13.5 ± 2.84	11.5 ± 2.65
July 31	15.8 ± 2.97	8.93 ± 2.58	16.4 ± 3.06	20.0 ± 3.18	17.7 ± 3.12	14.6 ± 2.88	15.2 ± 2.99	13.0 ± 2.81
August 07	14.3 ± 2.91	7.83 ± 2.53	13.7 ± 2.94	13.7 ± 2.86	14.4 ± 2.94	8.35 ± 2.56	13.9 ± 2.95	8.95 ± 2.59
August 14	10.1 ± 2.58	5.73 ± 2.29	10.5 ± 2.65	12.1 ± 2.66	12.5 ± 2.72	9.69 ± 2.51	11.9 ± 2.71	7.49 ± 2.37
August 21	17.9 ± 3.11	14.3 ± 2.93	23.0 ± 3.44	27.4 ± 3.56	28.0 ± 3.65	19.6 ± 3.22	25.5 ± 3.58	21.9 ± 3.34
August 28	13.7 ± 2.85	11.9 ± 2.76	17.2 ± 3.13	19.3 ± 3.13	20.2 ± 3.23	14.3 ± 2.89	20.7 ± 3.28	15.6 ± 2.96
September 04	9.27 ± 3.08	9.21 ± 2.42	17.1 ± 2.95	19.0 ± 2.97	17.8 ± 2.94	12.4 ± 2.61	16.9 ± 2.93	15.6 ± 2.79
September 11	13.0 ± 3.01	8.31 ± 2.69	13.9 ± 3.07	16.3 ± 3.11	19.7 ± 3.29	12.2 ± 2.90	15.6 ± 3.16	17.5 ± 3.16
September 17	15.8 ± 3.36	9.19 ± 2.91	13.6 ± 3.26	19.8 ± 3.49	17.6 ± 3.40	13.7 ± 3.17	14.4 ± 3.29	12.6 ± 3.10
September 24	16.3 ± 3.06	9.88 ± 2.66	15.0 ± 3.02	17.4 ± 3.05	18.6 ± 3.14	13.7 ± 2.86	16.4 ± 3.08	13.7 ± 2.85
Qtr. Avg. ± 2 s.d.	**15.0 ± 9.35**	**9.45 ± 5.29**	**15.7 ± 8.07**	**18.9 ± 10.9**	**18.8 ± 9.76**	**13.8 ± 6.96**	**17.4 ± 10.6**	**14.3 ± 9.25**
October 02	22.4 ± 2.98	11.7 ± 2.42	25.5 ± 3.16	26.0 ± 3.11	28.4 ± 3.25	19.2 ± 2.80	25.5 ± 3.16	20.1 ± 2.86
October 09	20.4 ± 3.07	12.0 ± 2.59	18.6 ± 3.01	22.3 ± 3.12	24.4 ± 3.26	20.7 ± 3.05	24.1 ± 3.29	17.6 ± 2.90
October 16	20.4 ± 3.24	11.0 ± 2.71	16.0 ± 3.07	22.4 ± 3.28	23.8 ± 3.39	18.4 ± 3.08	19.9 ± 3.23	15.7 ± 2.93
October 23	18.8 ± 2.97	9.59 ± 2.39	17.9 ± 2.95	22.5 ± 3.10	21.5 ± 3.10	18.1 ± 2.88	22.9 ± 3.20	18.8 ± 3.03
October 30	16.4 ± 3.12	7.42 ± 2.56	17.5 ± 3.18	21.9 ± 3.31	20.8 ± 3.30	18.6 ± 3.16	20.6 ± 3.33	16.9 ± 3.18
November 06	8.77 ± 2.46	4.16 ± 2.09	8.16 ± 2.42	9.06 ± 2.41	11.3 ± 2.58	6.37 ± 2.24	9.05 ± 2.47	10.2 ± 2.55
November 13	23.3 ± 3.42	13.5 ± 2.86	26.7 ± 3.57	27.3 ± 3.52	27.7 ± 3.58	24.3 ± 3.39	30.6 ± 3.74	28.2 ± 3.66
November 20	20.7 ± 3.12	11.3 ± 2.55	23.7 ± 3.27	20.7 ± 3.05	25.6 ± 3.32	21.7 ± 3.09	22.4 ± 3.20	23.9 ± 3.27
November 27	18.5 ± 3.38	10.6 ± 2.91	20.1 ± 3.45	20.8 ± 3.39	25.7 ± 3.65	25.9 ± 3.61	24.2 ± 3.64	21.3 ± 3.51
December 03	28.4 ± 3.97	17.9 ± 3.37	28.9 ± 4.00	33.2 ± 4.09	39.2 ± 4.39	32.3 ± 4.04	34.8 ± 4.25	41.1 ± 4.51
December 11	13.2 ± 2.72	7.95 ± 2.38	14.4 ± 2.81	14.3 ± 2.71	16.9 ± 2.86	13.4 ± 2.67	14.6 ± 2.80	15.9 ± 2.87
December 17	18.3 ± 3.21	10.8 ± 2.72	17.2 ± 3.20	20.3 ± 3.27	22.5 ± 3.43	16.8 ± 3.07	20.5 ± 3.35	17.5 ± 3.19
December 24	18.0 ± 3.26	15.7 ± 3.12	21.7 ± 3.47	20.7 ± 3.32	24.7 ± 3.54	17.5 ± 3.18	22.3 ± 3.49	23.0 ± 3.54
December 31	10.7 ± 2.62	10.1 ± 2.57	12.4 ± 2.76	17.0 ± 2.92	25.3 ± 3.35	15.3 ± 2.84	14.9 ± 2.87	15.6 ± 2.91
Qtr. Avg. ± 2 s.d.	**18.4 ± 10.2**	**11.0 ± 6.78**	**19.2 ± 11.5**	**21.3 ± 11.4**	**24.1 ± 12.4**	**19.2 ± 12.1**	**21.9 ± 12.9**	**20.4 ± 14.8**
Ann. Avg. ± 2 s.d	**15.9 ± 9.35**	**9.36 ± 6.83**	**15.8 ± 9.41**	**18.7 ± 10.3**	**18.3 ± 12.0**	**14.2 ± 10.2**	**17.3 ± 11.3**	**15.4 ± 11.6**

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

Surry Power Station, Surry County, Virginia - 2012

1.0E-3 pCi/m3 ± 2 Sigma

COLLECTION DATE	SAMPLING LOCATIONS							
	SS	HIR	BC	ALL	CP	BASF	FE	NN-C
January 03	3.03 ± 16.6	3.04 ± 16.7	2.97 ± 16.3	2.92 ± 16.0	-16.3 ± 19.7	-18.5 ± 22.4	-16.2 ± 19.5	-15.7 ± 19.0
January 10*	-8.07 ± 18.0	-7.99 ± 17.9	-6.66 ± 14.9	-6.63 ± 14.8	-1.12 ± 21.3	-1.09 ± 20.6	-1.12 ± 21.2	-1.10 ± 20.9
January 17	6.73 ± 16.2	6.60 ± 15.8	7.16 ± 17.2	7.13 ± 17.1	1.81 ± 16.8	1.76 ± 16.3	1.82 ± 16.9	1.80 ± 16.7
January 24	12.2 ± 15.0	12.1 ± 14.8	12.2 ± 14.9	12.1 ± 14.8	-3.44 ± 9.29	-3.34 ± 9.03	-3.46 ± 9.34	-3.35 ± 9.05
January 31	-9.42 ± 22.9	-9.28 ± 22.6	-9.37 ± 22.8	-9.33 ± 22.7	12.7 ± 15.6	12.3 ± 15.1	12.8 ± 15.6	12.4 ± 15.2
February 07	29.1 ± 30.0	28.6 ± 29.5	29.0 ± 29.9	28.6 ± 29.5	-1.01 ± 21.8	-0.99 ± 21.4	-1.00 ± 21.7	-0.98 ± 21.2
February 14	6.86 ± 21.1	6.74 ± 20.7	6.79 ± 20.9	6.73 ± 20.7	-13.1 ± 28.7	-12.8 ± 28.1	-13.1 ± 28.7	-12.9 ± 28.2
February 21	2.06 ± 15.8	2.02 ± 15.5	2.05 ± 15.7	2.03 ± 15.6	-0.06 ± 10.9	-0.06 ± 10.6	-0.06 ± 11.0	-0.06 ± 10.6
February 28	0.34 ± 13.0	0.34 ± 12.9	0.34 ± 13.1	0.34 ± 13.0	17.8 ± 13.9	17.2 ± 13.4	17.8 ± 13.9	17.4 ± 13.6
March 06	8.63 ± 24.0	8.51 ± 23.8	8.65 ± 24.2	8.52 ± 23.8	-6.97 ± 26.1	-6.73 ± 25.2	-6.97 ± 26.1	-6.83 ± 25.6
March 13	2.95 ± 14.3	2.93 ± 14.2	2.98 ± 14.5	2.95 ± 14.3	-1.71 ± 12.4	-1.66 ± 12.1	-1.71 ± 12.5	-1.68 ± 12.2
March 20	0.54 ± 13.7	0.53 ± 13.6	0.54 ± 13.8	0.53 ± 13.6	4.85 ± 21.2	4.69 ± 20.5	4.90 ± 21.4	4.66 ± 20.3
March 27	-6.58 ± 9.38	-6.49 ± 9.24	-6.60 ± 9.40	-6.51 ± 9.28	1.49 ± 7.28	1.47 ± 7.17	1.52 ± 7.42	1.45 ± 7.07
April 03	5.41 ± 17.1	5.36 ± 16.9	5.43 ± 17.1	5.33 ± 16.8	4.83 ± 12.1	4.72 ± 11.8	4.87 ± 12.2	4.69 ± 11.7
April 10	-14.6 ± 16.4	-14.4 ± 16.2	-14.7 ± 16.5	-14.5 ± 16.3	22.7 ± 19.4	22.0 ± 18.8	22.7 ± 19.4	21.9 ± 18.7
April 17	2.99 ± 12.5	2.95 ± 12.3	3.01 ± 12.6	2.95 ± 12.4	10.3 ± 11.5	10.0 ± 11.3	10.4 ± 11.7	10.1 ± 11.3
April 24	-8.72 ± 22.5	-8.59 ± 22.2	-8.74 ± 22.6	-8.66 ± 22.4	-10.0 ± 19.8	-9.69 ± 19.1	-9.97 ± 19.7	-9.55 ± 18.8
May 01	-2.34 ± 16.5	-2.31 ± 16.2	-2.34 ± 16.5	-2.31 ± 16.2	8.24 ± 14.9	8.00 ± 14.5	8.31 ± 15.0	8.00 ± 14.5
May 08	9.81 ± 20.5	9.72 ± 20.3	9.80 ± 20.5	9.77 ± 20.4	-7.71 ± 21.1	-7.02 ± 20.7	-7.25 ± 21.3	-7.08 ± 20.9
May 15	5.53 ± 21.7	5.48 ± 21.5	5.68 ± 22.3	5.50 ± 21.6	5.40 ± 22.5	5.31 ± 22.1	5.50 ± 22.9	5.39 ± 22.4
May 22	7.96 ± 29.1	7.89 ± 28.8	8.17 ± 29.9	7.87 ± 28.8	1.75 ± 19.2	1.72 ± 18.8	1.78 ± 19.5	1.75 ± 19.1
May 29	-3.82 ± 34.3	-3.79 ± 33.9	-3.92 ± 35.2	-3.78 ± 33.9	6.71 ± 34.4	6.59 ± 33.7	6.82 ± 34.9	6.68 ± 34.2
June 05	-4.30 ± 41.2	-4.26 ± 40.8	-4.42 ± 42.3	-4.26 ± 40.8	15.1 ± 28.2	14.8 ± 27.6	15.3 ± 28.5	15.0 ± 28.0
June 12	-7.28 ± 14.4	-7.18 ± 14.2	-7.50 ± 14.8	-7.16 ± 14.2	9.99 ± 18.7	9.74 ± 18.3	10.10 ± 18.9	9.72 ± 18.3
June 19	-5.35 ± 32.0	-5.27 ± 31.5	-5.47 ± 32.7	-5.27 ± 31.5	-20.1 ± 23.5	-19.9 ± 23.2	-20.6 ± 24.0	-20.0 ± 23.4
June 26	-17.6 ± 19.8	-17.3 ± 19.5	-18.1 ± 20.4	-17.3 ± 19.5	-2.26 ± 14.3	-2.22 ± 14.1	-2.30 ± 14.6	-2.21 ± 14.0

* SS and HIR samples collected January 9, 2012

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

Surry Power Station, Surry County, Virginia - 2012

1.0E-3 pCi/m3 ± 2 Sigma

COLLECTION DATE	SAMPLING LOCATIONS							
	SS	HIR	BC	ALL	CP	BASF	FE	NN-C
July 03	5.99 ± 28.6	5.93 ± 28.3	5.85 ± 27.9	5.69 ± 27.2	-13.0 ± 17.7	-12.8 ± 17.3	-14.1 ± 19.2	-12.8 ± 17.3
July 10	2.24 ± 26.0	2.20 ± 25.6	2.29 ± 26.6	2.20 ± 25.6	-5.08 ± 33.1	-4.94 ± 32.2	-5.10 ± 33.2	-4.85 ± 31.6
July 17	0.34 ± 16.4	0.33 ± 16.2	0.35 ± 16.9	0.33 ± 16.2	-11.2 ± 20.5	-10.9 ± 20.0	-11.3 ± 20.7	-10.9 ± 19.9
July 24	3.61 ± 9.59	3.57 ± 9.48	3.72 ± 9.88	3.65 ± 9.67	-7.20 ± 12.6	-7.06 ± 12.3	-7.31 ± 12.8	-7.02 ± 12.3
July 31	-3.77 ± 11.5	-3.74 ± 11.4	-3.87 ± 11.8	-3.77 ± 11.5	1.91 ± 8.78	1.84 ± 8.46	1.90 ± 8.75	1.84 ± 8.47
August 07	16.7 ± 15.6	16.5 ± 15.5	17.1 ± 16.0	16.5 ± 15.4	11.0 ± 25.4	10.8 ± 24.9	11.2 ± 25.8	10.7 ± 24.8
August 14	2.01 ± 20.6	1.99 ± 20.4	2.06 ± 21.1	1.97 ± 20.2	-3.11 ± 11.6	-3.04 ± 11.3	-3.14 ± 11.7	-3.01 ± 11.2
August 21	-4.12 ± 11.7	-4.12 ± 11.7	-4.29 ± 12.2	-4.14 ± 11.8	4.90 ± 11.7	4.80 ± 11.4	4.97 ± 11.8	4.79 ± 11.4
August 28	12.0 ± 35.0	12.0 ± 35.1	12.5 ± 36.4	12.0 ± 34.9	-18.3 ± 31.1	-17.8 ± 30.3	-18.4 ± 31.4	-17.8 ± 30.3
September 04	-20.1 ± 41.4	11.90 ± 34.1	12.50 ± 35.5	11.90 ± 34.0	6.40 ± 25.9	6.28 ± 25.4	6.50 ± 26.3	6.26 ± 25.3
September 11	3.65 ± 11.7	3.53 ± 11.4	3.66 ± 11.8	3.54 ± 11.4	-2.97 ± 13.3	-2.94 ± 13.2	-3.05 ± 13.7	-2.93 ± 13.2
September 17	4.50 ± 19.6	4.38 ± 19.0	4.54 ± 19.7	4.36 ± 18.9	6.62 ± 16.6	6.56 ± 16.5	6.77 ± 17.0	6.50 ± 16.3
September 24	5.18 ± 24.7	5.05 ± 24.1	5.23 ± 24.9	5.03 ± 23.9	-18.7 ± 25.2	-18.4 ± 24.9	-19.1 ± 25.7	-18.2 ± 24.6
October 02	-5.72 ± 19.7	-5.62 ± 19.3	-5.83 ± 20.1	-5.61 ± 19.3	1.18 ± 4.56	1.16 ± 4.47	1.20 ± 4.63	1.16 ± 4.48
October 09	-3.96 ± 24.0	-3.89 ± 23.6	-4.03 ± 24.4	-3.89 ± 23.5	-0.26 ± 20.2	-0.26 ± 19.9	-0.27 ± 20.6	-0.26 ± 19.8
October 16	-1.60 ± 18.9	-1.57 ± 18.5	-1.63 ± 19.3	-1.56 ± 18.5	7.24 ± 14.8	7.04 ± 14.4	7.27 ± 14.9	6.95 ± 14.2
October 23	3.26 ± 16.9	3.16 ± 16.4	3.31 ± 17.1	3.16 ± 16.4	-2.93 ± 16.7	-2.87 ± 16.3	-2.97 ± 16.9	-3.00 ± 17.1
October 30	-6.45 ± 10.3	-6.22 ± 10.0	-6.44 ± 10.3	-6.21 ± 10.0	-1.07 ± 14.0	-1.05 ± 13.8	-1.08 ± 14.2	-1.09 ± 14.3
November 06	6.60 ± 13.4	6.36 ± 12.9	6.59 ± 13.4	6.35 ± 12.9	-5.51 ± 10.8	-5.41 ± 10.6	-5.59 ± 11.0	-5.59 ± 11.0
November 13	-3.29 ± 12.1	-3.17 ± 11.6	-3.28 ± 12.1	-3.17 ± 11.6	0.97 ± 9.19	0.95 ± 9.03	0.99 ± 9.34	0.99 ± 9.38
November 20	13.9 ± 30.0	13.4 ± 28.9	13.9 ± 30.0	13.4 ± 28.9	44.0 ± 34.2	43.1 ± 33.5	44.6 ± 34.6	44.5 ± 34.6
November 27	-9.44 ± 15.0	-9.01 ± 14.4	-9.40 ± 14.9	-9.06 ± 14.4	10.6 ± 11.9	10.4 ± 11.7	10.7 ± 12.2	10.7 ± 12.1
December 03	-13.0 ± 12.6	-12.5 ± 12.1	-13.0 ± 12.6	-12.5 ± 12.1	1.30 ± 14.1	1.27 ± 13.9	1.32 ± 14.4	1.32 ± 14.3
December 11	8.79 ± 23.0	8.51 ± 22.2	8.90 ± 23.2	8.49 ± 22.2	-14.1 ± 26.8	-13.9 ± 26.4	-14.4 ± 27.3	-14.4 ± 27.3
December 17	-2.53 ± 21.2	-2.48 ± 20.8	-2.59 ± 21.7	-2.47 ± 20.7	2.91 ± 15.5	2.84 ± 15.1	2.93 ± 15.6	2.93 ± 15.6
December 24	3.15 ± 29.2	3.12 ± 28.9	3.20 ± 29.7	3.06 ± 28.4	14.4 ± 33.6	14.2 ± 33.0	14.7 ± 34.2	14.7 ± 34.3
December 31	-6.56 ± 15.1	-6.50 ± 14.9	-6.68 ± 15.4	-6.38 ± 14.7	-2.99 ± 17.1	-2.95 ± 16.9	-3.03 ± 17.4	-3.02 ± 17.3

TABLE 3-5: GAMMA EMITTER CONCENTRATION IN FILTERED AIR

Surry Power Station, Surry County, Virginia - 2012

1.0E-3 pCi/m3 ± 2 Sigma

SAMPLING LOCATIONS	NUCLIDE	FIRST QUARTER	SECOND QUARTER	THIRD QUARTER	FOURTH QUARTER	AVERAGE ± 2 SIGMA
SS	Cs-134	-0.29 ± 0.74	1.21 ± 0.95	1.15 ± 0.92	0.99 ± 1.64	
	Cs-137	-0.10 ± 0.68	-0.28 ± 0.62	0.12 ± 0.60	0.11 ± 1.17	
	Be-7	175 ± 3.7	196 ± 28.7	119 ± 32.6	107 ± 31.3	149 ± 86.0
	K-40		13.6 ± 11.5			13.6 ± 11.5
HIR	Cs-134	-0.01 ± 0.70	1.10 ± 0.86	1.44 ± 1.02	0.08 ± 1.17	
	Cs-137	0.40 ± 0.71	0.13 ± 0.66	0.33 ± 0.76	-0.22 ± 0.74	
	Be-7	82.9 ± 25.9	100 ± 21.4	95.7 ± 30.9	76.3 ± 22.3	89 ± 22.0
BC	Cs-134	-0.65 ± 0.49	2.36 ± 1.07	1.44 ± 1.18	0.32 ± 1.11	
	Cs-137	0.11 ± 0.48	0.55 ± 0.83	0.01 ± 0.80	-0.23 ± 0.90	
	Be-7	121 ± 28.6	141 ± 27.6	153 ± 42.0	97.2 ± 25.3	128 ± 48.9
	K-40				16.4 ± 14.3	16.4 ± 14.3
ALL	Cs-134	0.12 ± 0.89	0.63 ± 0.60	0.59 ± 0.71	0.55 ± 0.80	
	Cs-137	-0.42 ± 0.68	0.06 ± 0.46	0.04 ± 0.56	0.32 ± 0.61	
	Be-7	172 ± 34.3	197 ± 24.5	147 ± 30.0	119 ± 21.7	159 ± 66.9
CP	Cs-134	0.28 ± 1.15	0.47 ± 0.76	0.28 ± 1.05	0.84 ± 1.01	
	Cs-137	0.57 ± 1.13	0.41 ± 0.52	-0.26 ± 0.82	-0.06 ± 0.73	
	Be-7	163 ± 54.4	167 ± 24.7	190 ± 37.7	155 ± 30.1	169 ± 30.0
BASF	Cs-134	0.36 ± 0.80	1.71 ± 0.98	2.30 ± 1.36	0.34 ± 0.81	
	Cs-137	0.34 ± 0.80	0.74 ± 0.67	0.62 ± 1.02	-0.40 ± 0.71	
	Be-7	135 ± 35.1	142 ± 29.6	158 ± 36.7	113 ± 23.7	137 ± 37.3
	K-40				14.9 ± 13.3	14.9 ± 13.3
FE	Cs-134	0.14 ± 1.06	0.67 ± 0.87	0.26 ± 1.31	0.67 ± 0.84	
	Cs-137	-0.70 ± 1.07	0.25 ± 0.76	-0.38 ± 1.07	0.09 ± 0.72	
	Be-7	138 ± 36.8	146 ± 29.9	170 ± 37.8	110 ± 22.2	141 ± 49.5
	K-40				15.6 ± 10.4	15.6 ± 10.4
NN-C	Cs-134	0.37 ± 0.69	0.94 ± 0.85	0.19 ± 1.09	-0.38 ± 0.93	
	Cs-137	0.23 ± 0.78	0.26 ± 0.50	-0.84 ± 0.88	-0.06 ± 0.82	
	Be-7	147 ± 30.9	142 ± 25.8	179 ± 41.7	118 ± 26.8	147 ± 50.2

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

Surry Power Station, Surry County, Virginia - 2012

pCi/Liter ± 2 Sigma

NUCLIDE	EPPS	COLONIAL PARKWAY	WILLIAMS-C
JANUARY			
Cs-134	2.05 ± 3.31	-0.82 ± 4.01	3.04 ± 3.71
Cs-137	-0.92 ± 3.22	0.58 ± 3.80	-1.61 ± 3.57
Ba-140	14.0 ± 17.2	9.56 ± 18.0	-3.66 ± 18.1
La-140	-0.81 ± 5.92	-5.23 ± 5.65	0.66 ± 5.03
I-131	0.21 ± 0.33	0.07 ± 0.37	-0.01 ± 0.36
K-40	1370 ± 135	1490 ± 161	1250 ± 140
FEBRUARY			
Cs-134	-1.20 ± 2.99	0.63 ± 3.60	-2.49 ± 4.02
Cs-137	-1.08 ± 3.05	-0.88 ± 3.47	-0.20 ± 3.86
Ba-140	2.78 ± 13.7	5.67 ± 15.9	15.4 ± 17.6
La-140	0.09 ± 3.51	-2.93 ± 5.88	2.15 ± 4.72
I-131	0.02 ± 0.28	0.08 ± 0.28	0.03 ± 0.27
K-40	1410 ± 120	1310 ± 140	1210 ± 151
MARCH			
Cs-134	-0.01 ± 3.32	0.47 ± 3.20	-0.68 ± 2.77
Cs-137	-2.75 ± 3.36	-0.26 ± 3.00	0.07 ± 2.88
Ba-140	3.06 ± 15.0	-8.55 ± 16.0	0.27 ± 12.3
La-140	-12.3 ± 4.35	-10.5 ± 5.11	0.13 ± 3.41
I-131	-0.05 ± 0.42	0.29 ± 0.40	-0.17 ± 0.43
K-40	1280 ± 138	1350 ± 131	1340 ± 124
Sr-89		1.41 ± 3.13	
Sr-90		0.31 ± 0.43	
APRIL			
Cs-134	-1.39 ± 2.74	-0.81 ± 4.19	-3.32 ± 2.20
Cs-137	1.10 ± 2.91	-2.40 ± 4.38	0.42 ± 2.18
Ba-140	-10.2 ± 14.1	-1.00 ± 20.9	5.53 ± 10.3
La-140	1.79 ± 4.70	7.70 ± 4.97	0.17 ± 2.82
I-131	-0.22 ± 0.26	-0.17 ± 0.35	-0.11 ± 0.26
K-40	1410 ± 112	1420 ± 167	1330 ± 85.1

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

Surry Power Station, Surry County, Virginia - 2012

pCi/Liter ± 2 Sigma

NUCLIDE	EPPS	COLONIAL PARKWAY	WILLIAMS-C
MAY			
Cs-134	0.09 ± 3.46	1.44 ± 4.17	-4.27 ± 4.16
Cs-137	3.37 ± 3.47	1.38 ± 4.16	1.57 ± 4.09
Ba-140	9.36 ± 15.2	-9.57 ± 17.9	-7.26 ± 18.3
La-140	3.53 ± 5.09	0.09 ± 6.35	-8.99 ± 6.25
I-131	0.15 ± 0.45	-0.11 ± 0.25	0.02 ± 0.35
K-40	1240 ± 144	1620 ± 150	1400 ± 161
JUNE			
Cs-134	-0.83 ± 3.05	-0.40 ± 4.37	0.59 ± 2.83
Cs-137	-1.34 ± 3.03	-1.31 ± 4.49	2.13 ± 3.13
Ba-140	-6.55 ± 13.5	-1.76 ± 16.9	1.22 ± 14.7
La-140	0.55 ± 4.91	1.19 ± 5.48	-0.16 ± 3.61
I-131	0.02 ± 0.22	-0.02 ± 0.25	-0.25 ± 0.20
K-40	1480 ± 140	1410 ± 145	1280 ± 137
Sr-89		2.74 ± 2.80	
Sr-90		0.39 ± 0.61	
Ac-228	22.7 ± 15.5		
JULY			
Cs-134	-1.71 ± 4.14	-1.08 ± 4.05	3.17 ± 3.68
Cs-137	-0.79 ± 4.59	-2.47 ± 4.28	2.59 ± 3.75
Ba-140	-20.5 ± 27.3	-9.51 ± 23.9	-4.75 ± 22.7
La-140	-1.29 ± 7.63	0.10 ± 7.57	4.58 ± 7.45
I-131	-0.03 ± 0.30	-0.16 ± 0.38	0.67 ± 0.48
K-40	1240 ± 149	1310 ± 154	1330 ± 151
AUGUST			
Cs-134	-3.03 ± 3.44	-2.10 ± 2.67	0.10 ± 3.50
Cs-137	1.36 ± 3.18	2.37 ± 2.44	1.31 ± 3.41
Ba-140	-5.94 ± 13.8	-0.39 ± 10.7	-3.40 ± 14.4
La-140	-4.13 ± 4.76	1.10 ± 3.05	-2.03 ± 4.31
I-131	-0.03 ± 0.30	-0.23 ± 0.35	0.06 ± 0.32
K-40	1310 ± 133	1310 ± 100	1300 ± 123

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

Surry Power Station, Surry County, Virginia - 2012

pCi/Liter ± 2 Sigma

NUCLIDE	EPPS	COLONIAL PARKWAY	WILLIAMS-C
SEPTEMBER			
Cs-134	-6.49 ± 5.29	1.55 ± 3.73	-1.26 ± 6.44
Cs-137	0.78 ± 5.10	-2.65 ± 3.68	-1.23 ± 6.99
Ba-140	-6.22 ± 22.1	9.62 ± 17.1	-1.95 ± 28.7
La-140	-1.61 ± 6.57	-0.48 ± 4.20	4.05 ± 8.92
I-131	0.18 ± 0.34	0.10 ± 0.34	-0.14 ± 0.30
K-40	1510 ± 172	1280 ± 155	1180 ± 211
Sr-89		0.97 ± 1.64	
Sr-90		0.56 ± 0.56	
OCTOBER			
Cs-134	-9.05 ± 4.33	-3.96 ± 3.60	0.51 ± 3.05
Cs-137	1.94 ± 3.90	4.86 ± 3.97	0.14 ± 3.64
Ba-140	-11.50 ± 20.4	13.40 ± 16.3	7.57 ± 14.5
La-140	0.87 ± 3.89	0.07 ± 5.67	0.82 ± 4.68
I-131	-0.54 ± 0.47	0.31 ± 0.43	-0.36 ± 0.49
K-40	1330 ± 141	1250 ± 142	1300 ± 132
NOVEMBER			
Cs-134	-8.05 ± 4.42	-5.76 ± 4.89	-7.61 ± 4.28
Cs-137	-1.58 ± 4.13	-1.85 ± 4.30	0.86 ± 4.33
Ba-140	-3.92 ± 19.8	9.49 ± 24.2	-10.80 ± 19.4
La-140	2.91 ± 6.37	8.28 ± 6.31	0.17 ± 4.66
I-131	-2.16 ± 0.52	-0.30 ± 0.47	-2.14 ± 0.50
K-40	1360 ± 155	1300 ± 152	1310 ± 162
DECEMBER			
Cs-134	-6.85 ± 3.01	0.66 ± 2.84	-0.23 ± 3.34
Cs-137	0.48 ± 3.01	1.86 ± 3.26	-1.81 ± 3.28
Ba-140	-7.80 ± 13.9	2.17 ± 14.2	-2.27 ± 14.2
La-140	-2.75 ± 4.16	-2.27 ± 3.61	-1.46 ± 4.36
I-131	-0.18 ± 0.42	-0.40 ± 0.39	-0.23 ± 0.37
K-40	1300 ± 104	1340 ± 122	1330 ± 127
Sr-89		2.80 ± 2.59	
Sr-90		0.22 ± 0.48	
Th-228	9.07 ± 8.49		

TABLE 3-7: GAMMA EMITTER CONCENTRATION IN FOOD PRODUCTS

Surry Power Station, Surry County, Virginia - 2012

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	SAMPLE TYPE	Cs-134	Cs-137	I-131	K-40
BROCK FARM	11/5/2012	Corn	-7.1 ± 8.92	3.13 ± 8.2	12.00 ± 16.9	2920 ± 315
	11/5/2012	Peanuts	4.11 ± 12	7.92 ± 12.3	3.99 ± 19.7	6190 ± 461
SLADE FARM	11/5/2012	Soybeans	-12.4 ± 18.5	6.39 ± 17.8	-9.56 ± 29.3	14300 ± 869

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

Surry Power Station, Surry County, Virginia - 2012

pCi/Liter ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Mn-54	**Fe-59**	**Co-58**	**Co-60**	**Zn-65**
SS	3/20/2012	-0.78 ± 2.33	-2.27 ± 5.24	-0.17 ± 2.28	1.26 ± 2.61	-4.76 ± 5.16
	6/12/2012	-0.84 ± 2.73	2.90 ± 5.24	-0.16 ± 2.62	-1.01 ± 2.53	-6.91 ± 6.66
	9/17/2012	-0.93 ± 2.81	-2.00 ± 5.09	-1.65 ± 3.09	0.43 ± 2.87	-7.33 ± 7.17
	12/11/2012	-0.38 ± 2.01	0.38 ± 4.53	-0.36 ± 1.97	0.52 ± 2.26	-8.85 ± 5.65
		Zr-95	**Nb-95**	**I-131**	**Cs-134**	**Cs-137**
	3/20/2012	0.85 ± 4.02	1.27 ± 2.34	0.11 ± 0.29	-1.15 ± 2.49	-0.09 ± 2.47
	6/12/2012	0.06 ± 4.78	2.90 ± 2.97	-0.16 ± 0.38	0.24 ± 3.19	0.49 ± 3.01
	9/17/2012	3.17 ± 5.29	-0.19 ± 3.04	-0.06 ± 0.36	-6.00 ± 3.42	0.88 ± 3.37
	12/11/2012	1.80 ± 3.86	1.12 ± 2.21	-0.83 ± 0.35	-0.89 ± 2.36	0.93 ± 2.07
		Ba-140	**La-140**	**H-3**		
	3/20/2012	-5.08 ± 11.9	0.01 ± 3.16	58.1 ± 432		
	6/12/2012	-2.71 ± 13.70	-0.13 ± 4.50	139 ± 871		
	9/17/2012	-5.87 ± 16.0	0.14 ± 5.39	-78.7 ± 484		
	12/11/2012	-5.83 ± 10.3	-0.41 ± 3.36	-331 ± 484		
		Mn-54	**Fe-59**	**Co-58**	**Co-60**	**Zn-65**
HIR	3/20/2012	-0.09 ± 2.02	2.84 ± 3.83	-1.47 ± 1.93	2.10 ± 2.12	-6.42 ± 4.46
	6/12/2012	0.74 ± 2.81	2.61 ± 6.48	1.11 ± 3.07	-0.17 ± 3.43	-2.08 ± 5.24
	9/17/2012	-3.89 ± 4.02	6.06 ± 9.80	-0.88 ± 4.58	1.93 ± 4.39	0.07 ± 9.85
	12/11/2012	-0.13 ± 1.99	-0.03 ± 4.03	-0.11 ± 2.04	1.77 ± 2.05	-6.52 ± 4.54
		Zr-95	**Nb-95**	**I-131**	**Cs-134**	**Cs-137**
	3/20/2012	2.80 ± 3.48	0.96 ± 1.91	-0.20 ± 0.29	0.05 ± 3.36	-1.04 ± 2.18
	6/12/2012	-3.67 ± 5.34	-0.60 ± 3.00	0.00 ± 0.45	-1.43 ± 2.77	1.04 ± 2.64
	9/17/2012	-2.86 ± 7.87	4.98 ± 4.62	-0.07 ± 0.36	-0.63 ± 4.66	-1.16 ± 4.89
	12/11/2012	-1.15 ± 3.86	0.50 ± 2.19	-0.39 ± 0.37	-0.22 ± 2.09	1.50 ± 2.25
		Ba-140	**La-140**	**H-3**		
	3/20/2012	-3.28 ± 10.5	-0.32 ± 3.07	-345 ± 397		
	6/12/2012	0.73 ± 15.1	1.60 ± 5.13	555 ± 908		
	9/17/2012	0.19 ± 21.9	-4.18 ± 7.67	-104 ± 476		
	12/11/2012	1.54 ± 9.75	0.92 ± 3.26	-318 ± 486		

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

Surry Power Station, Surry County, Virginia - 2012

pCi/Liter ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Mn-54	**Fe-59**	**Co-58**	**Co-60**	**Zn-65**
CS	3/20/2012	-1.95 ± 2.84	-2.21 ± 6.37	-0.80 ± 3.26	1.10 ± 2.77	-4.45 ± 6.43
	6/12/2012	-3.31 ± 3.11	1.72 ± 6.38	-1.63 ± 2.77	0.03 ± 2.62	-3.27 ± 6.45
	9/17/2012	1.76 ± 2.64	-1.90 ± 4.58	-1.73 ± 2.75	2.67 ± 2.83	2.48 ± 4.65
	12/11/2012	-2.69 ± 2.18	-2.36 ± 5.01	-3.35 ± 2.58	-2.52 ± 2.55	-8.97 ± 5.54
		Zr-95	**Nb-95**	**I-131**	**Cs-134**	**Cs-137**
	3/20/2012	0.73 ± 5.73	-1.43 ± 3.02	-0.09 ± 0.31	-3.25 ± 3.54	-1.39 ± 3.13
	6/12/2012	-0.40 ± 5.67	0.70 ± 3.12	-0.17 ± 0.45	-6.72 ± 3.53	-0.61 ± 3.58
	9/17/2012	-3.04 ± 4.32	0.95 ± 2.97	-0.47 ± 0.36	1.72 ± 2.94	-3.23 ± 2.53
	12/11/2012	3.66 ± 4.14	0.87 ± 2.4	-0.10 ± 0.41	-0.16 ± 2.55	0.27 ± 2.54
		Ba-140	**La-140**	**H-3**	**Th-228**	
	3/20/2012	-10.2 ± 14.6	-2.07 ± 5.06	-152 ± 407		
	6/12/2012	-3.60 ± 15.0	-4.85 ± 5.15	550 ± 899		
	9/17/2012	1.12 ± 13.9	-2.73 ± 4.58	-318 ± 463	11.7 ± 6.68	
	12/11/2012	2.68 ± 11.3	0.98 ± 3.34	-89.5 ± 497		

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

Surry Power Station, Surry County, Virginia - 2012

pCi/Liter ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Mn-54	**Fe-59**	**Co-58**	**Co-60**	**Zn-65**
SD	1/9/2012	0.31 ± 2.10	2.16 ± 4.29	-0.39 ± 2.29	0.25 ± 2.07	-4.77 ± 4.43
	2/14/2012	-1.70 ± 2.71	-3.16 ± 8.38	1.84 ± 3.16	2.14 ± 3.17	-10.8 ± 7.78
	3/20/2012	-0.86 ± 2.66	0.21 ± 5.01	0.23 ± 2.60	-1.79 ± 2.39	-5.25 ± 6.21
	4/9/2012	0.74 ± 1.72	0.62 ± 4.26	-1.66 ± 1.86	1.24 ± 2.54	-0.95 ± 3.66
	5/22/2012	0.04 ± 0.22	-0.13 ± 0.63	0.28 ± 0.27	0.03 ± 0.24	-0.10 ± 0.39
	6/12/2012	0.38 ± 1.76	0.62 ± 3.20	0.29 ± 1.51	0.56 ± 1.76	-2.75 ± 3.54
	7/9/2012	0.33 ± 1.72	-0.70 ± 3.56	-0.45 ± 1.94	0.11 ± 1.71	1.02 ± 4.07
	8/14/2012	-1.28 ± 2.13	-0.69 ± 4.01	0.22 ± 2.07	-0.31 ± 2.36	1.12 ± 4.90
	9/17/2012	0.11 ± 3.04	3.51 ± 6.01	1.79 ± 3.01	-2.24 ± 2.94	-0.33 ± 6.68
	10/15/2012	0.09 ± 1.22	1.12 ± 2.80	0.06 ± 1.26	0.08 ± 1.25	1.26 ± 2.94
	11/20/2012	0.58 ± 1.28	3.21 ± 2.90	0.38 ± 1.36	-0.33 ± 1.28	-3.56 ± 2.73
	12/11/2012	1.04 ± 2.51	-2.67 ± 5.53	-0.17 ± 2.59	1.91 ± 2.81	3.47 ± 6.06
		Zr-95	**Nb-95**	**I-131**	**Cs-134**	**Cs-137**
	1/9/2012	1.91 ± 3.94	0.50 ± 2.09	-2.99 ± 4.48	0.80 ± 2.33	-1.58 ± 2.21
	2/14/2012	4.36 ± 6.15	-0.39 ± 3.20	6.45 ± 5.48	-0.25 ± 3.02	0.13 ± 3.65
	3/20/2012	0.55 ± 3.79	1.12 ± 3.08	0.67 ± 4.18	-0.75 ± 2.73	-1.93 ± 2.70
	4/9/2012	0.96 ± 2.84	-0.13 ± 2.02	0.79 ± 3.51	-0.19 ± 1.64	-0.03 ± 1.94
	5/22/2012	-0.34 ± 0.45	-0.02 ± 0.30	-0.74 ± 0.82	-0.11 ± 0.28	-0.09 ± 0.24
	6/12/2012	-0.81 ± 2.42	0.58 ± 1.98	-0.39 ± 5.62	0.12 ± 1.22	0.19 ± 1.25
	7/9/2012	0.72 ± 3.06	-0.19 ± 1.88	0.42 ± 3.65	1.99 ± 1.78	0.80 ± 1.93
	8/14/2012	0.14 ± 3.70	-0.07 ± 2.30	0.26 ± 2.63	0.04 ± 2.30	1.74 ± 2.29
	9/17/2012	-1.98 ± 4.65	1.67 ± 3.02	-0.33 ± 5.44	0.59 ± 3.01	2.93 ± 3.20
	10/15/2012	0.07 ± 2.14	0.72 ± 1.30	-0.64 ± 2.44	-0.05 ± 1.32	-0.90 ± 1.24
	11/20/2012	-0.57 ± 2.25	0.26 ± 1.33	-0.07 ± 4.22	-2.95 ± 1.24	0.10 ± 1.27
	12/11/2012	-1.74 ± 4.17	1.81 ± 2.50	0.99 ± 3.56	0.95 ± 2.76	-2.76 ± 2.76
		Ba-140	**La-140**	**H-3**	**K-40**	**Th-228**
	1/9/2012	-4.66 ± 11.3	-2.42 ± 4.05		107 ± 49.0	
	2/14/2012	0.92 ± 14.4	0.59 ± 4..65			
	3/20/2012	-10.7 ± 12.8	1.95 ± 4.57	-4.70 ± 409		
	4/9/2012	0.29 ± 8.3	-3.19 ± 3.34		52.9 ± 45.5	
	5/22/2012	0.22 ± 1.6	0.05 ± 0.63			
	6/12/2012	5.81 ± 11.3	-3.87 ± 4.55	311 ± 444	59.5 ± 44.5	
	7/9/2012	1.53 ± 9.71	1.06 ± 2.75		106 ± 40.3	
	8/14/2012	2.91 ± 8.30	0.45 ± 2.86		111 ± 54.5	
	9/17/2012	5.22 ± 13.2	-1.44 ± 4.74	2000 ± 599	113 ± 62.5	15.7 ± 13.8
	10/15/2012	-3.15 ± 6.68	-0.29 ± 2.09		139 ± 33.0	4.85 ± 2.84
	11/20/2012	-0.71 ± 8.99	-1.20 ± 3.11		162 ± 33.6	
	12/11/2012	2.30 ± 10.8	-0.59 ± 4.11	-172 ± 549	90.8 ± 66.0	

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

Surry Power Station, Surry County, Virginia - 2012

pCi/Liter ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPES				
		Mn-54	**Fe-59**	**Co-58**	**Co-60**	**Zn-65**
SW-C	1/10/2012	-1.50 ± 2.16	3.25 ± 4.65	0.43 ± 2.28	-1.55 ± 2.30	-7.03 ± 5.41
	2/14/2012	-0.78 ± 3.16	1.88 ± 6.29	-0.04 ± 3.12	-1.19 ± 2.95	-3.96 ± 7.02
	3/20/2012	2.29 ± 2.47	-2.65 ± 5.00	-0.31 ± 2.38	1.11 ± 2.35	-6.76 ± 5.08
	4/9/2012	-2.83 ± 2.63	0.67 ± 5.07	-0.16 ± 2.33	-0.51 ± 2.35	-0.30 ± 5.52
	5/22/2012	-0.28 ± 1.60	0.63 ± 3.18	0.70 ± 1.81	-0.41 ± 1.63	-1.04 ± 3.65
	6/12/2012	-0.43 ± 2.42	0.43 ± 3.23	-1.08 ± 2.72	0.08 ± 2.49	1.46 ± 3.57
	7/18/2011	-1.21 ± 3.93	4.08 ± 7.33	-3.87 ± 4.19	-0.98 ± 3.88	-0.86 ± 8.32
	8/14/2012	-0.04 ± 2.25	1.56 ± 4.44	-0.56 ± 2.44	1.90 ± 2.33	-0.21 ± 5.03
	9/17/2012	1.02 ± 4.44	-0.91 ± 9.13	1.50 ± 3.98	2.24 ± 4.71	4.22 ± 9.68
	10/15/2012	0.40 ± 1.11	2.55 ± 2.30	0.42 ± 1.11	0.23 ± 1.07	-0.56 ± 2.38
	11/20/2012	-0.33 ± 0.51	-0.65 ± 1.36	0.26 ± 0.58	0.37 ± 0.60	0.29 ± 1.15
	12/11/2012	-2.29 ± 2.15	0.82 ± 4.40	-1.06 ± 2.01	0.65 ± 2.05	-2.03 ± 4.88
		Zr-95	**Nb-95**	**I-131**	**Cs-134**	**Cs-137**
	1/10/2012	1.21 ± 3.78	1.82 ± 2.13	1.07 ± 4.50	-0.46 ± 2.56	-1.76 ± 2.42
	2/14/2012	-5.37 ± 5.73	-1.84 ± 3.13	1.85 ± 5.69	-0.03 ± 3.12	-0.58 ± 3.50
	3/20/2012	0.95 ± 4.29	-1.08 ± 2.53	-2.73 ± 4.54	2.64 ± 2.64	-1.40 ± 26.1
	4/9/2012	-2.87 ± 4.56	0.58 ± 2.55	1.66 ± 4.25	-3.54 ± 2.51	3.90 ± 2.52
	5/22/2012	-0.58 ± 2.60	1.59 ± 1.62	-0.51 ± 5.78	-0.13 ± 1.53	1.22 ± 1.69
	6/12/2012	1.31 ± 3.84	0.03 ± 2.18	8.03 ± 6.53	1.76 ± 2.16	1.48 ± 2.13
	7/18/2011	3.10 ± 6.97	-0.04 ± 4.16	0.63 ± 6.80	-5.04 ± 4.29	0.83 ± 4.16
	8/14/2012	-4.10 ± 4.17	-1.68 ± 2.48	2.15 ± 2.87	0.12 ± 2.48	1.46 ± 2.47
	9/17/2012	6.88 ± 7.38	4.07 ± 4.11	-3.04 ± 6.42	-2.55 ± 4.70	-0.70 ± 4.59
	10/15/2012	0.93 ± 2.11	0.16 ± 1.35	-1.48 ± 2.42	-2.05 ± 1.32	0.00 ± 1.20
	11/20/2012	0.22 ± 1.08	0.54 ± 0.64	-0.85 ± 2.14	0.11 ± 0.52	0.38 ± 0.57
	12/11/2012	1.32 ± 3.75	-0.16 ± 2.05	3.37 ± 3.49	2.14 ± 2.47	0.16 ± 2.30
		Ba-140	**La-140**	**H-3**	**K-40**	**Th-228**
	1/10/2012	10.8 ± 12.0	0.74 ± 3.72			
	2/14/2012	-2.87 ± 15.8	-2.50 ± 4.45			
	3/20/2012	-1.14 ± 12.4	1.65 ± 3.58	62.7 ± 425		
	4/9/2012	-3.58 ± 12.4	-1.08 ± 3.79			
	5/22/2012	9.00 ± 10.6	-0.53 ± 4.23			
	6/12/2012	5.38 ± 18.6	2.41 ± 3.61	349 ± 457		
	7/18/2011	10.4 ± 18.9	-6.72 ± 6.09			
	8/14/2012	1.27 ± 8.88	-1.33 ± 3.13			
	9/17/2012	-3.44 ± 17.8	-1.06 ± 6.59	284 ± 482		
	10/15/2012	0.46 ± 6.07	-0.80 ± 1.84		55.5 ± 27.2	5.22 ± 2.97
	11/20/2012	4.26 ± 4.16	-0.65 ± 1.57		72.6 ± 22.7	
	12/11/2012	7.14 ± 9.94	1.22 ± 2.97	5.89 ± 559	87.0 ± 46.7	

TABLE 3-10: GAMMA EMITTER CONCENTRATIONS IN SILT

Surry Power Station, Surry County, Virginia - 2012

pCi/kg (dry) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Cs-134	**Cs-137**	**K-40**	**Th-232**	**Th-228**
SD	3/14/2012	-0.49 ± 39.7	213 ± 72.7	19700 ± 1540	1140 ± 189	1550 ± 108
	9/12/2012	-34.7 ± 53.0	167 ± 75.1	16300 ± 1650	1010 ± 265	1240 ± 132
		Ra-226	**Be-7**			
	3/14/2012	3210 ± 1060				
	9/12/2012	2510 ± 1400	1770 ± 855			
		Cs-134	**Cs-137**	**K-40**	**Th-232**	**Th-228**
CHIC-C	3/13/2012	5.49 ± 51.0	161 ± 98.9	16100 ± 1530	1400 ± 174	1320 ± 114
	9/12/2012	5.03 ± 34.2	72.5 ± 47.0	13500 ± 1270	1070 ± 148	1140 ± 91.6
		Ra-226				
	3/13/2012	2890 ± 1490				
	9/12/2012	1640 ± 1070				

TABLE 3-11: GAMMA EMITTER CONCENTRATIONS IN SHORELINE SEDIMENT

Surry Power Station, Surry County, Virginia - 2012

pCi/kg (dry) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE				
		Cs-134	**Cs-137**	**K-40**	**Ra-226**	**Th-228**
HIR	2/14/2012	12.7 ± 19.2	-2.50 ± 21.4	7160 ± 946	634 ± 620	75.6 ± 51.8
	8/14/2012	5.49 ± 15.1	8.71 ± 15.8	6540 ± 598		51.9 29.2
CHIC-C	2/14/2012	-3.66 ± 19.5	-17.4 ± 21.6	5850 ± 740		95.6 ± 67.6
	8/14/2012	-10.1 ± 20.8	-18.6 ± 22.8	1250 ± 363	3620 ± 664	2450 ± 71.9
		Ac-228	**Th-232**			
	2/14/2012					
	8/14/2012	268 ± 214	2300 ± 123			

TABLE 3-12: GAMMA EMITTER CONCENTRATION IN FISH

Surry Power Station, Surry County, Virginia - 2012

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATION	COLLECTION DATE	SAMPLE TYPE	ISOTOPE			
			K-40	**Mn-54**	**Co-58**	**Fe-59**
SD	4/3/2012	Catfish	2730 ± 1000	0.95 ± 35.8	-23.3 ± 41.4	91.8 ± 80.6
	4/4/2012	White Perch	2760 ± 961	6.08 ± 34.7	1.52 ± 35.9	27.9 ± 77.1
	10/3/2012	Catfish	3030 ± 648	17.0 ± 28.1	-1.30 ± 27.9	15.2 ± 63.8
	10/3/2012	White Perch	3280 ± 986	-8.92 ± 44.8	-1.84 ± 47.4	92.8 ± 110
			Co-60	**Zn-65**	**Cs-134**	**Cs-137**
	4/3/2012	Catfish	-35.0 ± 41.1	-113 ± 84.0	-102 ± 40.5	15.9 ± 38.0
	4/4/2012	White Perch	9.92 ± 35.1	-19.2 ± 73.3	-7.23 ± 37.4	17.0 ± 31.9
	10/3/2012	Catfish	12.9 ± 30.8	-76.4 ± 64.3	-19.7 ± 36.0	3.70 ± 33.5
	10/3/2012	White Perch	-29.3 ± 46.5	-105 ± 108	2.82 ± 50.9	38.5 ± 41.8

TABLE 3-13: GAMMA EMITTER CONCENTRATIONS IN OYSTERS

Surry Power Station, Surry County, Virginia - 2012

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE			
		Co-58	**Co-60**	**Cs-134**	**Cs-137**
POS	3/13/2012	7.71 ± 22.7	1.46 ± 15.5	-12.2 ± 23.5	-10.9 ± 21.7
	9/11/2012	13.3 ± 39.4	40.2 ± 34.9	0.26 ± 40.9	0.08 ± 36.9
		Fe-59	**Mn-54**	**Zn-65**	**K-40**
	3/13/2012	-14.5 ± 40.8	6.96 ± 20.3	-33.5 ± 44.6	641 ± 385
	9/11/2012	-13.1 ± 74.5	-33.8 ± 34.6	-68.8 ± 78.8	884 ± 811
		Co-58	**Co-60**	**Cs-134**	**Cs-137**
MP	3/13/2012	-5.98 ± 23.0	2.58 ± 20.1	17.1 ± 26.0	8.24 ± 22.3
	9/11/2012	4.82 ± 24.8	20.1 ± 22.5	13.4 ± 25.2	17.8 ± 25.0
		Fe-59	**Mn-54**	**Zn-65**	
	3/13/2012	-16.0 ± 44.9	11.0 ± 20.2	-61.1 ± 50.3	
	9/11/2012	-2.56 ± 57.9	-3.41 ± 23.8	-64.5 ± 61.8	

TABLE 3-14: GAMMA EMITTER CONCENTRATIONS IN CLAMS

Surry Power Station, Surry County, Virginia - 2012

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE			
		Co-58	**Co-60**	**Cs-134**	**Cs-137**
JI	3/13/2012	-4.77 ± 22.2	6.35 ± 19.3	-51.3 ± 23.7	2.83 ± 19.6
	9/12/2012	-11.3 ± 28.2	17.3 ± 26.1	-32.7 ± 34.3	-7.06 ± 31.6
		Fe-59	**Mn-54**	**Zn-65**	**K-40**
	3/13/2012	18.4 ± 39.9	-4.80 ± 20.6	-60.4 ± 46.2	385 ± 376
	9/12/2012	-18.4 ± 57.3	33.1 ± 28.2	12.6 ± 66.8	591 ± 525
		Co-58	**Co-60**	**Cs-134**	**Cs-137**
SD	3/14/2012	11.3 ± 19.6	-11.0 ± 20.6	-8.90 ± 24.7	-1.26 ± 22.5
	9/12/2012	32.5 ± 26.8	27.2 ± 22.1	19.8 ± 26.5	-15.7 ± 28.6
		Fe-59	**Mn-54**	**Zn-65**	**K-40**
	3/14/2012	1.61 ± 44.0	-12.9 ± 20.8	6.89 ± 48.4	
	9/12/2012	35.5 ± 50.5	4.56 ± 21.2	-35.6 ± 53.4	856 ± 504
		Co-58	**Co-60**	**Cs-134**	**Cs-137**
LC	3/13/2012	-0.53 ± 17.5	-4.58 ± 17.0	-5.87 ± 18.2	-3.29 ± 18.1
	9/12/2012	2.90 ± 26.3	5.05 ± 23.1	18.8 ± 26.7	14.3 ± 26.8
		Fe-59	**Mn-54**	**Zn-65**	
	3/13/2012	3.89 ± 39.5	15.9 ± 17.4	-37.7 ± 38.9	
	9/12/2012	-25.2 ± 50.0	12.5 ± 23.4	-41.9 ± 51.2	
		Co-58	**Co-60**	**Cs-134**	**Cs-137**
CHIC-C	3/14/2012	-18.5 ± 15.7	12.6 ± 17.5	-12.6 ± 21.9	-7.47 ± 16.3
	9/12/2012	-0.82 ± 21.90	9.56 ± 17.30	-2.12 ± 23.20	-3.15 ± 21.4
		Fe-59	**Mn-54**	**Zn-65**	**K-40**
	3/14/2012	7.73 ± 31.0	-4.70 ± 16.8	-31.9 ± 35.8	305 ± 266
	9/12/2012	13.9 ± 42.4	3.94 ± 20.2	-19.1 ± 42.9	87.4 ± 445

TABLE 3-15: GAMMA EMITTER CONCENTRATIONS IN CRABS

Surry Power Station, Surry County, Virginia - 2012

pCi/kg (wet) ± 2 Sigma

SAMPLING LOCATIONS	COLLECTION DATE	ISOTOPE			
		K-40	**Co-58**	**Co-60**	**Cs-134**
SD	6/7/2012	1800 ± 440	7.81 ± 19.1	-3.18 ± 17.2	-0.31 ± 19.2
		Cs-137	**Fe-59**	**Mn-54**	**Zn-65**
		7.27 ± 19.4	1.62 ± 46.3	-5.07 ± 18.2	-37.3 ± 50.5

4. DISCUSSION OF RESULTS

Data from the radiological analyses of environmental media collected during 2012 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.

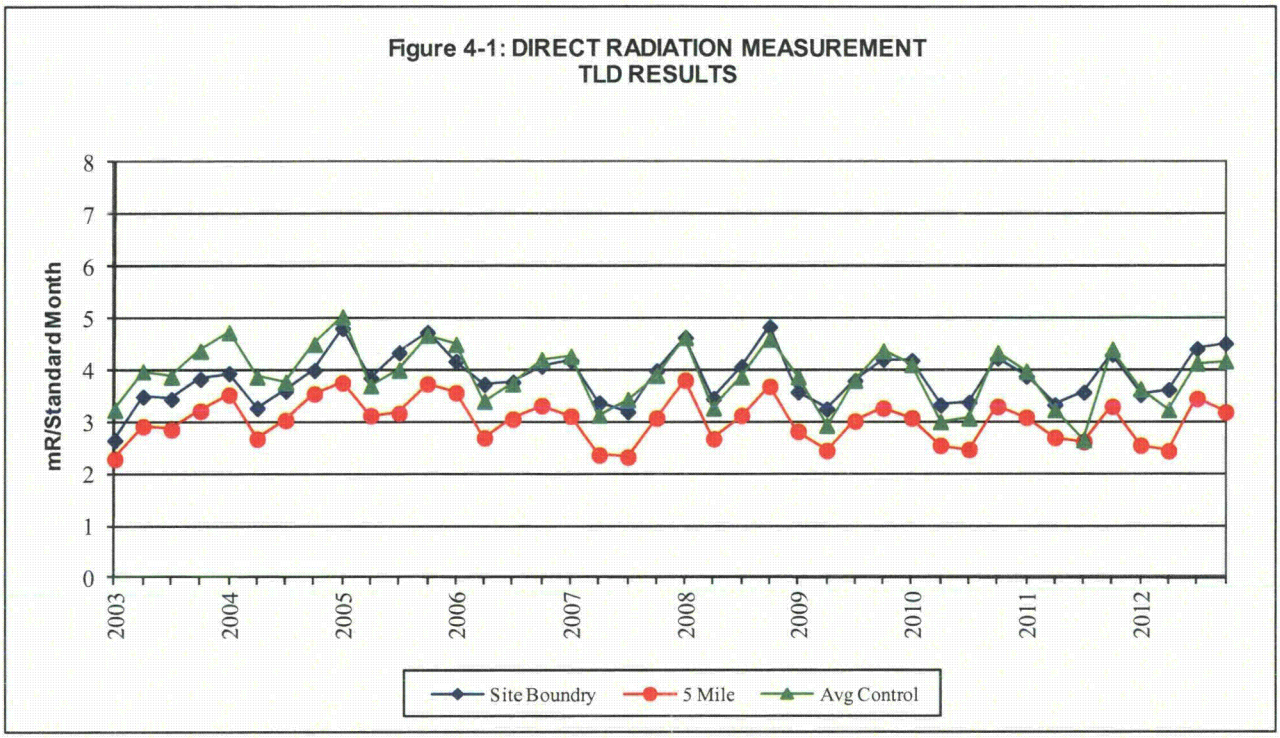
The predominant radioactivity detected throughout 2012 was from external sources, such as fallout from nuclear weapons tests (cesium-137) and naturally occurring radionuclides. Naturally occurring nuclides such as beryllium-7, potassium-40, radium-226, thorium-228 and thorium-232 were detected in numerous samples.

The following is a discussion and summary of the results of the environmental measurements taken during the 2012 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.



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.

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: 2012 GROSS BETA IN AIR PARTICULATES

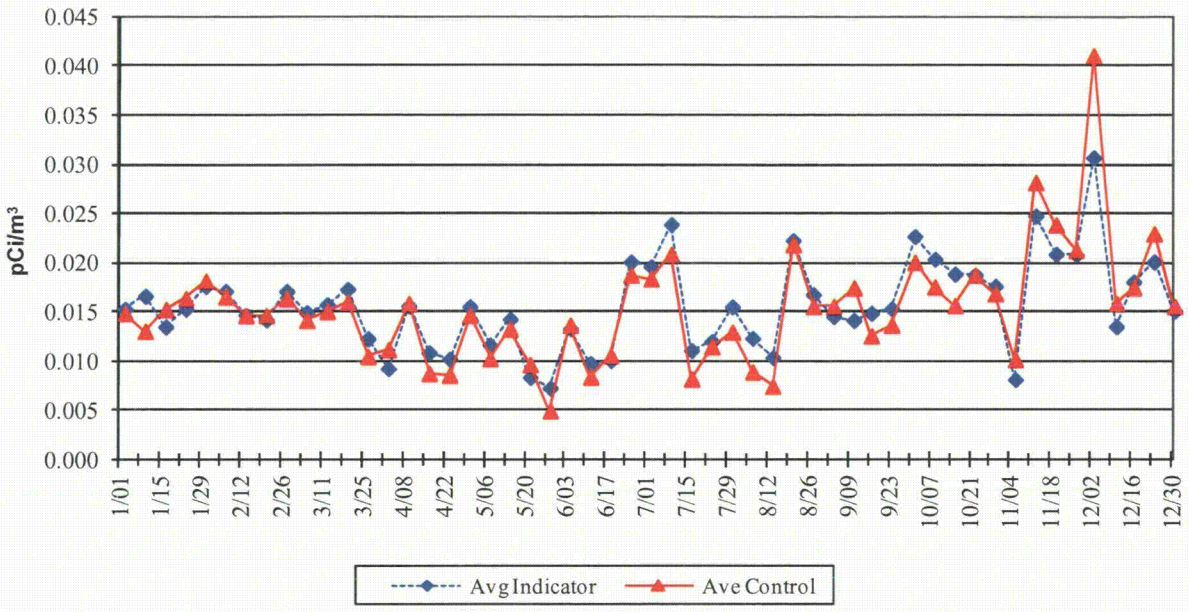
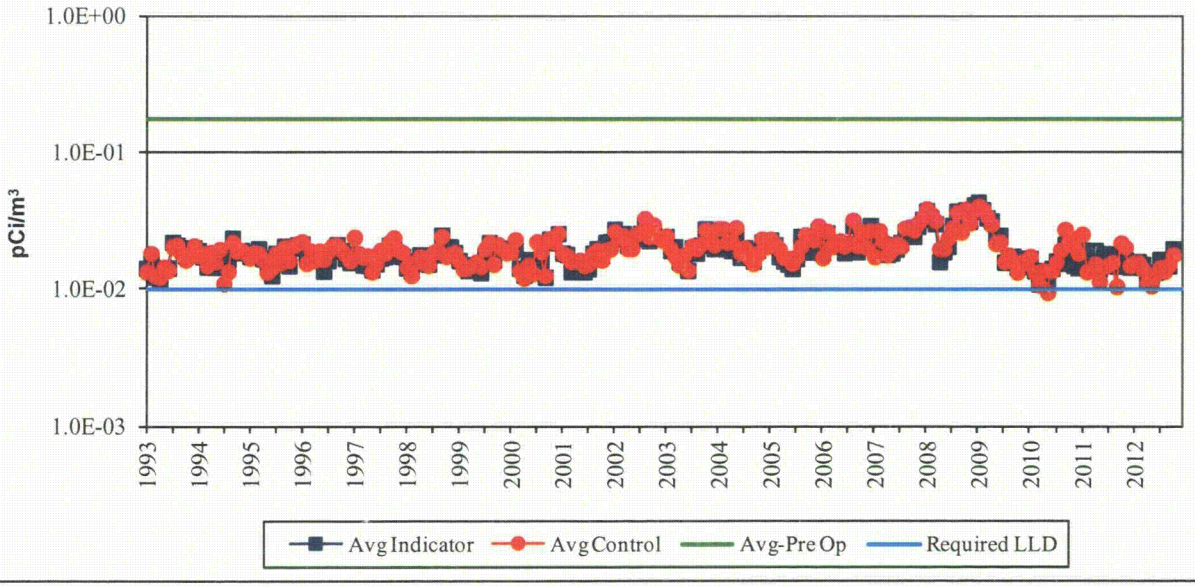


Figure 4-3: GROSS BETA IN AIR PARTICULATES HISTORICAL TREND



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 evaluated very carefully when trying to determine if there is any station effect.

Results of gamma spectroscopy indicate no other detectable station related radioactivity in the milk samples. In years past, cesium-137 has 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 2012.

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 was detected in the four composites analyzed. This is the first year since at least 1990 that strontium-90 has not been detected in at least one composite sample. The average Sr-90 concentration for the ten year period of 2002 to 2011 is 1.77 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. Berillium-7 was detected in one sample.

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. Naturally occurring thorium-228 was detected in one sample. 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. With the exception of natural products, no other gamma emitters were detected. Tritium was detected in one of eight samples at 2,000 pCi/liter. This concentration represents 6.7% of the 30,000 pCi/liter NRC reporting level concentration. The tritium was detected at the station discharge canal indicator sample location. The water in the discharge canal is further diluted by the river water beyond the discharge structure. No tritium or gamma emitting radionuclides were detected in the control river water samples. Naturally occurring potassium-40 and thorium-228 were detected in some samples. No station related radioactivity was detected.

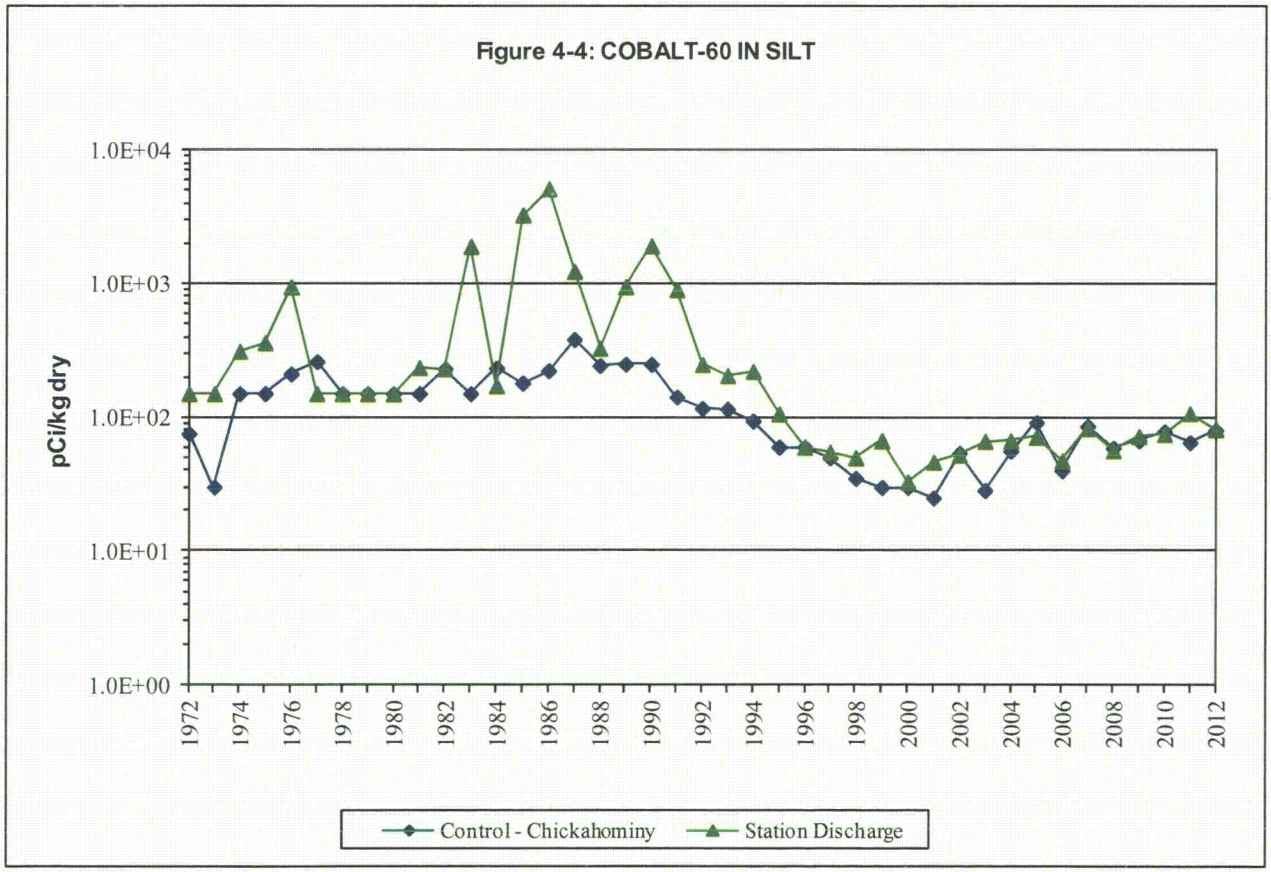
4.9 Silt

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

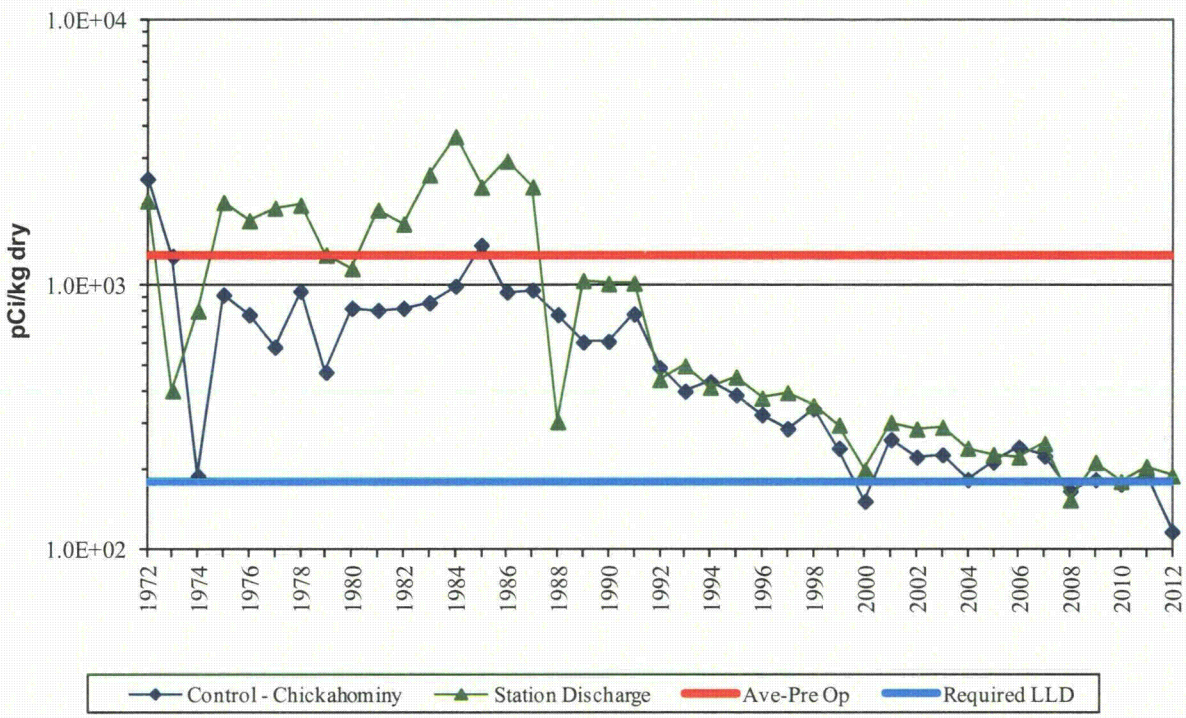
downstream of the station. The results of the gamma spectroscopy analyses are presented in Table 3-10. Naturally occurring beryllium-7, potassium-40, radium-226, thorium-228 and thorium-232 were detected. Historically, cobalt-60 has been detected in samples obtained from the indicator location (SD). 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 2012, cesium-137 was detected with an average indicator location concentration of 190 pCi/kg and an average control location concentration of 117 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 2012.

Figure 4-5: CESIUM-137 IN SILT



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 four 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 seven REMP exceptions for scheduled sampling and analysis during 2012.

1. The 1st quarter indicator environmental TLD #35 was missing when TLDs were collected. Therefore, there was no gamma dose evaluation available at this location for the 1st quarter.
2. The 2nd quarter indicator environmental TLD #36 was missing when TLDs were collected. Therefore, there was no gamma dose evaluation available at this location for the 2nd quarter.
3. The 4th quarter indicator environmental TLD #29 was missing when TLDs were collected. Therefore, there was no gamma dose evaluation available at this location for the 4th quarter.
4. One milk sample and three river water samples were not analyzed to the required LLDs for lanthanum-140 and iodine-131, respectively. A software variable that controls the confidence level setting for Minimum Detectable Concentration (MDC) for one particular detector at the TBE laboratory was not set with the appropriate value to meet the 95% confidence level concentration criteria. The variable was set at a default value of 3.29 vice 4.66. Activity and 2 sigma uncertainty results are correct. The TBE laboratory initiated Non-Conformance Report 13-07 to document this issue. Revised analytical reports were issued by TBE to document the actual MDCs and the MDC variable now appears on the TBE laboratory analytical reports for review and verification by laboratory personnel.

Media	Location	Date	Analysis	Required LLD	Reported LLD
Milk	WMS	9/4/12	La-140	15	16.58
River Water	SW	6/12/12	I-131	10	13.6
	SW	7/9/12	I-131	10	11.43
	SW	9/17/12	I-131	10	10.26

During the March 2008 clam sampling campaign, clams were not found at the Hog Island Point sample location. An alternate sampling location, Jamestown Island, was selected and sampled throughout 2008. In 2012, clams continued to be sampled at the Jamestown Island location in place of the Hog Island Point location which continued to indicate no shell stock recovery.

6. CONCLUSIONS

The results of the 2012 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. Air particulate gross beta concentrations at all of the indicator locations for 2012 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 not detected in any samples this year. Although Strontium-90 is not a component of station effluents, but rather, a product of nuclear weapons testing fallout, this is the first year that it was not detected.

- **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 2012.

- **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** - All river water samples were analyzed for gamma emitting radionuclides. The naturally occurring radionuclides potassium-40 and thorium-228 were detected. Tritium was detected in one of eight samples with a concentration of 2,000 pCi/liter. This represents 6.7% of the NRC reporting level concentration. Because river water is not used for drinking water or for crop irrigation, there is a reduced dose consequence to the public from this pathway.

- **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.

REFERENCES

References

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

2. United States Nuclear Regulatory Commission, Regulatory Guide 1.109, Rev. 1, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I", October 1977.

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

4. United States Nuclear Regulatory Commission Branch Technical Position, "Acceptable Radiological Environmental Monitoring Program", Rev. 1, November 1979.

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

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

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

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

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

APPENDICES

APPENDIX A: LAND USE CENSUS

Year 2012

*LAND USE CENSUS**

Surry Power Station, Surry County, Virginia

January 1 to December 31, 2012 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	3.0 @ 143°	(a)	(a)	(a)
H	SSE	2.7 @ 158°	(a)	(a)	(a)
J	S	1.7 @ 181°	2.0 @ 183°	(a)	(a)
K	SSW	2.3 @ 212°	4.3 @ 193°	4.8 @ 200°	(a)
L	SW	2.3 @ 221°	3.6 @ 223°	(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 2012

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 2012. 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 12-08, MAPEP air particulate sample 12-RdF26 failed Zn-65. The TBE Zn-65 result of 4.19 Bq exceeded the acceptance range of 2.09 – 3.89 Bq. TBE could not determine a cause for the high result. Based on acceptable results with Analytics air particulate cross check samples, TBE believes this to be an anomaly specific to the MAPAP sample. TBE will monitor Zn-65 in future ICP samples.
2. NCR 12-11, MAPEP water sample 12-MaW27 failed Sr-90. The TBE Sr-90 result of 19.6 Bq/L exceeded the acceptance range of 8.5 – 15.9 Bq/L. TBE believes that an incorrect sample aliquot of 50 mL, vice 100 mL, was

entered into the LIMS database. With an aliquot of 100mL, the result would have been 9.8, which falls within the acceptance range.

3. NCR 12-13, ERA water sample RAD-91 failed Sr-89 and Gross Beta. TBE reran both analyses with acceptable results.

Analysis	Reported	Known	Units	Acceptance Limit	Rerun
Gross Beta	59.3	39.2	pCi/L	26.0 – 46.7	44.8
Sr-89	46.5	39.1	pCi/L	29.7 – 46.1	38.5

For the Gross Beta analysis, TBE believes the sample aliquot was larger than was entered into the LIMS database. The typical water aliquot is 300 – 400 mLs and the aliquot required for ERA samples is 190 mLs. The laboratory technician was made aware of the problem prior to performing the rerun and will be more diligent in the future in aliquoting drinking water samples.

The original Sr-89 Reported to Known ratio was 1.19, which TBE considers acceptable with warning. Over the next two ICP samples, TBE will evaluate both chemical and counting methodology to determine the cause of the high trend.

ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2012	E10066	Milk	Sr-89	pCi/L	101	94.8	1.07	A
			Sr-90	pCi/L	11.7	13.5	0.87	A
	E10067	Milk	I-131	pCi/L	87.5	92.5	0.95	A
			Ce-141	pCi/L	247	260.0	0.95	A
			Cr-51	pCi/L	435	436	1.00	A
			Cs-134	pCi/L	133	149	0.89	A
			Cs-137	pCi/L	156	159	0.98	A
			Co-58	pCi/L	127	132	0.96	A
			Mn-54	pCi/L	190	195	0.97	A
			Fe-59	pCi/L	179	168	1.07	A
			Zn-65	pCi/L	327	333	0.98	A
			Co-60	pCi/L	274	279	0.98	A
	E10069	Filter	Ce-141	pCi	167	164	1.02	A
			Cr-51	pCi	310	276	1.12	A
			Cs-134	pCi	107.0	94.5	1.13	A
			Cs-137	pCi	109	101	1.08	A
			Co-58	pCi	87.6	83.5	1.05	A
			Mn-54	pCi	133	123	1.08	A
			Fe-59	pCi	113	106	1.07	A
			Zn-65	pCi	226	210	1.08	A
			Co-60	pCi	185	176	1.05	A
	E10068	Charcoal	I-131	pCi	92.8	94.2	0.99	A
June 2012	E10198	Milk	Sr-89	pCi/L	86.1	99.8	0.86	A
			Sr-90	pCi/L	9.2	12.7	0.72	W
	E10199	Milk	I-131	pCi/L	88.9	99.7	0.89	A
			Ce-141	pCi/L	72.8	82.2	0.89	A
			Cr-51	pCi/L	394	402	0.98	A
			Cs-134	pCi/L	159	174	0.91	A
			Cs-137	pCi/L	206	212	0.97	A
			Co-58	pCi/L	89.5	92.3	0.97	A
			Mn-54	pCi/L	129	132	0.98	A
			Fe-59	pCi/L	129	128	1.01	A
			Zn-65	pCi/L	193	199	0.97	A
			Co-60	pCi/L	342	355	0.96	A
	E10200	Charcoal	I-131	pCi	101	96.6	1.05	A

Footnotes are on page 3 of 3.

ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2012	E10201	Filter	Ce-141	pCi	73.2	75.1	0.97	A
			Cr-51	pCi	367	366	1.00	A
			Cs-134	pCi	165	159	1.04	A
			Cs-137	pCi	205	193.0	1.06	A
			Co-58	pCi	84.7	84.2	1.01	A
			Mn-54	pCi	118.0	121.0	0.98	A
			Fe-59	pCi	125.0	117.0	1.07	A
			Zn-65	pCi	181	182	0.99	A
			Co-60	pCi	338	324	1.04	A
September 2012	E10296	Milk	Sr-89	pCi/L	106	99.6	1.06	A
			Sr-90	pCi/L	13.6	16	0.85	A
	E10297	Milk	I-131	pCi/L	89.8	99.6	0.90	A
			Ce-141	pCi/L	160	164	0.98	A
			Cr-51	pCi/L	230	248	0.93	A
			Cs-134	pCi/L	101	108	0.94	A
			Cs-137	pCi/L	174	174	1.00	A
			Co-58	pCi/L	97.2	100	0.97	A
			Mn-54	pCi/L	188	196	0.96	A
			Fe-59	pCi/L	159	152	1.05	A
			Zn-65	pCi/L	195	192	1.02	A
			Co-60	pCi/L	155	152	1.02	A
	E10299	Filter	Ce-141	pCi	145	135	1.07	A
			Cr-51	pCi	219	205	1.07	A
			Cs-134	pCi	94.1	89.4	1.05	A
			Cs-137	pCi	140	144	0.97	A
			Co-58	pCi	88.3	83.0	1.06	A
			Mn-54	pCi	173	162	1.07	A
			Fe-59	pCi	136.0	125	1.09	A
			Zn-65	pCi	165	159	1.04	A
			Co-60	pCi	133	125	1.06	A
	E10298	Charcoal	I-131	pCi	95.5	97.2	0.98	A
December, 2012	E10334	Milk	Sr-89	pCi/L	101	96.6	1.05	A
			Sr-90	pCi/L	11.3	13.8	0.82	A
	E10336	Charcoal	I-131	pCi	73.1	72.7	1.01	A

Footnotes are on page 3 of 3.

ECKERT & ZIEGLER ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December, 2012	E10335	Milk	I-131	pCi/L	93.1	90.0	1.03	A
			Ce-141	pCi/L	52.5	51.0	1.03	A
			Cr-51	pCi/L	373	348	1.07	A
			Cs-134	pCi/L	157	165	0.95	A
			Cs-137	pCi/L	113	117	0.97	A
			Co-58	pCi/L	94.1	98.5	0.96	A
			Mn-54	pCi/L	116	116	1.00	A
			Fe-59	pCi/L	124	116	1.07	A
			Zn-65	pCi/L	190	186	1.02	A
			Co-60	pCi/L	172	170	1.01	A
	E10337A	Filter	Ce-141	pCi	51.8	49.6	1.04	A
			Cr-51	pCi	372	338	1.10	A
			Cs-134	pCi	165	161	1.02	A
			Cs-137	pCi	113	114	0.99	A
			Co-58	pCi	97	96	1.01	A
			Mn-54	pCi	118	112	1.05	A
			Fe-59	pCi	105	112	0.94	A
			Zn-65	pCi	166	181	0.92	A
			Co-60	pCi	179	165	1.08	A

(a) Teledyne Brown Engineering reported result.

(b) The Eckert & Ziegler 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 Eckert & Ziegler Analytics results.

(d) Eckert & Ziegler 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. Two consecutive Warning evaluations require an investigation. 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
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2012	12-MaW26	Water	Cs-134	Bq/L	-0.0045		(1)	A
			Cs-137	Bq/L	37.5	39.9	27.9 - 51.9	A
			Co-57	Bq/L	30.8	32.9	23.0 - 42.8	A
			Co-60	Bq/L	22.4	23.72	16.60 - 30.84	A
			H-3	Bq/L	456	437	306 - 568	A
			Mn-54	Bq/L	31.0	31.8	22.3 - 41.3	A
			K-40	Bq/L	144.0	142	99 - 185	A
			Sr-90	Bq/L	-0.0084		(1)	A
			Zn-65	Bq/L	-0.369		(1)	A
	12-GrW26	Water	Gr-A	Bq/L	2.06	2.14	0.64 - 3.64	A
			Gr-B	Bq/L	7.48	6.36	3.18 - 9.54	A
	12-RdF26	Filter	Cs-134	Bq/sample	2.31	2.38	1.67 - 3.09	A
			Cs-137	Bq/sample	2.15	1.79	1.25 - 2.33	W
			Co-57	Bq/sample	-0.0701		(1)	A
			Co-60	Bq/sample	2.62	2.182	1.527 - 2.837	W
			Mn-54	Bq/sample	4.13	3.24	2.27 - 4.21	W
			Sr-90	Bq/sample	0.0185		(1)	A
			Zn-65	Bq/sample	4.19	2.99	2.09 - 3.89	N (2)
	12-GrF26	Filter	Gr-A	Bq/sample	0.365	1.2	0.4 - 2.0	A
			Gr-B	Bq/sample	2.31	2.400	1.2 - 3.6	A
September 2012	12-MaW27	Water	Cs-134	Bq/L	21.4	23.2	16.2 - 30.2	A
			Cs-137	Bq/L	17.0	16.7	11.7 - 21.7	A
			Co-57	Bq/L	28.7	29.3	20.5 - 38.1	A
			Co-60	Bq/L	0.179		(1)	A
			H-3	Bq/L	387	334	234 - 434	A
			Mn-54	Bq/L	18.1	17.8	12.5 - 23.1	A
			K-40	Bq/L	139	134	94 - 174	A
			Sr-90	Bq/L	19.6	12.2	8.5 - 15.9	N (3)
			Zn-65	Bq/L	27.2	25.9	18.1 - 33.7	A
	12-GrW27	Water	Gr-A	Bq/L	0.966	1.79	0.54 - 3.04	A
			Gr-B	Bq/L	10.0	9.1	4.6 - 13.7	A

Footnotes are on page 2 of 2.

DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Control Limits	Evaluation (c)
September 2012	12-RdF27	Filter	Cs-134	Bq/sample	2.760	2.74	1.92 - 3.56	A
			Cs-137	Bq/sample	0.0415		(1)	A
			Co-57	Bq/sample	2.00	191.00	1.34 - 2.48	A
			Co-60	Bq/sample	1.78	1.728	1.210 - 2.246	A
			Mn-54	Bq/sample	2.40	2.36	1.65 - 3.07	A
			Sr-90	Bq/sample	0.931	1.03	0.72 - 1.34	A
			Zn-65	Bq/sample	-0.688		(1)	A
	12-GrF27	Filter	Gr-A	Bq/sample	0.434	0.97	0.29 - 1.65	A
			Gr-B	Bq/sample	1.927	1.92	0.96 - 2.88	A

(1) False positive test
(2) NCR 12-08 No cause determined for high result. TBE considers this an anomaly.
(3) NCR 12-11. High results due to incorrect aliquot entered in LIMS.
(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. Two consecutive Warning evaluations require an investigation. N = Not Acceptable

ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE QC SPIKE PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2012	RAD-89	Water	Sr-89	pCi/L	63.4	58.5	46.9 - 66.3	A
			Sr-90	pCi/L	33.5	37.4	27.4 - 43.1	A
			Ba-133	pCi/L	89.2	82.3	69.1 - 90.5	A
			Cs-134	pCi/L	66.5	74.2	60.6 - 81.6	A
			Cs-137	pCi/L	152	155.0	140 - 172	A
			Co-60	pCi/L	73.3	72.9	65.6 - 82.6	A
			Zn-65	pCi/L	109	105	94.5 - 125	A
			Gr-B	pCi/L	43.6	44.2	29.6 - 51.5	A
			I-131	pCi/L	25.9	27.1	22.5 - 31.9	A
			U-Nat	pCi/L	56.4	61.5	50.0 - 68.2	A
			H-3	pCi/L	15433	15800	13800-17400	A
	MRAD-16	Filter	Gr-A	pCi/filter	39.5	77.8	26.1 - 121	A
November 2012	RAD-91	Water	Sr-89	pCi/L	46.5	39.1	29.7 - 46.1	N (1)
			Sr-90	pCi/L	16.6	20.1	14.4 - 23.8	A
			Ba-133	pCi/L	85.2	84.8	71.3 - 93.3	A
			Cs-134	pCi/L	76.9	76.6	62.6 - 84.3	A
			Cs-137	pCi/L	177	183	165 - 203	A
			Co-60	pCi/L	77.4	78.3	70.5 - 88.5	A
			Zn-65	pCi/L	209	204	184 - 240	A
			Gr-B	pCi/L	59.3	39.2	26.0 - 46.7	N (1)
			I-131	pCi/L	22.9	24.8	20.6 - 29.4	A
			H-3	pCi/L	5020.0	4890	4190 - 5380	A
	MRAD-17	Filter	Gr-A	pCi/filter	59.6	87.5	29.3 - 136	A

(1) NCR 12-13. Sr-89 found to known ratio was 1.19. TBE considers this acceptable. An incorrect aliquot was used for the Gross Beta.

(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 the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.