COMMONWEALTH OF VIRGINIA
DEPARTMENT OF HEALTH

OFFICE OF RADIOLOGICAL HEALTH
109 Governor Street, 7th Floor, Richmond, Virginia 23219
Office (804) 864-8150, Fax (804) 864-8175

2014

ANNUAL ENVIRONMENTAL RADIATION PROGRAM REPORT

VDH VIRGINIA DEPARTMENT OF HEALTH
Protecting You and Your Environment

ACKNOWLEDGEMENTS

We would like to acknowledge the following organizations and agencies that contributed to the environmental surveillance program:

- Babcock & Wilcox

- Department of Agriculture and Consumer Services
  Dairy and Food Division

- Department of Conservation and Recreation
  Division of State Parks

- Department of Emergency Management
  Preparedness and Mitigation Division

- Department of General Services
  Division of Consolidated Laboratory Services

- Department of Health
  Division of Shellfish Sanitation

- Dominion Virginia Power

- Newport News Shipbuilding

- Norfolk Naval Shipyard

PREFACE

The Office of Radiological Health conducts an extensive environmental monitoring program of radiological conditions around certain fixed nuclear facilities in the Commonwealth of Virginia to provide an independent assessment of each facility's compliance with applicable federal and state regulations. Each of these fixed nuclear facilities has its own routine surveillance program. The objectives of a routine surveillance program include:

a) Providing information useful in assessing the adequacy of protection of the public
b) Meeting requirements of regulatory agencies
c) Verifying radionuclide containment and plant waste management practices
d) Meeting legal liability obligations
e) Providing public assurance and acceptance (NCRP, 1976).

In addition to these stated objectives, the ORH has identified other objectives such as;

a) Maintenance of a database of background radionuclide levels and trends to assist with the assessment of other environmental data
b) Identification of radiological releases not associated with the licensed facility
c) Maintenance of equipment and proficiency of capabilities used in emergency preparedness and response activities

Part of this work is funded by the Virginia Department of Emergency Management.

This report is distributed to the licensee, as well as state and local agencies, which have a direct interest in the results. Single copies of this report are available for download at:

http://www.vdh.virginia.gov/epidemiology/radiologicalhealth/Environmental/

You are invited to submit any comments or questions regarding this report to the Office of Radiological Health.

NCRP (2006) National Council on Radiation Protection and Measurements, *Environmental Radiation Measurements* (1976) - Report No. 050, National Council on Radiation Protection and Measurements, Washington.

VIRGINIA DEPARTMENT OF HEALTH

ENVIRONMENTAL RADIATION SURVEILLANCE DATA ANNUAL REPORT 2014

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FOREWORD

The Office of Radiological Health conducts an extensive environmental radiological monitoring program around nuclear facilities in the Commonwealth of Virginia to determine compliance with applicable federal and state regulations and guidelines.

Sampling locations are primarily located around the two nuclear power stations in the Commonwealth of Virginia.

(1) North Anna Power Station, Louisa County, Virginia
(2) Surry Power Station, Surry County, Virginia

Sampling locations are also present at:

(3) Babcock & Wilcox, Lynchburg, Virginia
(4) Newport News Shipbuilding (Formerly Newport News Shipbuilding & Drydock Company)
(5) Norfolk Naval Shipyard, Portsmouth, Virginia

Samples are also collected at various control locations. This data can be compared to data for samples collected at plant environs. This provides a comparison between naturally occurring radiation and any radiological deposition resulting from nuclear power plant operation or radioactive fallout.

All State samples are analyzed by Consolidated Laboratories of the Commonwealth of Virginia and Virginia Department of Health.

All the data are within normal expected levels.

This report represents a compilation of all samples collected between January 1, 2014 and December 31, 2014.

SAMPLING PROGRAM

The Office of Radiological Health maintains an environmental surveillance program with primary focus on the environs of the nuclear power facilities in Virginia. The objectives of this radiological monitoring program are:

a) To detect and measure radioactive releases during routine nuclear power plant operation.

b) To detect and measure radioactive releases during abnormal events occurring at nuclear facilities.

c) To measure concentration of radioactive effluents in the environment particularly in human exposure pathways.

d) To provide an independent means of verification of utility release reports.

These objectives are achieved through continuous sampling of air and ambient radiation, as well as, periodic sampling of water, milk, vegetation, fish, shellfish, etc. Details on sample locations and frequencies are outlined in Appendix III of this report.

A brief description of each sampling medium follows:

AIR PARTICULATE AND RADIOGAS

Stationary air samplers are utilized at the Surry Power Station, the North Anna Power Station, and one control location at Pocahontas State Park. Pumps run approximately 168 hours per week at an average flow rate of 115 cubic feet per hour. All samplers are continuously equipped with a charcoal filter. Air particulate filters are used at every sampling location to measure any radioactive particulates. All stations, except the control station, duplicate utility stations. At BWX Technologies, there is one air sampler located on site. This air pump is equipped with air particulate filters and run approximately 168 hours per week with an average flow rate of 70 cubic feet per hour.

Charcoal filters & air particulate filters are analyzed weekly for gamma activity with special emphasis on I-131 retention.

Samples obtained quarterly from Babcock & Wilcox undergo gross alpha analysis.

FISH

Fish samples are collected semiannually in Lake Anna, near the North Anna Power Station. Each sample consists of approximately one kilogram of flesh from catfish, sunfish, bass or bluegill.

Fish samples are collected semiannually from the Station Discharge Canal of Surry Power Station. This sample frequency was negotiated effective October 22, 2014. The sample consists of approximately one kilogram of flesh from catfish, perch, or eel.

All fish samples are counted for gamma activity with data based on wet weight.

MILK

Raw milk samples are collected quarterly from a dairy near each reactor site. Each sample consists of one gallon of raw milk with no preservatives added. Raw milk is a primary indicator of radioiodine incorporation in the food chain.

All milk samples are counted for gamma activity and analyzed quarterly for Strontium-89 & 90 and are also radiochemically separated for I-131.

SHELLFISH

Shellfish are collected as a part of the environmental surveillance program around Surry Power Station. Samples consisting of one kilogram of flesh are collected annually approximately 0.5 mile off the mouth of the SPS discharge canal in the James River and are indicators of incorporation of radioactivity within the food chain.

All shellfish samples are counted for gamma activity with data based on activity per unit of wet weight.

SILT

Silt is collected semiannually next to the Waste Treatment building at North Anna Power Station. The sample consists of one kilogram of bottom sediment and is an indicator of radioactive deposition in sediment.

Silt is collected semiannually at Surry Power Station from the Station Discharge Canal. The sample consists of one kilogram of bottom sediment and is an indicator of radioactive deposition in sediment.

Silt is collected quarterly at Norfolk Naval Shipyard (NNSY) on the Elizabeth River to ensure that shipyard operations result in minimal radioactive effluents. Silt is also collected quarterly at Newport News Shipbuilding (NNSB) on the James River to ensure that operations result in minimal radioactive deposition.

Silt samples are counted for gamma activity and gross beta activity with data based on activity per unit of dry weight.

SOIL

Two soil samples are collected at the Babcock & Wilcox facility. One sample site is located at a ball field on the facility's eastern boundary, and the other is a control location at the James River shoreline, 1.5 miles upstream from the plant, at Six Mile Bridge. These samples are collected annually. Samples obtained undergo uranium separation followed by alpha analysis.

VEGETATION

Green leafy vegetation is collected from home gardens located near each nuclear power facility. Samples of one kilogram of kale, cabbage, or turnip greens are collected biannually at harvest. When leafy vegetation is unavailable, tall grass is substituted. These samples would indicate incorporation of radioactivity in edible vegetation. Vegetation is counted for gamma activity with data based on activity per unit wet weight.

Two vegetation samples are collected at Babcock & Wilcox. These consist of one kilogram of

grass from the ball field at the eastern site boundary and one control location at the James River shoreline, 1.5 miles upstream from the plant, at Six Mile Bridge. These samples are collected annually and undergo uranium separation followed by alpha analysis.

SURFACE WATER

Surface water is collected weekly at each nuclear power facility. Three and one half liters (L) samples of station discharge water and upstream controls are collected. These samples provide data on radioactive effluents.

Two surface water samples are collected from the James River at Babcock & Wilcox on an annual basis. One is located approximately 3 miles downstream of the Babcock & Wilcox plant, near the ball field at the eastern site boundary, and the other is at a control location near Six Mile Bridge, which is approximately 1.5 miles upstream. Samples undergo uranium separation followed by alpha counting.

Surface water is also collected quarterly on the James River at Newport News Shipbuilding (NNSB) and on the Elizabeth River at the Norfolk Naval Shipyard (NNSY) to ensure that shipyard operations result in minimal radioactive effluents.

AMBIENT GAMMA EXPOSURE (OSL)

Ambient gamma exposure readings are collected using either calcium fluoride or optically stimulated luminescence dosimeters (OSL). There are twelve OSL sample stations surrounding North Anna Power Station and fourteen stations surrounding Surry Power Station. One control OSL station is located at Pocahontas State Park. Several stations at each site duplicate utility sampling stations.

The OSL's are processed quarterly using a Micro Star system, by Landauer, by VDH for net exposure during their time in the field, resulting in a millirem/quarter reading.

Sources of Radioactivity in the Environment

Radioactivity from natural sources is found everywhere. Naturally occurring radioactivity comes from the decay of primordial terrestrial sources, such as uranium and thorium. Other sources are continually produced in our upper atmosphere through interactions of atoms with cosmic rays. These naturally occurring sources produce the background levels of radioactivity.

In the past century, environmental radiation levels have been influenced by human practices of using or manufacturing radioactive materials. Such practices include the use of radioactive materials in the healing arts, uranium mining and milling operations, nuclear power generation, nuclear weapons manufacturing and testing, and storage and disposal of nuclear weapons.

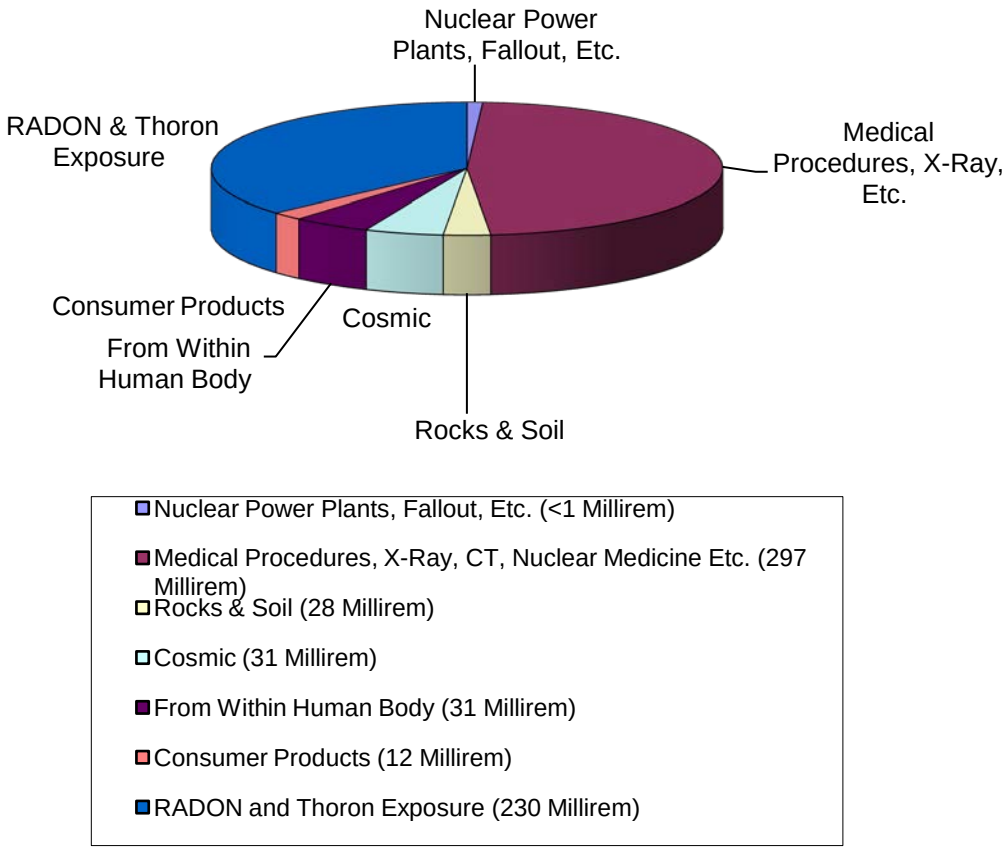
Background radiation levels were most altered by residual fallout from nuclear weapons testing. The United States ceased atmospheric testing following adoption of the 1963 Nuclear Test Ban Treaty. Only long-lived fallout radionuclides remain.

Doses to the Public

The primary source of natural radiation dose received by the general public is due to radon exposure (See Figure 1 next page). The average individual receives approximately 230 mrem/year from radon and less than 1 mrem/year from nuclear facilities. Another 81 mrem/year are received from other natural sources and approximately 297 mrem/year from medical procedures. The total average whole body dose nationwide is approximately 620 mrem/year.

Inherent in all standards for radiation control is the philosophy of limiting exposure to levels, “AS LOW AS REASONABLY ACHIEVABLE,” (ALARA). In practice, this philosophy continues to result in very low average doses to the public from nuclear facilities cited earlier. The monitoring program maintained by the Office of Radiological Health continues to verify compliance to these standards.

FIGURE 1: Sources of Radiation Exposure



Source: National Council on Radiation Protection & Measurement; Estimated Annual Dose of 620 Millirem for an average person in the U.S.A.

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North Anna and Surry Nuclear Power Stations & Other Selected Locations

Virginia Department of Health

AIR PARTICULATE

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location: Surry Power Station – on site

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
1	A-20	12/16/13	-	1/7/14	0.03	+/-	0.004
2	A-20	1/7/14	-	1/14/14	0.05	+/-	0.01
3	A-20	1/14/14	-	1/23/14	0.03	+/-	0.005
4	A-20	1/23/14	-	1/28/14	0.04	+/-	0.01
5	A-20	1/28/14	-	2/3/14	0.06	+/-	0.01
6	A-20	2/3/14	-	2/10/14	0.05	+/-	0.01
7	A-20	2/10/14	-	2/18/14	0.04	+/-	0.01
8	A-20	2/18/14	-	2/24/14	0.04	+/-	0.01
9*	A-20		-			+/-	
10	A-20	2/24/14	-	3/11/14	0.04	+/-	0.01
11	A-20	3/11/14	-	3/18/14	0.03	+/-	0.004
12*	A-20		-			+/-	
13**	A-20	3/18/14	-	4/1/14	0.03	+/-	0.004
14	A-20	4/1/14	-	4/8/14	.04	+/-	.01
15	A-20	4/8/14	-	4/15/14	.03	+/-	.005
16*	A-20	4/15/14	-	4/22/14		+/-	
17	A-20	4/22/14	-	4/29/14	.04	+/-	.01
18	A-20	4/29/14	-	5/6/14	.04	+/-	.01

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Location: Surry Power Station – on site - *continued*

Week #	Station	Date Start		Date Stop	Gross Beta Activity pCi/meter3		
19	A-20	5/6/14	-	5/13/14	.04	+/-	.01
20	A-20	5/13/14	-	5/20/14	.06	+/-	.01
21	A-20	5/20/14	-	5/27/14	.09	+/-	.01
22	A-20	5/27/14	-	6/3/14	.08	+/-	.01
23	A-20	6/3/14	-	6/10/14	.03	+/-	.00
24	A-20	6/10/14	-	6/17/14	.13	+/-	.02
25	A-20	6/17/14	-	6/24/14	.04	+/-	.01
26	A-20	6/24/14	-	6/29/14	.13	+/-	.02
27	A-20	7/1/14	-	7/8/14	.05	+/-	.01
28	A-20	7/8/14	-	7/15/14	.04	+/-	.01
29	A-20	7/15/14	-	7/22/14	.03	+/-	.01
30	A-20	7/22/14	-	7/29/14	.05	+/-	.01
31	A-20	7/29/14	-	8/5/14	.03	+/-	.004
32	A-20	8/5/14	-	8/12/14	.10	+/-	.013
33	A-20	8/12/14	-	8/19/14	.07	+/-	.01
34	A-20	8/19/14	-	8/26/14	.04	+/-	.01
35	A-20	8/26/14	-	9/2/14	.04	+/-	.005
36	A-20	9/2/14	-	9/9/14	.05	+/-	.01
37*	A-20	9/9/14	-	9/16/14		+/-	

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Location: Surry Power Station – on site - *continued*

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
38**	A-20	9/9/14	-	9/23/14	.03	+/-	.004
39	A-20	9/23/14	-	9/30/14	.05	+/-	.01
40	A-20	9/30/14	-	10/7/14	0.04	+/-	0.005
41*	A-20	10/7/14	-	10/14/14		+/-	
42**	A-20	10/7/14	-	10/21/14	0.05	+/-	0.01
43	A-20	10/21/14	-	10/28/14	0.03	+/-	0.005
44	A-20	10/28/14	-	11/4/14	0.04	+/-	0.005
45	A-20	11/4/14	-	11/11/14	0.06	+/-	0.01
46	A-20	11/11/14	-	11/18/14	0.03	+/-	0.005
47*	A-20	11/18/14	-	11/25/14		+/-	
48**	A-20	11/25/14	-	12/2/14	0.04	+/-	0.01
49[@]	A-20	12/2/14	-	12/9/14	0.04	+/-	0.01
50[#]	A-20	12/9/14	-	12/16/14		+/-	
51*	A-20	12/16/14	-	12/23/14		+/-	
52*	A-20	12/23/14	-	12/30/14		+/-	

*No samples collected due to staff training, conferences or holidays.

**Sampler ran for two weeks.

[@]Sampler was found to have malfunctioned upon arrival for sample change out, the sampler ran for approximately 2.8 days. Ending cfm was estimated based on past values.

[#]Sampler out of service.

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AIR PARTICULATE

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Location: Pocahontas State Park – *control / naturally occurring background*

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
1	A-40	12/16/13	-	1/6/14	0.03	+/-	0.004
2	A-40	1/6/14	-	`1/13/14	0.05	+/-	0.01
3	A-40	1/13/14	-	1/21/14	0.04	+/-	0.01
4	A-40	1/21/14	-	1/27/14	0.02	+/-	0.004
5	A-40	1/27/14	-	2/3/14	0.05	+/-	0.007
6	A-40	2/3/14	-	2/10/14	0.04	+/-	0.01
7	A-40	2/10/14	-	2/18/14	0.03	+/-	0.005
8	A-40	2/18/14	-	2/24/14	0.04	+/-	0.007
9*	A-40		-			+/-	
10	A-40	2/24/14	-	3/11/14	0.04	+/-	0.01
11	A-40	3/11/14	-	3/18/14	0.03	+/-	0.004
12*	A-40		-			+/-	
13**	A-40	3/11/14	-	4/1/14	0.03	+/-	0.004
14	A-40	4/1/14	-	4/8/14	.04	+/-	.01
15	A-40	4/8/14	-	4/15/14	.04	+/-	.01
16*	A-40	4/15/14	-	4/22/14		+/-	
17	A-40	4/22/14	-	4/29/14	.03	+/-	.004
18	A-40	4/29/14	-	5/6/14	.06	+/-	.01

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AIR PARTICULATE

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Location: - Pocahontas State Park – *control / naturally occurring background continued*

Week #	Station	Date Start		Date Stop	Gross Beta Activity pCi/meter3		
19	A-40	5/6/14	-	5/13/14	.09	+/-	.01
20	A-40	5/13/14	-	5/20/14	.07	+/-	.01
21	A-40	5/20/14	-	5/27/14	.10	+/-	.01
22	A-40	5/27/14	-	6/3/14	.07	+/-	.01
23	A-40	6/3/14	-	6/10/14	.10	+/-	.01
24	A-40	6/10/14	-	6/17/14	.12	+/-	.02
25	A-40	6/17/14	-	6/24/14	.05	+/-	.01
26	A-40	6/24/14	-	7/1/14	.10	+/-	.01
27	A-40	7/1/14	-	7/8/14	.10	+/-	.01
28	A-40	7/8/14	-	7/15/14	.08	+/-	.01
29	A-40	7/15/14	-	7/22/14	.13	+/-	.02
30	A-40	7/22/14	-	7/29/14	.09	+/-	.01
31	A-40	7/29/14	-	8/5/14	.03	+/-	.004
32	A-40	8/5/14	-	8/12/14	.14	+/-	.018
33	A-40	8/12/14	-	8/19/14	.11	+/-	.02
34	A-40	8/19/14	-	8/26/14	.12	+/-	.02
35	A-40	8/26/14	-	9/2/14	.05	+/-	.007
36	A-40	9/2/14	-	9/9/14	.11	+/-	.02

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Location: Pocahontas State Park – *control / naturally occurring background* **-** *continued*

Week #	Station	Date Start		Date Stop	Gross Beta Activity pCi/meter3		
37*[@]	A-40	9/9/14	-	9/16/14		+/-	
38**	A-40	9/9/14	-	9/23/14	.13	+/-	.02
39	A-40	9/23/14	-	9/30/14	.13	+/-	.02
40	A-40	9/30/14	-	10/7/14	0.11	+/-	0.014
41*	A-40	10/7/14	-	10/14/14		+/-	
42**	A-40	10/7/14	-	10/21/14	0.05	+/-	0.01
43	A-40	10/21/14	-	10/28/14	0.08	+/-	0.011
44	A-40	10/28/14	-	11/4/14	0.25	+/-	0.03
45	A-40	11/4/14	-	11/11/14	0.05	+/-	0.01
46	A-40	11/11/14	-	11/18/14	0.03	+/-	0.005
47*	A-40	11/18/14	-	11/25/14		+/-	
48[#]**	A-40	11/25/14	-	12/2/14		+/-	
49**	A-40	12/2/14	-	12/9/14	0.10	+/-	0.01
50	A-40	12/9/14	-	12/16/14	0.09	+/-	0.01
51*	A-40	12/16/14	-	12/23/14		+/-	
52*	A-40	12/23/14	-	12/30/14		+/-	

*No samples collected due to staff training, conferences, or holidays.

[@]On 9/15/14, the air sampler at this location was discovered to have malfunctioned after running for 82 hours. The approximate date/time of malfunction was 9/8/14 @ 0900. The sample run time is 6 days, which accounts for the dates listed.

[#]Managed hunt in progress, sample not collected.

**Sampler ran for two weeks.

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Location: Jamestown State Park & Historical Site

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
1	A-44	12/16/13	-	1/7/14	0.02	+/-	0.003
2	A-44	1/7/14	-	1/14/14	0.05	+/-	0.01
3	A-44	1/14/14	-	1/23/14	0.03	+/-	0.004
4	A-44	1/23/14	-	1/28/14	0.03	+/-	0.01
5	A-44	1/28/14	-	2/3/14	0.05	+/-	0.01
6	A-44	2/3/14	-	2/10/14	0.04	+/-	0.01
7	A-44	2/10/14	-	2/18/14	0.03	+/-	0.004
8	A-44	2/18/14	-	2/24/14	0.04	+/-	0.006
9*	A-44		-			+/-	
10	A-44	2/24/14	-	3/11/14	0.03	+/-	0.004
11	A-44	3/11/14	-	3/18/14	0.03	+/-	0.004
12*	A-44		-			+/-	
13**	A-44	3/18/14	-	4/1/14	0.03	+/-	0.004
14	A-44	4/1/14	-	4/8/14	.03	+/-	.005
15	A-44	4/8/14	-	4/15/14	.03	+/-	.01
16*	A-44	4/15/14	-	4/22/14		+/-	
17	A-44	4/22/14	-	4/29/14	.03	+/-	.004
18	A-44	4/29/14	-	5/6/14	.04	+/-	.01

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Location: - Jamestown State Park & Historical Site - *continued*

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
19	A-44	5/6/14	-	5/13/14	.08	+/-	.01
20	A-44	5/13/14	-	5/20/14	.05	+/-	.04
21	A-44	5/20/14	-	5/27/14	.07	+/-	.01
22	A-44	5/27/14	-	6/3/14	.06	+/-	.01
23	A-44	6/3/14	-	6/10/14	.06	+/-	.01
24	A-44	6/10/14	-	6/17/14	.07	+/-	.01
25	A-44	6/17/14	-	6/24/14	.04	+/-	.01
26	A-44	6/24/14	-	7/1/14	.07	+/-	.01
27	A-44	7/1/14	-	7/8/14	.04	+/-	.01
28	A-44	7/8/14	-	7/15/14	.03	+/-	.00
29	A-44	7/15/14	-	7/22/14	.03	+/-	.00
30	A-44	7/22/14	-	7/29/14	.04	+/-	.01
31	A-44	7/29/14	-	8/5/14	.03	+/-	.004
32	A-44	8/5/14	-	8/12/14	.08	+/-	.011
33	A-44	8/12/14	-	8/19/14	.09	+/-	.01
34	A-44	8/19/14	-	8/26/14	.05	+/-	.01
35	A-44	8/26/14	-	9/2/14	.03	+/-	.005
36	A-44	9/2/14	-	9/9/14	.06	+/-	.01

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AIR PARTICULATE

January 1, 2014 through December 31, 2014

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Location: Jamestown State Park & Historical Site - *continued*

Week #	Station	Date Start		Date Stop	Gross Beta Activity pCi/meter3		
37*	A-44	9/9/14	-	9/16/14		+/-	
38**	A-44	9/9/14	-	9/23/14	.03	+/-	.003
39	A-44	9/23/14	-	9/30/14	.05	+/-	.01
40	A-44	9/30/14	-	10/7/14	0.03	+/-	0.005
41*	A-44	10/7/14	-	10/14/14		+/-	
42**	A-44	10/7/14	-	10/21/14	0.04	+/-	0.01
43	A-44	10/21/14	-	10/28/14	0.03	+/-	0.005
44	A-44	10/28/14	-	11/4/14	0.03	+/-	0.004
45	A-44	11/4/14	-	11/11/14	0.05	+/-	0.01
46	A-44	11/11/14	-	11/18/14	0.03	+/-	0.004
47*	A-44	11/18/14	-	11/25/14		+/-	
48**	A-44	11/25/14	-	12/2/14	0.03	+/-	0.004
49	A-44	12/2/14	-	12/9/14	0.03	+/-	0.004
50	A-44	12/9/14	-	12/16/14	0.04	+/-	0.01
51*	A-44	12/16/14	-	12/23/14		+/-	
52*	A-44	12/23/14	-	12/30/14		+/-	

*No samples collected due to staff training, conferences, or holidays.

**Sampler ran for two weeks.

Virginia Department of Health

AIR PARTICULATE

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location: Louisa County / Bumpass Volunteer Fire Station

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
1	A-86	12/17/13	-	1/6/14	0.03	+/-	0.003
2	A-86	1/6/14	-	1/13/14	0.04	+/-	0.01
3	A-86	1/13/14	-	1/21/14	0.04	+/-	0.01
4	A-86	1/21/14	-	1/27/14	0.03	+/-	0.004
5	A-86	1/27/14	-	2/4/14	0.03	+/-	0.005
6	A-86	2/4/14	-	2/11/14	0.04	+/-	0.01
7	A-86	2/11/14	-	2/19/14	0.04	+/-	0.005
8	A-86	2/19/14	-	2/25/14	0.05	+/-	0.007
9*	A-86		-			+/-	
10	A-86	2/24/14	-	3/11/14	0.04	+/-	0.01
11	A-86	3/11/14	-	3/18/14	0.03	+/-	0.004
12*	A-86		-			+/-	
13**	A-86	3/11/14	-	4/1/14	0.02	+/-	0.003
14	A-86	4/1/14	-	4/8/14	.04	+/-	.01
15	A-86	4/8/14	-	4/15/14	.03	+/-	.005
16*	A-86	4/15/14	-	4/22/14		+/-	
17	A-86	4/22/14	-	4/29/14	.04	+/-	.01
18	A-86	4/29/14	-	5/6/14	.04	+/-	.01

Virginia Department of Health

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Location: Louisa County / Bumpass Volunteer Fire Station

Week #	Station	Date Start		Date Stop	Gross Beta Activity pCi/meter3		
19	A-86	5/6/14	-	5/13/14	.04	+/-	.01
20	A-86	5/13/14	-	5/20/14	.06	+/-	.01
21	A-86	5/20/14	-	5/27/14	.09	+/-	.01
22	A-86	5/27/14	-	6/3/14	.08	+/-	.01
23	A-86	6/3/14	-	6/10/14	.03	+/-	.00
24	A-86	6/10/14	-	6/17/14	.13	+/-	.02
25	A-86	6/17/14	-	6/24/14	.04	+/-	.01
26	A-86	6/24/14	-	6/29/14	.13	+/-	.02
27	A-86	7/1/14	-	7/8/14	.08	+/-	.01
28	A-86	7/8/14	-	7/15/14	.07	+/-	.01
29	A-86	7/15/14	-	7/22/14	.06	+/-	.01
30	A-86	7/22/14	-	7/29/14	.07	+/-	.01
31	A-86	7/29/14	-	8/5/14	.03	+/-	.01
32	A-86	8/5/14	-	8/12/14	.17	+/-	.022
33	A-86	8/12/14	-	8/19/14	.12	+/-	.02
34	A-86	8/19/14	-	8/26/14	.10	+/-	.01
35	A-86	8/26/14	-	9/2/14	.04	+/-	.006
36	A-86	9/2/14	-	9/9/14	.08	+/-	.01

Virginia Department of Health

AIR PARTICULATE

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location: Louisa County / Bumpass Volunteer Fire Station *continued*

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
37*	A-86	9/9/14	-	9/16/14		+/-	
38**	A-86	9/9/14	-	9/23/14	.05	+/-	.01
39	A-86	9/23/14	-	9/30/14	.21	+/-	.03
40	A-86	9/30/14	-	10/7/14	0.14	+/-	0.019
41*	A-86	10/7/14	-	10/14/14		+/-	
42**	A-86	10/7/14	-	10/21/14	0.07	+/-	0.01
43	A-86	10/21/14	-	10/28/14	0.06	+/-	0.008
44	A-86	10/28/14	-	11/4/14	0.14	+/-	0.02
45	A-86	11/4/14	-	11/11/14	0.07	+/-	0.01
46	A-86	11/11/14	-	11/18/14	0.04	+/-	0.005
47*	A-86	11/18/14	-	11/25/14		+/-	
48**	A-86	11/25/14	-	12/2/14	0.04	+/-	0.005
49	A-86	12/2/14	-	12/9/14	0.03	+/-	0.005
50	A-86	12/9/14	-	12/16/14	0.09	+/-	0.01
51*	A-86	12/16/14	-	12/23/14		+/-	
52*	A-86	12/23/14	-	12/30/14		+/-	

*No samples collected due to staff training, conferences, or holidays.

**Sampler ran for two weeks.

Virginia Department of Health

AIR PARTICULATE

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location: Louisa County / Route 700

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
1*	A-88		-			+/-	
2	A-88	1/6/14	-	1/13/14	0.04	+/-	0.01
3	A-88	1/13/14	-	1/21/14	0.03	+/-	0.01
4	A-88	1/21/14	-	1/27/14	0.02	+/-	0.003
5	A-88	1/27/14	-	2/4/14	0.04	+/-	0.006
6	A-88	2/4/14	-	2/11/14	0.06	+/-	0.01
7	A-88	2/11/14	-	2/19/14	0.04	+/-	0.005
8	A-88	2/19/14	-	2/25/14	0.06	+/-	0.006
9**	A-88		-			+/-	
10	A-88	2/24/14	-	3/11/14	0.04	+/-	0.01
11	A-88	3/11/14	-	3/18/14	0.03	+/-	0.004
12	A-88		-			+/-	
13***	A-88	3/25/14	-	4/1/14	0.02	+/-	0.003
14	A-88	4/1/14	-	4/8/14	.04	+/-	.01
15	A-88	4/8/14	-	4/15/14	.03	+/-	.005
16**	A-88	4/15/14	-	4/22/14		+/-	
17	A-88	4/22/14	-	4/29/14	.04	+/-	.01
18	A-88	4/29/14	-	5/6/14	.04	+/-	.01

Virginia Department of Health

AIR PARTICULATE

January 1, 2014 through December 31, 2014

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Location: Louisa County / Route 700 *continued*

Week #	Station	Date Start		Date Stop	Gross Beta Activity pCi/meter3		
19	A-88	5/6/14	-	5/13/14	.04	+/-	.01
20	A-88	5/13/14	-	5/20/14	.06	+/-	.01
21	A-88	5/20/14	-	5/27/14	.09	+/-	.01
22	A-88	5/27/14	-	6/3/14	.08	+/-	.01
23	A-88	6/3/14	-	6/10/14	.03	+/-	.00
24	A-88	6/10/14	-	6/17/14	.13	+/-	.02
25	A-88	6/17/14	-	6/24/14	.04	+/-	.01
26	A-88	6/24/14	-	7/1/14	.13	+/-	.02
27	A-88	7/1/14	-	7/8/14	.07	+/-	.01
28	A-88	7/8/14	-	7/15/14	.06	+/-	.01
29	A-88	7/15/14	-	7/22/14	.06	+/-	.01
30	A-88	7/22/14	-	7/29/14	.06	+/-	.01
31	A-88	7/29/14	-	8/5/14	.03	+/-	.005
32	A-88	8/5/14	-	8/12/14	.12	+/-	.015
33	A-88	8/12/14	-	8/19/14	.09	+/-	.01
34	A-88	8/19/14	-	8/26/14	.08	+/-	.01
35	A-88	8/26/14	-	9/2/14	.04	+/-	.005
36	A-88	9/2/14	-	9/9/14	.08	+/-	.01

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AIR PARTICULATE

January 1, 2014 through December 31, 2014

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Location: Louisa County / Route 700 *continued*

Week #	Station	Date Start		Stop	Gross Beta Activity pCi/meter3		
37**	A-88	9/9/14	-	9/16/14		+/-	
38***	A-88	9/16/14	-	9/23/14	.03	+/-	.005
39	A-88	9/23/14	-	9/30/14	.13	+/-	.02
40	A-88	9/30/14	-	10/7/14	0.08	+/-	0.011
41**	A-88	10/7/14	-	10/14/14		+/-	
42***	A-88	10/7/14	-	10/21/14	0.06	+/-	0.01
43	A-88	10/21/14	-	10/28/14	0.07	+/-	0.010
44	A-88	10/28/14	-	11/4/14	0.09	+/-	0.01
45	A-88	11/4/14	-	11/11/14	0.05	+/-	0.01
46	A-88	11/11/14	-	11/18/14	0.04	+/-	0.005
47**	A-88	11/18/14	-	11/25/14		+/-	
48***	A-88	11/25/14	-	12/2/14	0.04	+/-	0.01
49	A-88	12/2/14	-	12/9/14	0.03	+/-	0.00
50	A-88	12/9/14	-	12/16/14	0.06	+/-	0.01
51**	A-88	12/16/14	-	12/23/14		+/-	
52**	A-88	12/23/14	-	12/30/14		+/-	

*A-88 was unable to be analyzed due to power failure during operation.

**No samples were collected due staff training, conferences, or holidays.

***Sampler ran for two weeks.

Virginia Department of Health

AMBIENT GAMMA EXPOSURE

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Location	Station	Quarter	Net Exposure Rate mR/Std Qtr +/- 2 S.D.		
Surry Power Station	D-20	1st	**26.49**	**+/-**	**10.29**
Surry Power Station	D-20	2nd	**27.60**	**+/-**	**10.51**
Surry Power Station	D-20	3rd	**24.61**	**+/-**	**9.92**
Surry Power Station	D-20	4th	**29.40**	**+/-**	**10.85**
North Anna Power Station	D-35	1st	**34.72**	**+/-**	**11.78**
North Anna Power Station	D-35	2nd	**34.96**	**+/-**	**11.82**
North Anna Power Station	D-35	3rd	**31.81**	**+/-**	**11.28**
North Anna Power Station	D-35	4th	**39.46**	**+/-**	**12.56**
Pocahontas State Park	D-40	1st	**41.00**	**+/-**	**12.81**
Pocahontas State Park	D-40	2nd	**40.98**	**+/-**	**12.80**
Pocahontas State Park	D-40	3rd	**40.00**	**+/-**	**12.65**
Pocahontas State Park	D-40	4th	**45.23**	**+/-**	**13.45**
Surry – Lebanon Baptist Church	D-41	1st	**24.05**	**+/-**	**9.81**
Surry – Lebanon Baptist Church	D-41	2nd	*	**+/-**	*
Surry – Lebanon Baptist Church	D-41	3rd	**22.59**	**+/-**	**9.51**
Surry – Lebanon Baptist Church	D-41	4th	**22.80**	**+/-**	**9.55**
Surry – Lawnes Creek	D-42	1st	**26.62**	**+/-**	**10.32**
Surry – Lawnes Creek	D-42	2nd	**27.40**	**+/-**	**10.47**
Surry – Lawnes Creek	D-42	3rd	**28.55**	**+/-**	**10.69**
Surry – Lawnes Creek	D-42	4th	**29.64**	**+/-**	**10.89**
Surry – Route 628	D-43	1st	**24.78**	**+/-**	**9.95**
Surry – Route 628	D-43	2nd	**23.42**	**+/-**	**9.68**
Surry – Route 628	D-43	3rd	**22.48**	**+/-**	**9.48**
Surry – Route 628	D-43	4th	**25.46**	**+/-**	**10.09**
Jamestown – Historical site	D-44	1st	**29.13**	**+/-**	**10.80**
Jamestown – Historical site	D-44	2nd	**22.57**	**+/-**	**9.50**
Jamestown – Historical site	D-44	3rd	**29.91**	**+/-**	**10.94**
Jamestown – Historical site	D-44	4th	**26.06**	**+/-**	**10.21**
Newport News - Lee Hall	D-45	1st	**31.29**	**+/-**	**11.19**
Newport News - Lee Hall	D-45	2nd	**37.67**	**+/-**	**12.28**
Newport News - Lee Hall	D-45	3rd	**31.99**	**+/-**	**11.31**
Newport News - Lee Hall	D-45	4th	**41.23**	**+/-**	**12.84**
Louisa County - Mineral	D-50	1st	**26.46**	**+/-**	**10.29**
Louisa County - Mineral	D-50	2nd	**34.65**	**+/-**	**11.77**
Louisa County - Mineral	D-50	3rd	**25.05**	**+/-**	**10.01**
Louisa County - Mineral	D-50	4th	**35.48**	**+/-**	**11.91**
Louisa County – Wares Crossroads	D-51	1st	**24.47**	**+/-**	**9.89**
Louisa County – Wares Crossroads	D-51	2nd	**23.09**	**+/-**	**9.61**
Louisa County – Wares Crossroads	D-51	3rd	**25.01**	**+/-**	**10.00**
Louisa County – Wares Crossroads	D-51	4th	**25.88**	**+/-**	**10.17**

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Location	Station	Quarter	Net Exposure Rate mR/Std Qtr +/- 2 S.D.		
Louisa County – Good Hope Church	D-52	1st	**30.06**	**+/-**	**10.96**
Louisa County – Good Hope Church	D-52	2nd	**30.07**	**+/-**	**10.97**
Louisa County – Good Hope Church	D-52	3rd	**32.17**	**+/-**	**11.34**
Louisa County – Good Hope Church	D-52	4th	**36.17**	**+/-**	**12.03**
Spotsylvania Route 614	D-53	1st	**24.21**	**+/-**	**9.84**
Spotsylvania Route 614	D-53	2nd	**27.56**	**+/-**	**10.50**
Spotsylvania Route 614	D-53	3rd	**26.06**	**+/-**	**10.21**
Spotsylvania Route 614	D-53	4th	**28.84**	**+/-**	**10.74**
Louisa County – Fred Hall	D-54	1st	**24.56**	**+/-**	**9.91**
Louisa County – Fred Hall	D-54	2nd	**25.17**	**+/-**	**10.03**
Louisa County – Fred Hall	D-54	3rd	**23.40**	**+/-**	**9.67**
Louisa County – Fred Hall	D-54	4th	**28.36**	**+/-**	**10.65**
Naval Weapons Station – 1	D-73	1st	**22.19**	**+/-**	**9.42**
Naval Weapons Station – 1	D-73	2nd	**28.17**	**+/-**	**10.62**
Naval Weapons Station – 1	D-73	3rd	**21.95**	**+/-**	**9.37**
Naval Weapons Station – 1	D-73	4th	**31.23**	**+/-**	**11.18**
Newport News – Fort Eustis	D-76	1st	**25.05**	**+/-**	**10.01**
Newport News – Fort Eustis	D-76	2nd	**27.29**	**+/-**	**10.45**
Newport News – Fort Eustis	D-76	3rd	**25.72**	**+/-**	**10.14**
Newport News – Fort Eustis	D-76	4th	**31.03**	**+/-**	**11.14**
Williamsburg – Busch Gardens	D-77	1st	**31.00**	**+/-**	**11.13**
Williamsburg – Busch Gardens	D-77	2nd	**33.58**	**+/-**	**11.59**
Williamsburg – Busch Gardens	D-77	3rd	**29.93**	**+/-**	**10.94**
Williamsburg – Busch Gardens	D-77	4th	**34.94**	**+/-**	**11.82**
Williamsburg – Airport	D-78	1st	**22.08**	**+/-**	**9.40**
Williamsburg – Airport	D-78	2nd	**30.33**	**+/-**	**11.01**
Williamsburg – Airport	D-78	3rd	**21.86**	**+/-**	**9.35**
Williamsburg – Airport	D-78	4th	**33.55**	**+/-**	**11.58**
Surry – Scotland Wharf	D-79	1st	**23.08**	**+/-**	**9.61**
Surry – Scotland Wharf	D-79	2nd	**25.19**	**+/-**	**10.04**
Surry – Scotland Wharf	D-79	3rd	**22.15**	**+/-**	**9.41**
Surry – Scotland Wharf	D-79	4th	**29.33**	**+/-**	**10.83**
Surry – Bacon's Castle	D-80	1st	**23.62**	**+/-**	**9.72**
Surry – Bacon's Castle	D-80	2nd	**25.52**	**+/-**	**10.10**
Surry – Bacon's Castle	D-80	3rd	**21.30**	**+/-**	**9.23**
Surry – Bacon's Castle	D-80	4th	**27.34**	**+/-**	**10.46**
Surry – Alliance	D-81	1st	**25.10**	**+/-**	**10.02**
Surry – Alliance	D-81	2nd	**24.36**	**+/-**	**9.87**
Surry – Alliance	D-81	3rd	**23.40**	**+/-**	**9.67**
Surry – Alliance	D-81	4th	**26.22**	**+/-**	**10.24**

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Location	Station	Quarter	Net Exposure Rate mR/Std Qtr +/- 2 S.D.		
Surry – Hog Point	D-82	1st	**24.72**	**+/-**	**9.94**
Surry – Hog Point	D-82	2nd	**24.29**	**+/-**	**9.86**
Surry – Hog Point	D-82	3rd	**23.67**	**+/-**	**9.73**
Surry – Hog Point	D-82	4th	**28.43**	**+/-**	**10.66**
Louisa County – Route 685	D-84	1st	**24.92**	**+/-**	**9.98**
Louisa County – Route 685	D-84	2nd	**31.95**	**+/-**	**11.31**
Louisa County – Route 685	D-84	3rd	**26.75**	**+/-**	**10.34**
Louisa County – Route 685	D-84	4th	**35.48**	**+/-**	**11.91**
Spotsylvania – Route 713	D-85	1st	**26.51**	**+/-**	**10.30**
Spotsylvania – Route 713	D-85	2nd	**25.10**	**+/-**	**10.02**
Spotsylvania – Route 713	D-85	3rd	**25.19**	**+/-**	**10.04**
Spotsylvania – Route 713	D-85	4th	**26.71**	**+/-**	**10.34**
Louisa County – Bumpass Fire Dept.	D-86	1st	**29.51**	**+/-**	**10.87**
Louisa County – Bumpass Fire Dept.	D-86	2nd	**30.94**	**+/-**	**11.13**
Louisa County – Bumpass Fire Dept.	D-86	3rd	**27.99**	**+/-**	**10.58**
Louisa County – Bumpass Fire Dept.	D-86	4th	**35.30**	**+/-**	**11.88**
Spotsylvania – Levy	D-87	1st	**28.92**	**+/-**	**10.75**
Spotsylvania – Levy	D-87	2nd	**31.09**	**+/-**	**11.15**
Spotsylvania – Levy	D-87	3rd	**30.07**	**+/-**	**10.97**
Spotsylvania – Levy	D-87	4th	**35.79**	**+/-**	**11.96**
Louisa County – Route 700	D-88	1st	**32.73**	**+/-**	**11.44**
Louisa County – Route 700	D-88	2nd	**32.30**	**+/-**	**11.37**
Louisa County – Route 700	D-88	3rd	**31.16**	**+/-**	**11.16**
Louisa County – Route 700	D-88	4th	**36.76**	**+/-**	**12.13**
Louisa County – Aspen Hill	D-89	1st	**32.26**	**+/-**	**11.36**
Louisa County – Aspen Hill	D-89	2nd	**34.20**	**+/-**	**11.70**
Louisa County – Aspen Hill	D-89	3rd	**34.52**	**+/-**	**11.75**
Louisa County – Aspen Hill	D-89	4th	**42.14**	**+/-**	**12.98**
Radiological Health	Control 1	1st	**13.40**	**+/-**	**7.32**
Radiological Health	Control 1	2nd	**13.22**	**+/-**	**7.27**
Radiological Health	Control 1	3rd	**12.32**	**+/-**	**7.02**
Radiological Health	Control 1	4th	**14.34**	**+/-**	**7.57**
Radiological Health	Control 2	1st	**15.59**	**+/-**	**7.90**
Radiological Health	Control 2	2nd	**14.58**	**+/-**	**7.64**
Radiological Health	Control 2	3rd	**14.38**	**+/-**	**7.58**
Radiological Health	Control 2	4th	**14.97**	**+/-**	**7.74**

*D41 Missing at time of change out

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FISH

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Location Type of fish	Date Collected	Isotope	pCi/gram
North Anna 2nd Cooling Lagoon F-24	4/17/14	Ba-140	< 0.06
		Cs-134	< 0.01
		Cs-137	0.01 +/- 0.01
		Co-58	< 0.01
		Co-60	< 0.01
		I-131	< 0.02
		Fe-59	< 0.02
		Mn-54	< 0.01
		Ru-106	< 0.07
		Ag-110M	< 0.01
		Zn-65	< 0.02
		Nb-95	< 0.01
North Anna 2nd Cooling Lagoon F-24	10/17/14	Ba-140	<0.05
		Cs-134	<0.01
		Cs-137	0.006+/-0.001
		Co-58	<0.01
		Co-60	<0.01
		I-131	<0.02
		Fe-59	<0.01
		Mn-54	<0.01
		Ru-106	<0.06
		Ag-110M	<0.01
		Zn-65	<0.01
		Nb-95	<0.01

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FISH

January 1, 2014 through December 31, 2014

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Location Type of fish	Date Collected	Isotope	pCi/gram
Surry Discharge Canal* F-17	10/7/14	Ba-140	<0.03
		Cs-134	<0.01
		Cs-137	<0.01
		Co-58	<0.01
		Co-60	<0.01
		I-131	<0.01
		Fe-59	<0.01
		Mn-54	<0.01
		Ru-106	<0.03
		Ag-110M	<0.01
		Zn-65	<0.01
		Nb-95	<0.01

* Fish will be collected twice a year (biannually) at Surry beginning in 2015 (negotiated effective 10/22/14).

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SHELLFISH

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Location Type of fish	Date Collected	Isotope	pCi/gram
Surry Power Station R-17 (Clams and Oysters)	9/10/14	Ba-140	<0.03
		Cs-134	<0.01
		Cs-137	<0.01
		Co-58	<0.01
		Co-60	<0.01
		I-131	<0.07
		Fe-59	<0.02
		Mn-54	<0.01
		Ru-106	<0.06
		Ag-110M	<0.01
		Zn-65	<0.01
		Nb-95	<0.01

Note: Shellfish are collected annually at Surry, when available.

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Milk

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Louisa County - Lakeside Dairy M-29			
1st Quarter Date: 1/14/2014		2nd Quarter Date: 4/1/14	
Isotope	**Results - pCi/liter**	**Isotope**	**Results - pCi/liter**
Ba	<6	Ba	<6
Cs-134	<6	Cs-134	<6
Cs-137	<7	Cs-137	<6
K-40*	1.4+/-0.1	K-40*	1.6 +/-0.1
I-131	0.0+/-0.4	I-131	0.0+/-0.2
Sr-89	<4	Sr-89	<4.0
Sr-90	0.7+/-0.4	Sr-90	0.2+/-0.4
3rd Quarter Date: 7/9/2014		4th Quarter Date: 10/9/14	
Isotope	**Results - pCi/liter**	**Isotope**	**Results - pCi/liter**
Ba	<6	Ba	<6
Cs-134	<6	Cs-134	<6
Cs-137	<6	Cs-137	<7
K-40*	1.6 +/- 0.1	K-40*	1.7+/-0.1
I-131	0.0 +/- 0.2	I-131	0.0+/-0.4
Sr-89	<4.0	Sr-89	<4.0
Sr-90	2.6 +/- 0.6	Sr-90	0.8+/-0.5
Surry County - Epps Dairy M-66			
1st Quarter Date: 1/15/2014		2nd Quarter Date: 4/2/14	
Isotope	**Results - pCi/liter**	**Isotope**	**Results - pCi/liter**
Ba	<3	Ba	<6
Cs-134	<3	Cs-134	<6
Cs-137	<4	Cs-137	<6
K-40*	1.5+/-0.1	K-40*	1.6+/-1.0
I-131	0.0+/-0.3	I-131	0.0+/-0.3
Sr-89	<4	Sr-89	<4.0
Sr-90	0.8+/-0.5	Sr-90	0.4+/-0.4
3rd Quarter Date: 7/4/2014		4th Quarter Date: 10/1/14	
Isotope	**Results - pCi/liter**	**Isotope**	**Results - pCi/liter**
Ba	<4	Ba	<7
Cs-134	<3	Cs-134	<6
Cs-137	<3	Cs-137	<7
K-40*	1.7 +/- 0.1	K-40*	1.6+/-0.1
I-131	0.0 +/- 0.2	I-131	0.0+/-0.3
Sr-89	<4.0	Sr-89	<4.0
Sr-90	0.9 +/- 0.5	Sr-90	0.6+/-0.4

*K-40 data is reported in units of grams/liter.

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Gamma & Radiogas in Air

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Location: Surry Power Station

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
1	C-20	12/16/13	-	1/7/14	0.007	0.005	< 0	0.007
2	C-20	1/7/14	-	1/14/14	0.004	< 0	0.002	0.02
3	C-20	1/14/14	-	1/23/14	0.01	< 0	< 0	0.01
4	C-20	1/23/14	-	1/28/14	< 0	0.009	0.004	0.02
5	C-20	1/2814	-	2/3/14	0.002	0.01	0.01	0.02
6	C-20	2/3/14	-	2/10/14	0.006	0.009	0.005	0.02
7	C-20	2/10/14	-	2/18/14	0.03	0.005	<0	0.02
8	C-20	2/18/14	-	2/24/14	<0	0.02	0.006	0.02
9*	C-20		-					
10	C-20	2/24/14	-	3/11/14	0.03	0.001	0.001	0.009
11	C-20	3/11/14	-	3/18/14	<0	0.002	<0	0.02
12	C-20		-					
13**	C-20	3/25/14	-	4/1/14	<0	0.003	0.003	0.01
14	C-20	4/1/14	-	4/8/14	1.19E-2	6.92E-3	4.63E-3	2.12E-2
15	C-20	4/8/14	-	4/15/14	3.43E-2	1.12E-2	<0	2.25E-2
16*	C-20	4/15/14	-	4/22/14				
17	C-20	4/22/14	-	4/29/14	9.58E-3	6.21E-3	9.83E-4	8.89E-3
18	C-20	4/29/14	-	5/6/14	<0	<0	1.22E-2	1.89E-2
19	C-20	5/6/14	-	5/13/14	<0	<0	<0	1.82E-2
20	C-20	5/13/14	-	5/20/14	8.16E-3	<0	<0	2.39E-2
21	C-20	5/20/14	-	5/27/14	1.83E-2	3.64E-3	4.09E-4	1.57E-2
22	C-20	5/27/14	-	6/3/14	1.62E-3	2.11E-2	<0	3.21E-2
23	C-20	6/3/14	-	6/10/14	1.20E-2	2.67E-2	1.97E-3	1.82E-2
24	C-20	6/10/14	-	6/17/14	<0	1.78E-2	<0	2.19E-2
25	C-20	6/17/14	-	6/24/14	8.75E-5	3.93E-2	1.28E-2	2.97E-2
26	C-20	6/24/14	-	7/1/14	1.37E-3	3.64E-3	6.84E-3	1.99E-2
27	C-20	7/1/14	-	7/8/14	7.37E-3	2.86E-3	<0	2.28E-2
28	C-20	7/8/14	-	7/15/14	6.06E-2	3.48E-3	<0	1.93E-2
29	C-20	7/15/14	-	7/22/14	3.46E-2	9.91E-3	<0	2.22E-2
30	C-20	7/22/14	-	7/29/14	3.10E-3	2.08E-3	3.50E-3	2.30E-2
31	C-20	7/29/14	-	8/5/14	4.77E-3	1.32E-2	6.09E-3	2.60E-2
32	C-20	8/5/14	-	8/12/14	8.19E-3	<0	<0	2.03E-2
33	C-20	8/12/14	-	8/19/14	1.29E-2	8.12E-3	<0	1.88E-2
34	C-20	8/19/14	-	8/26/14	7.88E-2	1.68E-2	1.76E-3	2.13E-2

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Gamma & Radiogas in Air

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Location: Surry Power Station *continued*

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
35	C-20	8/26/14	-	9/2/14	7.22E-3	<0	1.12E-3	1.59E-2
36	C-20	9/2/14	-	9/9/14	6.20E-2	3.95E-2	<0	2.78E-2
37*	C-20	9/9/14	-	9/16/14				
38**	C-20	9/9/14	-	9/23/14	1.51E-2	<0	1.52E-3	9.59E-3
39	C-20	9/23/14	-	9/30/14	3.77E-2	1.46E-2	1.26E-3	2.21E-2
40	C-20	9/30/14	-	10/7/14	1.46E-2	1.04E-2	6.51E-3	2.12E-2
41*	C-20	10/7/14	-	10/14/14				
42**	C-20	10/14/14	-	10/21/14	1.48E-2	4.05E-3	<0	8.88E-3
43	C-20	10/21/14	-	10/28/14	1.16E-1	4.18E-3	1.24E-2	2.18E-2
44	C-20	10/28/14	-	11/4/14	<0	<0	1.07E-2	2.09E-2
45	C-20	11/4/14	-	11/11/14	1.36E-2	2.08E-2	8.51E-3	1.89E-2
46	C-20	11/11/14	-	11/18/14	<0	2.44E-2	<0	1.91E-2
47*	C-20	11/18/14	-	11/25/14				
48**	C-20	11/25/14	-	12/2/14	2.54E-3	<0	8.66E-4	9.37E-3
49[@]	C-20	12/2/14	-	12/9/14	2.78E-1	2.33E-2	1.54E-2	4.61E-2
50[#]	C-20	12/9/14	-	12/16/14				
51*	C-20	12/16/14	-	12/23/14				
52*	C-20	12/23/14	-	12/30/14				

*No samples collected due to staff training, conferences or holidays.

**Sampler ran for two weeks.

[@]Sampler was found to have malfunctioned upon arrival for sample change out, the sampler ran for approximately 2.8 days. Ending cfm was estimated based on past values.

[#]Sampler out of service.

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Gamma & Radiogas in Air

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Location: Pocahontas State Park

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
1	C-40	12/16/13	-	1/6/14	0.02	<0	0.002	0.006
2	C-40	1/6/14	-	1/13/14	0.09	<0	<0	0.02
3	C-40	1/13/14	-	1/21/14	<0	0.01	0.00006	0.02
4	C-40	1/21/14	-	1/27/14	0.02	0.02	0.01	0.02
5	C-40	1/27/14	-	2/3/14	<0	0.01	0.0009	0.02
6	C-40	2/3/14	-	2/10/14	0.007	0.001	<0	0.01
7	C-40	2/10/14	-	2/18/14	<0	0.002	<0	0.01
8	C-40	2/18/14	-	2/24/14	0.02	0.005	0.004	0.03
9*	C-40		-					
10	C-40	2/24/14	-	3/11/14	<0	0.02	<0	0.01
11	C-40	3/11/14	-	3/18/14	0.07	0.01	<0	0.02
12*	C-40		-					
13**	C-40	3/18/14	-	4/1/14	0.002	0.004	<0	0.008
14	C-40	4/1/14	-	4/8/14	5.53E-2	5.03E-3	<0	2.67E-2
15	C-40	4/8/14	-	4/15/14	3.73E-3	4.30E-3	3.70E-3	2.53E-2
16	C-40	4/15/14	-	4/22/14				
17	C-40	4/22/14	-	4/29/14	1.07E-3	<0	<0	1.01E-2
18	C-40	4/29/14	-	5/6/14	9.97E-3	3.27E-2	1.04E-2	2.19E-2
19	C-40	5/6/14	-	5/13/14	6.13E-2	<0	6.61E-3	1.98E-2
20	C-40	5/13/14	-	5/20/14	9.23E-2	5.52E-3	<0	2.31E-2
21	C-40	5/20/14	-	5/27/14	3.63E-3	1.77E-2	<0	1.95E-2
22	C-40	5/27/14	-	6/3/14	9.23E-3	1.61E-2	6.56E-3	2.42E-2
23	C-40	6/3/14	-	6/10/14	1.47E-2	1.47E-2	1.24E-2	2.32E-2
24	C-40	6/10/14	-	6/17/14	2.38E-2	<0	1.47E-3	3.28E-2
25	C-40	6/17/14	-	6/24/14	1.06E-2	2.34E-3	2.94E-3	2.18E-2
26	C-40	6/24/14	-	7/1/14	1.03E-2	6.19E-3	2.36E-3	2.23E-2
27	C-40	7/1/14	-	7/8/14	1.04E-2	2.01E-2	6.84E-3	2.46E-2
28	C-40	7/8/14	-	7/15/14	7.41E-2	1.90E-2	1.08E-2	1.84E-2
29	C-40	7/15/14	-	7/22/14	2.62E-2	5.70E-3	1.56E-2	1.72E-2
30	C-40	7/22/14	-	7/29/14	3.10E-2	2.10E-2	1.14E-3	2.08E-2
31	C-40	7/29/14	-	8/5/14	<0	<0	<0	2.32E-2
32	C-40	8/5/14	-	8/12/14	<0	2.02E-2	<0	2.06E-2
33	C-40	8/12/14	-	8/19/14	6.31E-3	<0	1.48E-2	2.67E-2
34	C-40	8/19/14	-	8/26/14	<0	9.44E-3	7.64E-3	2.13E-2

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Gamma & Radiogas in Air

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Location: Pocahontas State Park *continued*

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
35	C-40	8/26/14	-	9/2/14	<0	3.83E-3	5.91E-3	2.20E-2
36	C-40	9/2/14	-	9/9/14	<0	1.11E-2	<0	3.28E-2
37*@	C-40	9/9/14	-	9/16/14				
38**	C-40	9/9/14	-	9/23/14	<0	7.59E-3	<0	1.98E-2
39	C-40	9/23/14	-	9/30/14	3.68E-2	1.57E-2	5.80E-4	3.19E-2
40	C-40	9/30/14	-	10/7/14	5.26E-2	2.49E-2	4.01E-3	2.06E-2
41*	C-40	10/7/14	-	10/14/14				
42**	C-40	10/14/14	-	10/21/14	2.02E-2	<0	2.93E-3	1.31E-2
43	C-40	10/21/14	-	10/28/14	5.49E-2	<0	<0	1.92E-2
44	C-40	10/28/14	-	11/4/14	3.70E-2	4.62E-3	8.70E-3	1.55E-2
45	C-40	11/4/14	-	11/11/14	6.97E-2	<0	6.78E-4	2.79E-2
46	C-40	11/11/14	-	11/18/14	3.56E-2	1.28E-3	<0	1.86E-2
47*	C-40	11/18/14	-	11/25/14				
48#**	C-40	11/25/14	-	12/2/14				
49	C-40	12/2/14	-	12/9/14	7.01E-3	1.51E-2	3.97E-3	2.19E-2
50	C-40	12/9/14	-	12/16/14	1.00E-2	<0	1.08E-2	1.77E-2
51*	C-40	12/16/14	-	12/23/14				
52*	C-40	12/23/14	-	12/30/14				

*No samples analyzed due to staff training, conferences, or holidays.

@On 9/15/14, the air sampler at this location was discovered to have malfunctioned after running for 82 hours. The approximate date/time of malfunction was 9/8/14 @ 0900. The sample run time is 6 days, which accounts for the dates listed.

#Managed hunt in progress, sample not collected.

**Sampler ran for two weeks.

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Gamma & Radiogas in Air

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Location: Jamestown State Park – Historical Site

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
1	C-44	12/16/13	-	1/7/14	0.0005	0.005	0.001	0.006
2	C-44	1/7/14	-	1/14/14	<0	<0	0.01	0.02
3	C-44	1/14/14	-	1/23/14	0.04	<0	0.007	0.01
4	C-44	1/23/14	-	1/28/14	0.01	0.02	0.003	0.02
5	C-44	1/2814	-	2/3/14	0.02	0.01	<0	0.02
6	C-44	2/3/14	-	2/10/14	0.01	0.005	0.006	0.02
7	C-44	2/10/14	-	2/18/14	<0	0.002	<0	0.01
8	C-44	2/18/14	-	2/24/14	0.05	0.009	<0	0.02
9*	C-44		-					
10	C-44	2/24/14	-	3/11/14	0.03	<0	<0	0.007
11	C-44	3/11/14	-	3/18/14	<0	0.005	<0	0.02
12*	C-44		-					
13**	C-44	3/18/14	-	4/1/14	0.02	0.0008	<0	0.01
14	C-44	4/1/14	-	4/8/14	4.61E-3	5.25E-3	1.56E-2	2.08E-2
15	C-44	4/8/14	-	4/15/14	7.41E-2	1.80E-2	<0	2.19E-2
16*	C-44	4/15/14	-	4/22/14				
17	C-44	4/22/14	-	4/29/14	1.48E-2	6.64E-3	3.20E-3	8.97E-3
18	C-44	4/29/14	-	5/6/14	5.45E-3	1.34E-2	2.61E-3	1.92E-2
19	C-44	5/6/14	-	5/13/14	<0	9.63E-3	<0	1.91E-2
20	C-44	5/13/14	-	5/20/14	<0	2.03E-3	3.44E-3	2.16E-2
21	C-44	5/20/14	-	5/27/14	6.21E-3	1.12E-2	2.71E-3	1.48E-2
22	C-44	5/27/14	-	6/3/14	3.20E-4	2.55E-2	2.38E-3	2.63E-2
23	C-44	6/3/14	-	6/10/14	4.98E-2	2.12E-2	<0	1.63E-2
24	C-44	6/10/14	-	6/17/14	<0	6.29E-3	1.48E-2	2.19E-2
25	C-44	6/17/14	-	6/24/14	1.46E-2	7.30E-3	1.99E-3	2.46E-2
26	C-44	6/24/14	-	7/1/14	2.38E-3	1.34E-2	7.47E-3	1.96E-2
27	C-44	7/1/14	-	7/8/14	3.18E-2	1.22E-3	9.35E-3	1.82E-2
28	C-44	7/8/14	-	7/15/14	1.62E-2	2.29E-2	<0	1.67E-2
29	C-44	7/15/14	-	7/22/14	<0	<0	<0	1.86E-2
30	C-44	7/22/14	-	7/29/14	5.30E-2	<0	<0	1.83E-2
31	C-44	7/29/14	-	8/5/14	1.29E-2	1.52E-2	<0	2.63E-2
32	C-44	8/5/14	-	8/12/14	1.04E-2	3.30E-3	<0	1.70E-2
33	C-44	8/12/14	-	8/19/14	1.15E-2	1.01E-2	1.00E-2	1.87E-2
34	C-44	8/19/14	-	8/26/14	<0	<0	1.14E-2	1.96E-2

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Gamma & Radiogas in Air

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Location: Jamestown State Park – Historical Site *continued*

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
35	C-44	8/26/14	-	9/2/14	6.34E-3	1.06E-3	1.10E-2	1.45E-2
36	C-44	9/2/14	-	9/9/14	2.82E-3	1.31E-2	<0	2.45E-2
37*	C-44	9/9/14	-	9/16/14				
38**	C-44	9/9/14	-	9/23/14	<0	9.40E-3	<0	9.03E-3
39	C-44	9/23/14	-	9/30/14	5.14E-2	6.31E-3	<0	1.86E-2
40	C-44	9/30/14	-	10/7/14	1.33E-2	1.83E-2	<0	1.76E-2
41*	C-44	10/7/14	-	10/14/14				
42**	C-44	10/14/14	-	10/21/14	<0	7.99E-3	<0	9.08E-3
43	C-44	10/21/14	-	10/28/14	4.10E-2	<0	<0	2.33E-2
44	C-44	10/28/14	-	11/4/14	8.84E-3	1.67E-2	1.94E-2	2.46E-2
45	C-44	11/4/14	-	11/11/14	<0	<0	1.33E-2	1.94E-2
46	C-44	11/11/14	-	11/18/14	1.26E-2	3.26E-3	4.04E-3	2.01E-2
47*	C-44	11/18/14	-	11/25/14				
48**	C-44	11/25/14	-	12/2/14	2.54E-2	4.50E	<0	8.61E-3
49	C-44	12/2/14	-	12/9/14	3.33E-2	6.35E-3	3.11E-3	2.03E-2
50	C-44	12/9/14	-	12/16/14	<0	<0	<0	1.69E-2
51*	C-44	12/16/14	-	12/23/14				
52*	C-44	12/23/14	-	12/30/14				

*No samples analyzed due to staff training, conferences, or holidays.

**Sampler ran for two weeks.

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Gamma & Radiogas in Air

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Location: Bumpass Volunteer Fire Department

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
1	C-86	12/17/13	-	1/6/14	0.03	0.0006	<0	0.005
2	C-86	1/6/14	-	1/13/14	0.0004	0.004	<0	0.02
3	C-86	1/13/14	-	1/21/14	0.007	0.004	0.003	0.02
4	C-86	1/21/14	-	1/27/14	0.01	0.02	<0	0.02
5	C-86	1/27/14	-	2/4/14	0.02	<0	<0	0.01
6	C-86	2/4/14	-	2/11/14	0.01	0.02	<0	0.02
7	C-86	2/11/14	-	2/19/14	0.004	0.01	<0	0.01
8	C-86	2/19/14	-	2/25/14	0.009	0.02	<0	0.02
9*	C-86		-					
10	C-86	2/25/14	-	3/11/14	<0	0.004	<0	0.009
11	C-86	3/11/14	-	3/18/14	<0	0.01	<0	0.01
12*	C-86		-					
13**	C-86	3/18/14	-	4/1/14	<0	0.0003	<0	0.008
14	C-86	4/1/14	-	4/8/14	5.53E-2	5.03E-3	<0	2.67E-2
15	C-86	4/8/14	-	4/15/14	3.85E-2	<0	<0	1.93E-2
16*	C-86	4/15/14	-	4/22/14	4.15E-3	9.13E-3	<0	2.00E-2
17	C-86	4/22/14	-	4/29/14				
18	C-86	4/29/14	-	5/6/14	2.59E-3	2.12E-3	<0	9.99E-3
19	C-86	5/6/14	-	5/13/14	<0	7.48E-3	<0	1.76E-2
20	C-86	5/13/14	-	5/20/14	<0	<0	<0	2.09E-2
21	C-86	5/20/14	-	5/27/14	2.86E-2	1.82E-2	<0	1.76E-2
22	C-86	5/27/14	-	6/3/14	3.24E-3	8.79E-3	<0	2.24E-2
23	C-86	6/3/14	-	6/10/14	9.01E-5	3.46E-3	<0	2.11E-2
24	C-86	6/10/14	-	6/17/14	1.34E-3	4.16E-3	5.47E-5	2.22E-2
25	C-86	6/17/14	-	6/24/14	<0	9.45E-3	<0	1.85E-2
26	C-86	6/24/14	-	7/1/14	8.12E-2	1.31E-2	3.72E-3	1.91E-2
27	C-86	7/1/14	-	7/8/14	4.86E-3	7.61E-2	3.12E-3	2.10E-2
28	C-86	7/8/14	-	7/15/14	1.50E-2	<0	<0	1.90E-2
29	C-86	7/15/14	-	7/22/14	1.72E-2	<0	<0	2.15E-2
30	C-86	7/22/14	-	7/29/14	<0	3.14E-2	<0	2.01E-2
31	C-86	7/29/14	-	8/5/14	2.24E-3	5.07E-3	4.75E-4	2.44E-2
32	C-86	8/5/14	-	8/12/14	7.47E-3	<0	6.86E-3	2.16E-2
33	C-86	8/12/14	-	8/19/14	8.21E-2	2.02E-2	<0	2.35E-2
34	C-86	8/19/14	-	8/26/14	7.18E-2	1.15E-2	<0	1.89E-2

Virginia Department of Health

Gamma & Radiogas in Air

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Location: Bumpass Volunteer Fire Department - *continued*

Week #	Station	Date Start		Ended	Cs-134 pCi/meter^3	Cs-137 pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
35	C-86	8/26/14	-	9/2/14	3.28E-3	<0	<0	1.80E-2
36	C-86	9/2/14	-	9/9/14	1.12E-2	1.46E-2	1.28E-2	2.29E-2
37*	C-86	9/9/14	-	9/16/14				
38**	C-86	9/9/14	-	9/23/14	5.88E-3	1.03E-2	<0	1.08E-2
39	C-86	9/23/14	-	9/30/14	3.99E-3	<0	<0	2.33E-2
40	C-86	9/30/14	-	10/7/14	4.12E-2	1.99E-2	<0	2.24E-2
41*	C-86	10/7/14	-	10/14/14				
42**	C-86	10/14/14	-	10/21/14	9.46E-3	2.04E-3	6.30E-3	1.10E-2
43	C-86	10/21/14	-	10/28/14	4.74E-4	<0	<0	2.19E-2
44	C-86	10/28/14	-	11/4/14	4.58E-2	3.93E-3	<0	2.02E-2
45	C-86	11/4/14	-	11/11/14	6.75E-3	<0	2.02E-2	2.28E-2
46	C-86	11/11/14	-	11/18/14	1.66E-2	<0	<0	2.06E-2
47*	C-86	11/18/14	-	11/25/14				
48**	C-86	11/25/14	-	12/2/14	1.03E-2	<0	<0	9.38E-2
49	C-86	12/2/14	-	12/9/14	5.26E-3	<0	7.13E-3	2.36E-2
50	C-86	12/9/14	-	12/16/14	2.24E-3	1.88E-2	7.78E-3	2.29E-2
51*	C-86	12/16/14	-	12/23/14				
52*	C-86	12/23/14	-	12/30/14				

*No samples collected due to staff training, conferences, or holidays.

**Sampler ran for two weeks.

Virginia Department of Health

Gamma & Radiogas in Air

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location: Louisa County / Route 700

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
1*	C-88		-					
2	C-88	1/6/14	-	1/13/14	<0	0.007	<0	0.02
3	C-88	1/13/14	-	1/21/14	0.02	<0	0.007	0.02
4	C-88	1/21/14	-	1/27/14	0.06	0.006	0.005	0.02
5	C-88	1/27/14	-	2/4/14	0.01	0.02	<0	0.02
6	C-88	2/4/14	-	2/11/14	0.03	0.008	<0	0.02
7	C-88	2/11/14	-	2/19/14	<0	0.01	<0	0.02
8	C-88	2/19/14	-	2/25/14	0.03	0.005	0.006	0.02
9**	C-88		-					
10	C-88	2/25/14	-	3/11/14	<0	0.009	0.0009	0.009
11	C-88	3/11/14	-	3/18/14	0.01	<0	<0	0.02
12**	C-88		-					
13***	C-88	3/18/14	-	4/1/14	<0	0.0009	0.007	0.009
14	C-88	4/1/14	-	4/8/14	2.35E-2	<0	<0	1.99E-2
15	C-88	4/8/14	-	4/15/14	<0	<0	<0	2.60E-2
16**	C-88	4/15/14	-	4/22/14				
17	C-88	4/22/14	-	4/29/14	2.90E-3	4.82E-3	5.36E-3	9.44E-3
18	C-88	4/29/14	-	5/6/14	4.41E-2	<0	<0	1.85E-2
19	C-88	5/6/14	-	5/13/14	3.77E-2	3.83E-3	<0	1.75E-2
20	C-88	5/13/14	-	5/20/14	6.80E-2	1.45E-2	<0	1.98E-2
21	C-88	5/20/14	-	5/27/14	2.83E-2	9.71E-3	<0	1.55E-2
22	C-88	5/27/14	-	6/3/14	5.50E-3	8.88E-4	2.42E-2	2.31E-2
23	C-88	6/3/14	-	6/10/14	1.10E-2	1.63E-2	1.41E-3	1.87E-2
24	C-88	6/10/14	-	6/17/14	3.24E-2	1.80E-2	5.06E-3	1.88E-2
25	C-88	6/17/14	-	6/24/14	8.36E-3	1.08E-2	<0	1.75E-2
26	C-88	6/24/14	-	7/1/14	5.59E-2	1.29E-2	8.58E-4	1.76E-2
27	C-88	7/1/14	-	7/8/14	<0	1.96E-2	<0	2.03E-2
28	C-88	7/8/14	-	7/15/14	<0	<0	<0	1.70E-2
29	C-88	7/15/14	-	7/22/14	1.54E-2	4.05E-3	1.28E-3	1.88E-2
30	C-88	7/22/14	-	7/29/14	6.90E-2	9.73E-3	1.33E-2	1.96E-2
31	C-88	7/29/14	-	8/5/14	2.19E-3	2.00E-2	9.55E-3	2.21E-2
32	C-88	8/5/14	-	8/12/14	2.20E-2	1.06E-3	2.79E-3	1.84E-2
33	C-88	8/12/14	-	8/19/14	5.10E-3	9.34E-4	9.68E-3	1.83E-2
34	C-88	8/19/14	-	8/26/14	3.73E-3	2.11E-2	<0	1.89E-2

Virginia Department of Health

Gamma & Radiogas in Air

January 1, 2014 through December 31, 2014

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Location: Louisa County / Route 700 *continued*

Week #	Station	Date Start		Ended	Cs-134 Activity pCi/meter^3	Cs-137 Activity pCi/meter^3	I-131 Activity pCi/meter^3	Nuclide I-131 MDA pCi/meter^3
35	C-88	8/26/14	-	9/2/14	1.82E-2	6.46E-3	<0	1.62E-2
36	C-88	9/2/14	-	9/9/14	<0	5.02E-4	9.02E-3	2.23E-2
37**	C-88	9/9/14	-	9/16/14				
38***	C-88	9/9/14	-	9/23/14	9.83E-3	3.40E-3	8.48E-4	9.01E-3
39	C-88	9/23/14	-	9/30/14	3.48E-2	<0	<0	1.83E-2
40	C-88	9/30/14	-	10/7/14	3.20E-3	6.02E-3	<0	1.90E-2
41**	C-88	10/7/14	-	10/14/14				
42***	C-88	10/14/14	-	10/21/14	7.26E-3	<0	<0	9.48E-3
43	C-88	10/21/14	-	10/28/14	8.02E-2	<0	<0	1.91E-2
44	C-88	10/28/14	-	11/4/14	1.51E-3	7.84E-3	<0	2.10E-2
45	C-88	11/4/14	-	11/11/14	8.98E-2	1.55E-2	<0	2.09E-2
46	C-88	11/11/14	-	11/18/14	9.07E-3	1.56E-2	6.25E-3	1.99E-2
47**	C-88	11/18/14	-	11/25/14				
48***	C-88	11/25/14	-	12/2/14	1.56E-3	<0	<0	8.99E-3
49	C-88	12/2/14	-	12/9/14	3.59E-2	1.57E-2	<0	1.93E-2
50	C-88	12/9/14	-	12/16/14	2.12E-2	<0	7.86E-3	2.04E-2
51**	C-88	12/16/14	-	12/23/14				
52**	C-88	12/23/14	-	12/30/14				

*A-88 was unable to be analyzed due to power failure during operation.

**No samples were collected due to staff training, conferences or holidays.

***Sampler ran for two weeks.

Virginia Department of Health

Silt

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

James River – Pier 1
Newport News Shipyard S-15A

Quarter	Date collected	Gamma Activity – pCi/gram (wet)				Gross Beta pCi/gram (DRY)
		Cs-134	Cs-137	Co-58	C0-60	
1st	3/21/14	<0.01	0.03+/-0.01	<0.01	<0.01	26.1 +/- 4.7
2nd	6/19/14	<0.01	0.01+/-0.01	<0.01	<0.01	12.9 +/-4.0
3rd	9/18/14	<0.01	<0.01	<0.01	<0.01	8.4 +/- 3.6
4th	11/4/14	<0.01	0.02+/-0.01	<0.01	<0.01	16.9+/-4.2

James River – Shipway 11
Newport News Shipyard S-16

Quarter	Date collected	Gamma Activity – pCi/gram (wet)				Gross Beta pCi/gram (DRY)
		Cs-134	Cs-137	Co-58	C0-60	
1st	3/21/14	<0.01	0.03+/-0.01	<0.01	<0.01	21.2 +/- 4.3
2nd	6/19/14	<0.01	0.02+/-0.01	<0.01	<0.01	30.4 +/- 4.9
3rd	9/18/14	<0.01	0.03 +/-0.01	<0.01	<0.01	26.9 +/- 4.8
4th	11/4/14	<0.01	0.02+/-0.01	<0.01	<0.01	17.1+/-4.4

Virginia Department of Health

Silt

January 1, 2014 through December 31, 2014

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Elizabeth River – Dry Dock #8
Norfolk Naval Shipyard S-18

Quarter	Date collected	Gamma Activity – pCi/gram (wet)				Gross Beta pCi/gram (DRY)	Gross Alpha pCi/gram (DRY)
		Cs-134	Cs-137	Co-58	C0-60		
1st	3/27/14	<0.01	0.02+/- 0.01	<0.01	<0.01	25.9 +/- 4.7	25.9 +/- 4.7
2nd	6/19/14	<0.01	0.02+/- 0.01	<0.01	<0.01	31.9 +/-4.8	19.6 +/-9.4
3rd	9/18/14	<0.01	0.02+/- 0.01	<0.01	<0.01	28.7+/-4.6	14.3+/-6.7
4th	11/4/14	<0.01	0.02+/- 0.01	<0.01	<0.01	28.7+/-5.1	15.2+/-8.3

Elizabeth River – Dry Dock #4
Norfolk Naval Shipyard S-19

Quarter	Date collected	Gamma Activity – pCi/gram (wet)				Gross Beta pCi/gram (DRY)	Gross Alpha pCi/gram (DRY)
		Cs-134	Cs-137	Co-58	C0-60		
1st	3/27/14	<0.01	0.02+/- 0.01	<0.01	<0.01	28.1 +/- 4.6	11.9 +/- 5.6
2nd	6/19/14	<0.01	0.01+/- 0.01	<0.01	<0.01	29.1 +/- 4.9	20.9 +/-8.5
3rd	9/18/14	<0.01	0.02+/- 0.01	<0.01	<0.01	29.8+/-4.8	15.8+/-7.0
4th	11/4/14	<0.01	0.02+/- 0.01	<0.01	<0.01	29.1+/-5.3	16.6+/-9.0

Elizabeth River – Wet slip #1
Norfolk Naval Shipyard S-20

Quarter	Date collected	Gamma Activity – pCi/gram (wet)				Gross Beta pCi/gram (DRY)	Gross Alpha pCi/gram (DRY)
		Cs-134	Cs-137	Co-58	C0-60		
1st	3/27/14	<0.01	0.03+/- 0.01	<0.01	<0.01	25.4 +/- 4.6	14.9 +/- 6.4
2nd	6/19/14	<0.01	0.02+/- 0.1	<0.01	<0.01	30.7+/-4.9	17.9+/-7.6
3rd	9/18/14	<0.01	0.03+/- 0.01	<0.01	<0.01	21.8+/-4.5	9.3+/-6.2
4th	11/4/14	<0.01	0.03+/- 0.01	<0.01	<0.01	30.8+/-5.4	9.9+/-7.9

Virginia Department of Health

Silt

January 1, 2014 through December 31, 2014

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James River – Surry Power Station
Discharge Canal S-17

Quarter	Date collected	Gamma Activity – pCi/gram (wet)				Gross Beta pCi/gram (DRY)
		Cs-134	Cs-137	Co-58	C0-60	
1st	NA					
2nd	NA					
3rd	9/10/14	<0.02	0.01 +/- 0.01	<0.02	<0.01	30.1 +/- 4.9
4th	NA					

North Anna Power
Waste Treatment S-24

Quarter	Date collected	Gamma Activity – pCi/gram (wet)				Gross Beta pCi/gram (DRY)
		Cs-134	Cs-137	Co-58	C0-60	
1st	NA					
2nd	4/15/14	<0.01	0.01+/- 0.01	<0.01	<0.01	1.2+/-3.3
3rd	NA					
4th	10/15/14	<0.01	0.01 +/- 0.01	<0.01	<0.01	1.6 +/- 3.2

NA-Sample not collected.

Virginia Department of Health

SURFACE WATER

January 1, 2014 through December 31, 2014

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James River – Pier 1
Newport News Shipyard W-15A

Qtr	Date collected	Gamma Activity – pCi/liter						Gross Beta
		Ba-140	Cs-137	I-131	Mn-54	Zn-65	Zr95/Nb95	
1st	3/21/14	<21	<6	<51	<6	<13	<13	194.8 +/- 43.9
2nd	6/19/14	<7	<6	<9	<5	<12	<10	155.3+/-41.8
3rd	9/18/14	<5	<3	<5	<3	<7	<6	232.0 +/- 62.0
4th	11/4/14	<12	<7	<20	<6	<13	<12	187.1+/-74.8

James River – Shipway #11
Newport News Shipyard W-16

Qtr	Date collected	Gamma Activity – pCi/liter						Gross Beta
		Ba-140	Cs-137	I-131	Mn-54	Zn-65	Zr95/Nb95	
1st	3/21/14	<10	<3	<16	<3	<7	<7	194.3 +/- 45.7
2nd	6/19/14	<5	<4	<4	<3	<7	<5	124.4+/-40.6
3rd	9/18/14	<8	<6	<12	<6	<12	<11	13.7 +/-54.9
4th	11/4/14	<8	<3	<6	<3	<8	<6	270.5+/-82.8

N/A = not collected.

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SURFACE WATER

January 1, 2014 through December 31, 2014

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Elizabeth River – Dry Dock #4
Norfolk Naval Shipyard W-37

Qtr	Date collected	Gamma Activity – pCi/liter						Gross Beta	Gross Alpha
		Ba-140	Cs-137	I-131	Mn-54	Zn-65	Zr95/Nb95		
1st	3/27/14	<8	<3	<11	<3	<8	<7	156.4 +/- 41.0	0.0 +/- 50.3
2nd	6/19/14	<8	<6	<10	<6	<12	<10	170.6+/- 42.2	0.0+/-35.4
3rd	9/18/14	<7	<4	<9	<6	<12	<11	165.3 +/- 42.8	10.0 +/- 51.7
4th	11/4/14	<12	<7	<22	<6	<13	<12	211.5+/- 78.5	0.0+/- 115.3

Elizabeth River – Wet Slip #1
Norfolk Naval Shipyard W-38

Qtr	Date collected	Gamma Activity – pCi/liter						Gross Beta	Gross Alpha
		Ba-140	Cs-137	I-131	Mn-54	Zn-65	Zr95/Nb95		
1st	3/27/14	<11	4.2+/- 0.8	<18	<5	<12	<11	165.0 +/- 41.9	19.7+/- 50.6
2nd	6/19/14	<8	<4	<12	<5	<12	<10	194.5+/- 43.8	0.0+/-28.3
3rd	9/18/14	<8	5.5 +/- .9	<11	<6	<12	<11	146.5 +/- 42.1	19.0 +/- 66.1
4th	11/4/14	<8	<3	<9	<3	<8	<6	231.8+/- 80.6	0.0+/-77.3

Elizabeth River – Dry Dock #8
Norfolk Naval Shipyard W-39

Qtr	Date collected	Gamma Activity – pCi/liter						Gross Beta	Gross Alpha
		Ba-140	Cs-137	I-131	Mn-54	Zn-65	Zr95/Nb95		
1st	3/27/14	<7	4.1+/- 0.6	<7	<3	<7	<6	159.4 +/- 42.9	14.2 +/- 55.4
2nd	6/19/14	<6	<3	<5	<3	<7	<6	178.2+/- 43.8	0.0+/-46.7
3rd	9/18/14	<5	<3	<4	<3	<8	<6	159.2 +/- 40.7	18.7 +/- 47.2
4th	11/4/14	<9	<3	<10	<3	<8	<6	168.0+/- 71.0	0.0+/-73.9

N/A = not collected **GB = GROSS BETA (pCi/L) GA= GROSS ALPHA (pCi/L)**

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SURFACE WATER

January 1, 2014 through December 31, 2014

Surry Power Station – Discharge Canal - W-19
Gamma Activity – pCi/liter

Date	Ba-140	Cs-134	Cs-137	Co-58	Co-60	I-131	Mn-54	Zn-65	Zr/Nb 95	Gross Beta	+/-	H3 MDA	H3 Activity
1/7/14D	<9	<3	<3	<3	<3	<10	<3	<8	<6	14.7	16.8		
1/7/14	<37	<9	<12	<12	<11	<11	<11	<24	<19				375+/-43
1/14/14	<34	<10	<11	<11	<12	<10	<19	<27	<18				1051+/-68
1/23/14	<38	<9	<11	<11	<10	<10	<11	<25	<20				450+/-43
1/28/14	<36	<10	<12	<11	<12	<10	<11	<24	<17			254	
2/3/14	<31	<10	<12	<12	<13	<10	<10	<24	<19				751+/-60
2/10/14	<36	<10	<13	<10	<14	<10	<11	<25	<20			244	
2/18/14	<38	<10	<12	<10	<11	<11	<10	<25	<20			255	
2/24/14	<33	<10	<13	<12	<12	<9	<10	<25	<20			245	
3/11/14	<36	<10	<13	<12	<12	<10	<12	<24	<20				1201+/-74
3/18/14	<44	<10	<13	<11	<11	<12	<12	<21	<23			246	
3/31/14	<36	<10	<13	<11	<11	<9	<11	<23	<21				1351+/-75
4/7/14	<39	<10	<11	<11	<12	<10	<11	<21	<21				901 +/-68
4/14/14	<40	<9	<12	<11	<10	<11	<11	<23	<19				751 +/-61
4/28/14	<33	<10	<12	<11	<12	<9	<11	<27	<20				450 +/-43
5/5/14	<38	<10	<12	<11	<12	<9	<11	<27	<20				150 +/-30
5/12/14	<34	<10	<12	<11	<11	<9	<12	<26	<20			246	
5/19/14	<41	<9	<12	<11	<11	<11	<12	<25	<20				2027 +/- 90
5/27/14	<36	<9	<12	<10	<12	<9	<11	<21	<18				526 +/-52
5/28/14D	<6	<6	<6	<5	<5	<8	<5	<12	<10	21.6	31.0		
6/1/14	<33	<9	<10	<11	<13	<10	<11	<25	<21				225 +/-30
6/8/14	<36	<10	<12	<10	<13	<9	<9	<26	<21				1802 +/- 86
6/16/14	<37	<9	<12	<11	<12	<9	<12	<22	<20			233	
6/23/14	<31	<9	<12	<11	<13	<10	<11	<24	<18				150 +/-30
6/29/14	<35	<9	<13	<11	<12	<10	<11	<28	<21			245	
7/7/14	<34	<9	<13	<10	<11	<10	<12	<24	<19			246	
7/13/14	<36	<9	<11	<10	<11	<9	<11	<23	<19				75 +/-30
7/20/14	<33	<8	<11	<11	<12	<10	<12	<26	<18				375 +/-

													43
7/28/14	<38	<10	<12	<11	<12	<9	<11	<26	<21				300 +/- 30
8/4/14	<37	<8	<11	<10	<13	<12	<10	<24	<20				150 +/- 30
8/11/14	<35	<9	<12	<12	<13	<9	<11	<25	<21			235	
8/18/14	<33	<10	<12	<11	<12	<10	<11	<26	<21				150 +/- 30
8/24/14	<37	<9	<12	<12	<12	<10	<10	<23	<19			234	
9/2/14	<32	<9	<12	<11	<12	<9	<11	<24	<21				225 +/- 30
9/8/14	<39	<9	<11	<10	<12	<10	<11	<24	<19			245	
9/15/14*													
9/21/14	<35	<10	<12	<10	<11	<9	<10	<25	<22			245	
9/28/14D	<6	<3	<3.8+/- 0.5	<3	<3	<7	<3	<7	<6	108.8	37.4		
9/29/14	<37	<10	<11	<12	<12	<10	<11	<25	<19				450 +/- 43
10/5/14	<33	<8	<12	<11	<12	<11	<11	<22	<20				450 +/- 43
10/20/14	<38	<10	<12	<11	<13	<9	<13	<25	<19				1652 +/- 86
10/20/14D	<10	<6	4.5 +/- 0.9	<7	<6	<17	<6	<13	<12	110.2	37.6		
10/26/14	<34	<9	<12	<11	<11	<10	<10	<23	<18				150 +/- 30
11/3/14	<38	<10	<12	<10	<11	<10	<11	<26	<20			244	
11/10/14	<37	<9	<12	<11	<12	<10	<12	<28	<19				300 +/- 30
11/16/14	<38	<10	<12	<12	<11	<9	<11	<26	<21				300 +/- 28
12/1/14	<32	<9	<12	<12	<12	<9	<10	<25	<20				150 +/- 30
12/8/14	<37	<9	<12	<12	<11	<9	<9	<22	<17				601 +/- 53
12/15/14	<37	<9	<12	<11	<12	<10	<12	<24	<17				150 +/- 30

*Staff participated in Virginia Hazmat conference, no samples were collected.

D = Sample analyzed by DCLS

Virginia Department of Health

SURFACE WATER

January 1, 2014 through December 31, 2014

North Anna River - W-27 / baseline
Gamma Activity – pCi/liter

Date	Ba-140	Cs-134	Cs-137	Co-58	Co-60	I-131	Mn-54	Zn-65	Zr/Nb 95	Gross Beta	+/-	H3 MDA	H3 Activity
1/6/14D	<12	<3	<4	<6	<6	<24	<6	<12	<11	4.1	0.9		
1/6/14	<37	<10	<12	<12	<11	<10	<10	<20	<19			255	
1/13/14	<35	<10	<13	<11	<13	<12	<12	<24	<22			254	
1/21/14	<36	<10	<12	<12	<13	<9	<11	<24	<20			254	
1/27/14	<33	<10	<11	<11	<13	<9	<11	<24	<20			254	
2/4/14	<35	<9	<11	<11	<12	<10	<10	<27	<19				676+/-52
2/11/14	<37	<10	<11	<11	<11	<10	<12	<23	<18			244	
2/19/14	<38	<11	<12	<12	<14	<10	<12	<26	<19			255	
2/25/14	<36	<9	<13	<11	<12	<9	<10	<22	<21				1802+/-91
3/10/14	<38	<9	<13	<11	<12	<10	<10	<24	<19			246	
3/17/14	<36	<10	<12	<11	<12	<9	<12	<28	<20			246	
3/31/14	<36	<11	<12	<12	<11	<9	<11	<27	<18			246	
4/7/14	<34	<10	<13	<12	<13	<9	<12	<26	<20			246	
4/14/14	<46	<9	<11	<11	<11	<12	<11	<28	<20			246	
4/28/14	<37	<9	<11	<10	<11	<10	<12	<21	<19			246	
5/5/14	<39	<10	<12	<11	<11	<10	<11	<25	<16			246	
5/12/14	<36	<9	<12	<11	<13	<9	<11	<24	<20			246	
5/19/14	<36	<9	<11	<11	<10	<9	<11	<26	<20				601 +/-52
5/27/14D	<4	<3	<3	<3	<3	<4	<3	<7	<5	3.5	0.9		
5/27/14	<35	<9	<11	<11	<12	<9	<11	<25	<21				375 +/-43
6/1/14	<30	<10	<12	<10	<11	<9	<10	<26	<18				375 +/-43
6/8/14	<32	<9	<12	<10	<10	<9	<12	<24	<22				676 +/-53
6/16/14	<37	<10	<12	<11	<13	<9	<11	<27	<20				601 +/-52
6/23/14	<36	<10	<12	<11	<11	<10	<9	<21	<18				976 +/-68
6/29/14	<38	<9	<11	<11	<10	<9	<10	<25	<17				901 +/-61
7/7/14	<37	<9	<14	<11	<11	<9	<12	<24	<20				601 +/-53
7/13/14	<34	<9	<12	<12	<13	<9	<10	<25	<18				526 +/-52
7/20/14	<35	<9	<11	<11	<12	<9	<11	<24	<19				976 +/-68
7/28/14	<36	<10	<12	<10	<13	<9	<11	<26	<20				901 +/-61
8/4/14	<35	<9	<11	<13	<11	<9	<10	<23	<22				1276 +/- 74

8/11/14	<35	<9	<12	<12	<12	<10	<11	<27	<21			976 +/- 68
8/18/14	<37	<10	<12	<11	<12	<10	<11	<24	<20			751 +/- 60
8/24/14	<32	<10	<12	<10	<13	<8	<10	<25	<18			1126 +/- 68
9/2/14	<36	<9	<10	<9	<12	<9	<12	<26	<19			1126 +/- 68
9/8/14	<35	<9	<11	<11	<12	<9	<11	<23	<20			1276 +/- 74
9/15/14*												
9/21/14	<34	<9	<12	<9	<12	<9	<11	<23	<19			150 +/- 80
9/29/14	<37	<9	<12	<12	<12	<10	<12	<21	<20			1502 +/- 86
9/29/14D	<8	<3	<3	<3	<3	<10	<3	<7	<6	2.5	0.7	
10/5/14	<39	<10	<13	<11	<11	<9	<13	<26	<19			2027 +/- 96
10/20/14	<40	<9	<13	<12	<13	<11	<11	<28	<20			976 +/- 68
10/20/14D	<7	<3	<3	<3	<3	<7	<3	<8	<6	3.1	0.8	
10/26/14	<35	<9	<12	<12	<11	<9	<9	<26	<19			601 +/- 53
11/3/14	<33	<9	<12	<11	<11	<9	<12	<27	<20			1276 +/- 74
11/10/14	<35	<9	<12	<11	<11	<9	<10	<26	<19			1502 +/- 80
11/16/14	<38	<9	<11	<12	<11	<10	<12	<22	<19			1426+/- 74
12/1/14	<36	<9	<11	<10	<12	<9	<11	<23	<19			751 +/- 60
12/8/14	<32	<9	<11	<10	<11	<9	<11	<26	<20			375 +/- 43
12/15/14	<37	<9	<12	<11	<13	<8	<10	<25	<18			150 +/- 30

*Staff participated in Virginia Hazmat conference, no samples were collected.
D = Sample analyzed by DCLS

Virginia Department of Health

SURFACE WATER

January 1, 2014 through December 31, 2014

North Anna Power Station – Discharge Canal - W-33
Gamma Activity – pCi/liter

Date	Ba-140	Cs-134	Cs-137	Co-58	Co-60	I-131	Mn-54	Zn-65	Zr/Nb 95	Gross Beta	+/-	H3 MDA	H3 Activity
1/6/14D	<8	<3	<2	<3	<3	<11	<3	<7	<7	4.1	3.3		
1/6/14	<34	<10	<11	<12	<12	<11	<12	<22	<20				2928+/-117
1/13/14	<39	<10	<12	<11	<13	<11	<11	<23	<21				3003+/-117
1/21/14	<38	<10	<12	<12	<12	<10	<11	<25	<17				3003+/-117
1/27/14	<35	<10	<11	<11	<10	<9	<10	<23	<19				3078+/-121
2/4/14	<32	<10	<12	<9	<12	<9	<11	<24	<19				3679+/-128
2/11/14	<34	<9	<12	<11	<11	<11	<11	<24	<16				4129+/-138
2/19/14	<36	<11	<12	<10	<11	<9	<11	<24	<19				2778+/-113
2/25/14	<35	<10	<12	<10	<11	<10	<11	<26	<17				3604+/-129
3/10/14	<40	<10	<12	<11	<11	<10	<10	<26	<18				2553+/-109
3/17/14	<49	<10	<13	<12	<11	<12	<12	<25	<23				2703+/-109
3/31/14	<36	<10	<12	<11	<12	<8	<11	<25	<18				2327+/-101
4/7/14	<37	<11	<12	<10	<11	<11	<11	<23	<18				2327 +/- 105
4/14/14	<44	<8	<12	<12	<10	<12	<11	<26	<19				2252 +/- 101
4/28/14	<37	<9	<11	<11	<12	<9	<11	<28	<18				2027 +/- 96
5/5/14	<36	<10	<13	<12	<13	<10	<11	<25	<20				1727 +/- 91
5/12/14	<36	<9	<12	<10	<10	<9	<10	<23	<20				1727 +/- 86
5/19/14	<35	<9	<12	<12	<12	<9	<11	<24	<20				2252 +/- 100
5/27/14D	<5	<3	<3	<3	<3	<5	<3	<7	<6	3.3	3.1		
5/27/14	<37	<9	<11	<12	<11	<10	<12	<25	<22				1426 +/- 80
6/1/14	<37	<9	<11	<11	<10	<9	<10	<24	<20				1426 +/- 80
6/8/14	<38	<9	<10	<12	<9	<10	<11	<27	<18				1952 +/- 96
6/16/14	<36	<9	<12	<12	<11	<9	<11	<23	<19				1276 +/- 74

6/23/14	<36	<10	<11	<10	<12	<9	<11	<25	<19			1802 +/- 91
6/29/14	<36	<10	<12	<11	<12	<9	<11	<28	<19			1276 +/- 80
7/7/14	<36	<10	<12	<12	<12	<11	<12	<26	<20			1051 +/- 68
7/13/14	<39	<9	<11	<12	<12	<9	<10	<26	<18			1276 +/- 74
7/20/14	<34	<9	<11	<1	<12	<9	<11	<27	<17			2027 +/- 96
7/28/14	<35	<10	<13	<11	<12	<9	<11	<22	<19			1652 +/- 86
8/4/14	<37	<10	<12	<11	<12	<10	<11	<27	<19			1502 +/- 80
8/11/14	<33	<9	<12	<11	<11	<9	<11	<29	<19			1201 +/- 74
***8/18/14**	<36	<8	<11	<10	<11	<10	<10	<21	<20			7057 +/- 179
8/24/14	<30	<8	<11	<10	<11	<9	<11	<24	<17			2928 +/- 118
9/2/14	<39	<9	<12	<10	<12	<11	<11	<25	<18			2628 +/- 110
***9/8/14**	<38	<9	<11	<11	<11	<9	<11	<24	<18			9535 +/- 212
****9/15/14**												
9/21/14	<37	<8	<12	<11	<12	<9	<11	<23	<19			2628 +/- 109
9/29/14	<38	<9	<12	<12	<12	<10	<11	<26	<19			3679 +/- 129
9/29/14D	<14	<6	5+/- 1	<7	<6	<6	<26	<13	<12	6.1	3.5	
10/5/14	<36	<10	<12	<12	<12	<10	<11	<26	<19			4644 +/- 142
10/20/14	<36	<10	<11	<12	<12	<10	<11	<24	<21			3378 +/- 125
10/20/14D	<10	<6	<7	<6	<6	<14	<6	<13	<11	3.3	3.5	
10/26/14	<33	<9	<12	<11	<13	<9	<11	<27	<19			2628 +/- 114
11/3/14	<35	<10	<12	<11	<11	<9	<11	<25	<19			3604 +/- 128
11/10/14	<40	<10	<13	<11	<11	<10	<12	<24	<19			3453 +/- 129
11/16/14	<40	<9	<11	<10	<12	<11	<11	<26	<21			4204+/- 125
12/1/14	<32	<9	<11	<11	<12	<9	<12	<24	<19			3604 +/- 125
12/8/14	<32	<9	<11	<12	<11	<8	<12	<24	<19			4054 +/- 136
12/15/14	<36	<9	<13	<10	<11	<10	<11	<27	<19			3303 +/- 121

*Elevated tritium results were due to the release of the Boron Recovery Tank into North Anna discharge canal. Sample was reanalyzed and two new samples were taken from the composite sample. The results from reanalysis and new samples were consistent with initial sample results.

**Staff participated in Virginia Hazmat conference, no samples were collected.

D = Sample analyzed by DCLS

Virginia Department of Health

SURFACE WATER

January 1, 2014 through December 31, 2014

Surry Power Station – Scotland Wharf / baseline - W-79
Gamma Activity – pCi/liter

Date	Ba-140	Cs-134	Cs-137	Co-58	Co-60	I-131	Mn-54	Zn-65	Zr/Nb 95	Gross Beta	+/-	H3 MDA	H3 Activity
1/7/14D	<12	<6	<6	<6	<5	<23	<6	<13	<11	0.0	0.9		
1/7/14	<35	<9	<11	<12	<11	<12	<10	<22	<21			255	
1/14/14	<36	<10	<13	<11	<13	<9	<10	<26	<19				150+/-30
1/23/14	<33	<9	<11	<11	<11	<10	<11	<25	<21				300+/-30
1/28/14	<36	<9	<11	<10	<13	<11	<11	<20	<21			254	
2/3/14	<34	<9	<12	<10	<12	<10	<11	<23	<18			244	
2/10/14	<35	<10	<11	<11	<11	<9	<10	<26	<20			244	
2/18/14	<37	<10	<11	<11	<11	<10	<11	<26	<19			255	
2/24/14	<36	<9	<11	<10	<10	<9	<11	<24	<19			245	
3/11/14	<36	<10	<11	<11	<12	<10	<10	<27	<20			246	
3/18/14	<36	<9	<13	<11	<11	<9	<12	<26	<19			246	
3/31/14	<35	<10	<12	<11	<11	<9	<12	<24	<18			246	
4/7/14	<34	<11	<12	<12	<12	<9	<12	<25	<19				150 +/-30
4/14/14	<43	<10	<12	<11	<12	<15	<11	<27	<19			246	
4/28/14	<37	<8	<11	<11	<11	<9	<12	<25	<17			246	
5/5/14	<39	<9	<11	<10	<9	<10	<12	<24	<19			246	
5/12/14	<34	<10	<14	<10	<13	<9	<12	<23	<20			246	
5/19/14	<32	<9	<12	<11	<11	<9	<12	<25	<20				225 +/- 30
5/27/14	<32	<9	<12	<11	<12	<9	<10	<26	<21			234	
5/28/14D	<7	<6	<4	<3	<6	<11	<5	<12	<10	0.0	30.2		
6/1/14	<33	<10	<9	<10	<12	<9	<12	<26	<20			0	
6/8/14	<35	<10	<12	<11	<12	<9	<11	<24	<21				826 +/- 61
6/16/14	<35	<10	<12	<11	<12	<9	<11	<24	<21			233	
6/23/14	<35	<9	<11	<9	<11	<10	<11	<23	<18				75 +/-0
6/29/14	<31	<8	<11	<10	<12	<9	<11	<27	<18			245	
7/7/14	<34	<9	<11	<10	<10	<8	<11	<24	<19			246	
7/13/14	<31	<9	<11	<9	<12	<9	<10	<23	<21			243	
7/20/14	<33	<10	<11	<10	<13	<8	<11	<26	<19				225 +/- 30
7/28/14	<33	<9	<13	<12	<13	<9	<12	<27	<19				150 +/- 30
8/4/14	<44	<10	<12	<11	<12	<11	<11	<24	<19				225 +/- 30
8/11/14	<35	<10	<12	<11	<12	<9	<11	<23	<19			235	
8/18/14	<37	<10	<10	<12	<12	<9	<10	<25	<19				375 +/- 43
8/24/14	<36	<9	<12	<10	<12	<9	<11	<26	<19			234	

9/2/14	<37	<9	<12	<12	<12	<9	<12	<25	<20				150 +/- 110
9/8/14	<35	<9	<13	<12	<11	<8	<11	<24	<19			245	
***9/15/14**													
9/21/14	<38	<10	<12	<11	<12	<9	<11	<24	<21			245	
9/28/14D	<7	<3	<3	<3	<3	<8	<3	<7	<6	49.5	34.4		
9/29/14	<33	<9	<12	<11	<12	<8	<10	<25	<18			245	
10/5/14	<35	<9	<12	<11	<12	<9	<12	<25	<18				375 +/- 43
10/20/14	<37	<9	<12	<12	<11	<10	<10	<24	<18			254	
10/20/14D	<6	<3	<3	<3	<4	<6	<3	<7	<6	50.9	33.4		
10/26/14	<38	<9	<12	<12	<12	<9	<11	<26	<21			246	
11/3/14	<33	<9	<12	<11	<12	<9	<11	<28	<20			244	
11/10/14	<35	<8	<12	<12	<12	<9	<12	<26	<21				150 +/- 30
11/16/14	<35	<10	<11	<11	<11	<9	<12	<28	<21			549	
12/1/14	<37	<10	<12	<13	<12	<8	<11	<26	<20				150 +/- 30
12/8/14	<32	<9	<11	<10	<11	<9	<11	<26	<20				375 +/- 43
12/15/14	<37	<9	<12	<11	<13	<8	<10	<25	<18				150 +/- 30

D = Sample analyzed by DCLS

Virginia Department of Health

VEGETATION

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location	Date collected	Type	Isotope	Results pCi/Gram (wet weight)
Surry County			I-131	<0.02
Private Garden	2/10/2014	Greens	Cs-134	<0.02
V-96B			Cs-137	<0.02
Surry County	11/16/14	Greens	I-131	<0.02
Private Garden			Cs-134	<0.01
V-96B			Cs-137	<0.01
Louisa County	11/24/14	Greens	I-131	<0.04
Private Garden			Cs-134	<0.02
V-98			Cs-137	<0.02
Louisa County	NA		I-131	
Private Garden			Cs-134	
V-98C			Cs-137	

NA-Sample not collected.

*Note: Vegetation is collected biannually, when available.

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HEALTH

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BABCOCK & WILCOX

Virginia Department of Health

Babcock & Wilcox

AIR PARTICULATE COMPOSITE SAMPLES

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Eastern Site Boundary – Ball field **A-101**

Quarter	Date Start		Stop	Gross Alpha Activity pCi/meter3		
1st	1/15/14	-	1/21/14	0.0006	+/-	0.0004
2nd	4/16/14	-	4/22/14	0.001	+/-	0.001
3rd	7/9/14	-	7/15/14	0.001	+/-	0.001
4th	10/7/14	-	10/14/14	0.002	+/-	0.001

Virginia Department of Health

Babcock & Wilcox

SOIL

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location	Date	Distance & Direction	Type	Alpha Activity pCi/gram
Eastern Site Boundary Ball field **S-101**	11/12/14	Site Boundary	Soil	0.7+/-0.3
James River Shoreline Near Six Mile Bridge "control" **S-102a**	11/12/14	1.5 miles SW	Soil	0.0+/-0.2

Uranium separation followed by alpha counting.

Virginia Department of Health

Babcock & Wilcox

SURFACE WATER

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location	Date	Distance & Direction	Alpha Activity pCi/gram
James River Shoreline Near Ball field at eastern site boundary W-101	11/12/14	Approx. 3 miles downstream	0.3+/-0.3
James River Shoreline Near Six Mile Bridge “control” W-102	11/12/14	Approx 1.5 Miles upstream	1.1+/-0.4

Virginia Department of Health

Babcock & Wilcox

VEGETATION

January 1, 2014 through December 31, 2014

ANNUAL REPORT 2014

Location	Date	Type	Distance & Direction	Alpha Activity pCi/gram
Eastern site boundary Ball field V-101	11/12/14	Vegetation	Approx. 3 miles downstream	0.0+/-0.2
James River Shoreline off Rt. 460 “control” V-102	11/12/14	Vegetation	Approx 4.5 Miles SW	0.1+/-0.2

Uranium separation followed by alpha counting.

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HEALTH

OFFICE OF RADIOLOGICAL HEALTH
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APPENDIX I

LOWER LIMITS OF DETECTION "LLD"

LOWER LIMITS OF DETECTION
"LLD"

Definition: **"Lower Limit of Detection"** – The smallest amount, or concentration, of a radioactive or nonradioactive element that can be reliably detected in a sample.

All radioactive measurements for samples are reported with an uncertainty. The uncertainty arises for a number of reasons including imperfections in the apparatus or procedure, human error, and counting uncertainty. The counting uncertainty arises because radioactive decay is a random process. This means that if one counts the radioactive decay of a sample several times, each for a fixed time, one will find that the measured number of decays varies randomly. However, these random answers all cluster near an average value. It is usually assumed that the counting uncertainty is the dominant uncertainty. The uncertainties that are reported are the counting uncertainties only. The interpretation of this is that we are 95% confident that the true concentration in the sample lies somewhere between the measured concentration minus the counting uncertainty and the measured concentration plus the counting uncertainty.

One consequence of the uncertainties in a measurement of radioactivity is that it is not possible to determine a zero concentration of a radioisotope. Rather, when the uncertainty is such that one cannot distinguish between the sample and background counting rates, we report that the sample radioactivity is less than some concentration. This minimum concentration is termed the Lower Limit of Detection (LLD). Practical sample size, counting time, and background radiation all combine to determine the LLD. The LLD for most radioisotopes is at least several orders of magnitude (factors of ten) less than the standards for a level of a concern that has been set by the state or federal government.

CONDITIONS
Consolidated Laboratories

LLD values apply to samples analyzed immediately after collection with no decay corrections used in the calculations. Decay corrections normally required during sample processing may result in significant increases in the LLD's for the short-lived isotopes.

Gamma isotopic analysis is performed with a 4" X 4" Sodium Iodide (Tl) detector and a High Purity Germanium Detector.

Gross alpha, beta, Sr-89, and Sr-90 LLD's were based on variable averages normally encountered in sample processing. The LLD may vary from sample to sample depending on self-absorption corrections, counting efficiency, background changes, counting time, and recovery yields. Fish values will depend on the wet to ash weight ratio of the collected sample.

The lower limits of detection for all analysis were calculated using the methods found on the following pages:

LOWER LIMITS OF DETECTION (LLD's) FOR GAMMA COUNTING
Consolidated Laboratories

For solids such as Silt, Vegetation, Fish etc., as provided by
HPGE Detector – 1000 minute count time

Required Sample Size: 1 Kilogram

NOMINAL LLD's for selected isotopes are given below. Actual LLD's are determined at the time of analysis, and vary with decay time, background radiation, sample size, etc.

Isotope	LLD, pCi/Kilogram
Cs-134	5
Cs-137	6
Co-58	5
Co-60	5
I-131	7
Ru/Rh-106	50
Zn-65	12
Zr-95	10
Ba/La-140	8
Ag-110m	10
Mn-54	6
Fe-59	11

Canberra's Spectran-F Software calculates LLD using the following relationships:

LLD = $LD \left(\frac{e^{(.693*Td/T\ \square)}}{(T)(Y)(e)(V)(0.037)} \right)$

Where:

Td	=	Decay Time
T □	=	Half-Life
T	=	Count Time
Y	=	Yield of the gamma ray in question
E	=	Detector efficiency at the energy of gamma ray in question
V	=	Sample size
0.037	=	Conversion factor: gammas/second to picocuries

and: $LD = k^2 = (2)LC$

Where: LC is the weakest signal the instrument can detect as a peak.

and: k is a constant which depends on the desired confidence limit for the result. (At the 95% confidence level, k= 1.645.)

LOWER LIMITS OF DETECTION (LLD's) FOR GAMMA COUNTING
Consolidated Laboratories

For liquids such as Water, Milk, etc, as provided by HPGE detector – 1000 minute count time

Required Sample Size: 3.5 Liters

NOMINAL LLD's for selected isotopes are given below. Actual LLD's are determined at the time of analysis, and vary with decay time, background radiation, sample size, etc.

Isotope	LLD, pCi/Liter
Cs-134	7.3
Cs-137	7.6
Co-58	7.2
Co-60	12.0
I-131	7.9
Zn-65	21.0
Zr-95	15.0
Ba/La-140	10.0
Mn-54	7.8
Fe-59	19.0

Canberra's GAMMA-M Software calculates LLD using the following relationships:

LLD = $LD \left(\frac{e^{(.693*Td/T\ \square)}}{(T)(Y)(e)(V)(0.037)} \right)$

Where:

Td	= Decay Time
T □	= Half-Life
T	= Count Time
Y	= Yield of the gamma ray in question
E	= Detector efficiency at the energy of gamma ray in question
V	= Sample size
0.037	= Conversion factor: gammas/second to picocuries

and: $LD = k^2 = (2)LC$

Where: LC is the weakest signal the instrument can detect as a peak.

and: k is a constant which depends on the desired confidence limit for the result. (At the 95% confidence level, k= 1.645.)

LOWER LIMITS OF DETECTION (LLD's) FOR GAMMA COUNTING
VDH-ORH Mobile Incident Command Laboratory

For liquids such as Water as provided by HPGE detector – 100 minute count time

Required Sample Size: 3.5 Liters

NOMINAL LLD's for selected isotopes are given below. Actual LLD's are determined at the time of analysis, and vary with decay time, background radiation, sample size, etc.

Isotope	LLD, pCi/Liter
Cs-134	10.3
Cs-137	11.3
Co-58	10.3
Co-60	12.3
I-131	9.2
Zn-65	25.5
Zr-95	21.1
Ba/La-140	34.9
Mn-54	10.7
Fe-59	22.2

Canberra's GAMMA-M Software calculates LLD using the following relationships:

LLD = $LD \left(\frac{e^{(.693*Td/T\square)}}{(T)(Y)(e)(V)(0.037)} \right)$

Where:

Td	= Decay Time
T □	= Half-Life
T	= Count Time
Y	= Yield of the gamma ray in question
E	= Detector efficiency at the energy of gamma ray in question
V	= Sample size
0.037	= Conversion factor: gammas/second to picocuries

and: $LD = k^2 = (2)LC$

Where: LC is the weakest signal the instrument can detect as a peak.

and: k is a constant which depends on the desired confidence limit for the result. (At the 95% confidence level, k= 1.645.)

LOWER LIMITS OF DETECTION (LLD's) FOR GAMMA COUNTING
VDH-ORH Mobile Incident Command Laboratory

Charcoal Canister provided by HPGE detector - 100 minute count time

Required Sample Size: $300m^3$

Actual LLD is determined at the time of analysis and varies with decay time, background radiation, sample size, etc.

Isotope	LLD, pCi/m^3
I-131 in Charcoal Canister	0.02

Canberra's Gamma-M Software calculates LLD using the following relationships:

$$LLD = 4.65 \left(\frac{(R_b/T_s)^{1/2}}{(Y)(e)(V)(d)(2.22)} \right)$$

Where:

	R_b=	Background rate (CPM)
	T_s=	Sample Count Time
	Y=	Chemical Yield (Gamma ray abundance for I-131 @ 364KeV)
	e=	Detector efficiency = 23.9%
	V=	Sample size
	d=	Decay Correction Factor
	2.22=	Conversion factor: counts/minute to picocuries

LOWER LIMITS OF DETECTION (LLD's) FOR BETA COUNTING

Consolidated Laboratories

For: Milk and Water (Radiochemical Analysis).

Matrix	LLD	Weight or Volume Required
Sr-89	4.00 pCi/Liter	1000 ml
Sr-90	1.00 pCi/Liter	1000 ml
I-131 in Water	0.34 pCi/Liter	1000 ml
I-131 in Milk	0.36 pCi/Liter	1000 ml

$$LLD = 4.65\left(\frac{\sqrt{p(R_b/T_s)}}{(Y)(e)(V)(d)(2.22)}\right)$$

Where:

R_b=	Background rate (CPM)
T_s=	Sample Count Time
Y=	Chemical Yield
e=	Detector efficiency
V=	Sample size
d=	Decay Correction Factor
2.22=	Conversion factor: counts/minute to picocuries
4.65=	95% Confidence Factor

LOWER LIMITS OF DETECTION (LLD's) FOR GROSS BETA COUNTING

Consolidated Laboratories (DCLS)
&
VDH-ORH Mobile Incident Command Laboratory (MICL)

For: Air Particulate, Surface/Saline Water, Silt/Soil and Fish.

Matrix	LLD	Weight or Volume Required
Air Particulate (MICL)	0.003 pCi/m3	300 m3
Surface Water (DCLS)	34.7 pCi/L	10 ml
Saline Water (DCLS)	40.8 pCi/Liter	10 ml
Silt/Soil (DCLS)	5.7 pCi/gram	100 mg
Fish (DCLS)	0.046 pCi/gram	1000 grams

$$LLD = 4.65 \left(\frac{(\sqrt{R_b/T_s})}{(Y)(e)(V)(d)(2.22)} \right)$$

Where:

R_b=	Background rate (CPM)
T_s=	Sample Count Time
Y=	Chemical Yield
e=	Detector efficiency
V=	Sample size
d=	Decay Correction Factor
2.22=	Conversion factor counts per minute to picocuries
4.65=	95% Confidence Factor

LOWER LIMITS OF DETECTION (LLD's) FOR GROSS ALPHA COUNTING

Consolidated Laboratories (DCLS)
&
VDH-ORH Mobile Incident Command Laboratory (MICL)

For: Air Particulate, Surface/Saline Water, and Silt/Soil.

Matrix	LLD	Weight or Volume Required
Air Particulate (MICL)	0.001 pCi/m^3	286 m^3
Surface Water (DCLS)	45.0 pCi/liter	10 ml
Saline Water (DCLS)	45.0 pCi/liter	10 ml
Silt/Soil (DCLS)	11.0 pCi/gram	100 mg

$$LLD = 4.65 \left(\frac{(2.71/T_s) + (\sqrt{(R_b/T_s)}}{(Y)(e)(V)(d)(2.22)} \right)$$

Where:

R_b=	Background rate (CPM)
T_s=	Sample Count Time
Y=	Chemical Yield (Gamma ray abundance for I-131 @ 634 KeV)
e=	Detector efficiency
V=	Sample size
d=	Decay Correction Factor
2.22=	Conversion factor: counts/minute to picocuries
4.65=	95% Confidence Factor
2.71=	Conversion factor used to compensate for low backgrounds encountered in Alpha counting

LOWER LIMITS OF DETECTION (LLD's) FOR ALPHA COUNTING

Consolidated Laboratories

For: Water, Vegetation, Silt and Soil (Uranium Radiochemical Analysis).

Matrix	LLD	Weight or Volume Required
Water	0.20 pCi/Liter	1000 ml
Vegetation	0.02 pCi/gram	1000 grams
Silt	0.02 pCi/gram	1000 grams
Soil	0.02 pCi/gram	1000 grams

$$LLD = 4.65 \left(\frac{(2.71/T_s) + (\sqrt{(R_b/T_s)}.}{(Y)(e)(V)(d)(2.22)} \right)$$

Where:

R_b=	Background rate (CPM)
T_s=	Sample Count Time
Y=	Chemical Yield (Gamma ray abundance for I-131 @ 634 KeV)
e=	Detector efficiency
V=	Sample size
d=	Decay Correction Factor
2.22=	Conversion factor: counts/minute to picocuries
4.65=	95% Confidence Factor
2.71=	Conversion factor used to compensate for low backgrounds encountered in Alpha counting

LOWER LIMITS OF DETECTION (LLD's) FOR ALPHA COUNTING

Consolidated Laboratories

For: Air Particulate and Waste Water (Fluorometric Uranium Analysis).

Matrix	LLD	Weight or Volume Required
Air Particulate	2.00 E-09 ug/ml	1440 m^3
Waste Water	0.04 ug/Liter	1000 ml

$$LLD = 4.65 \left(\frac{(2.71/T_s) + (\sqrt{(R_b/T_s).}}{(Y)(e)(V)(d)(2.22)} \right)$$

Where:

R_b=	Background rate (CPM)
T_s=	Sample Count Time
Y=	Chemical Yield (Gamma ray abundance for I-131 @ 634 KeV)
e=	Detector efficiency
V=	Sample size
d=	Decay Correction Factor
2.22=	Conversion factor: counts/minute to picocuries
4.65=	95% Confidence Factor
2.71=	Conversion factor used to compensate for low backgrounds encountered in Alpha counting

LOWER LIMITS OF DETECTION (LLD) FOR TRITIUM ANALYSIS

VDH-ORH Mobile Incident Command Laboratory (MICL)

For: Surface Water

Minimum Required Sample Volume: 50 ml
Sample Aliquot = 6 ml

$$\text{LLD in pCi/L} = \frac{4.66(R_b/T)^{1/2}}{(2.22)(V)(E)}$$

Where:	R_b=	Background rate (CPM)
	T=	Background Counting Time = 60 minutes
	E=	Counter Efficiency = 65%
	V=	Sample Volume or Size
	4.66=	95% Confidence Factor
	LLD=	**225 pCi/L**

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APPENDIX II

SAMPLING LOCATIONS

Sampling Locations for Surry Nuclear Power Station

Photo courtesy of Dominion Power

LOCATION	TYPE	FREQUENCY
Milk		
M-66 Surry County - W.B. Epps Dairy *	Raw	Quarterly
Air		
A-20 Surry Power Station *	Air Particulate	Weekly
A-44 Jamestown State Park - Historical Site	Air Particulate	Weekly
Charcoal Filter		
C-20 Surry Power Station *	Release Gas	Weekly
C-44 Jamestown State Park - Historical Site	Release Gas	Weekly
Dosimeters		
D-20 Surry Power Station *	Gamma in Air	Quarterly
D-41 Surry Lebanon Baptist Church	Gamma in Air	Quarterly
D-42 Surry County - Lawnes Creek	Gamma in Air	Quarterly
D-43 Surry County - Route 628	Gamma in Air	Quarterly
D-44 Jamestown State Park - Historical Site	Gamma in Air	Quarterly
D-45 Newport News - Lee Hall	Gamma in Air	Quarterly
D-73 Naval Weapons Station - Enlisted Quarters	Gamma in Air	Quarterly
D-76 Newport News - Fort Eustis *	Gamma in Air	Quarterly
D-77 Williamsburg - Busch Gardens	Gamma in Air	Quarterly
D-78 Williamsburg - Williamsburg Airport	Gamma in Air	Quarterly
D-79 Surry County - Scotland Wharf	Gamma in Air	Quarterly
D-80 Surry County - Bacon's Castle *	Gamma in Air	Quarterly
D-81 Surry County – Alliance *	Gamma in Air	Quarterly
D-82 Surry County - Hog Point *	Gamma in Air	Quarterly
Silt		
S-17 James River - 1/2 Mile Off Discharge Canal	Silt	Semi-annually
Fish		
F-17 Surry Discharge Canal	Fish	Semi-annually

Shellfish		
R-17 Surry Discharge Canal	Shellfish	Annually
	Surface Water	Weekly
Surface Water		
W-19 Surry Discharge Canal *	Surface Water	Weekly
W-79 James River - Scotland Wharf *		
Vegetation	Edible Vegetation	Annually
V-96B Surry County - local farms *		

*** Virginia and Virginia Power Duplicate Sampling Sites**

Sampling Locations for North Anna Nuclear Power Station

Photo courtesy of Dominion Power

LOCATION	TYPE	FREQUENCY
Milk		
M-29 Louisa County - Lakeside Dairy *	Raw	Quarterly
Air		
A-88 Louisa County Route 700 *	Air Particulate	Weekly
A-86 Louisa County – Bumpass Volunteer Fire	Air Particulate	Weekly
Charcoal Filter		
C-88 Louisa County Route 700 *	Release Gas	Weekly
C-86 Louisa County – Bumpass Volunteer Fire	Release Gas	Weekly
Dosimeters		
D-35 NAPS *	Gamma in Air	Quarterly
D-50 Louisa County – Mineral *	Gamma in Air	Quarterly
D-51 Louisa County - Wares Crossroads *	Gamma in Air	Quarterly
D-52 Spotsylvania - Good Hope Church *	Gamma in Air	Quarterly
D-53 Spotsylvania - Route 614	Gamma in Air	Quarterly
D-54 Louisa County - Frederick's Hall	Gamma in Air	Quarterly
D-84 Louisa County - Route 685	Gamma in Air	Quarterly
D-85 Spotsylvania Co. - Route 713	Gamma in Air	Quarterly
D-86 Louisa County – Bumpass Volunteer Fire	Gamma in Air	Quarterly
D-87 Spotsylvania Co. - Levy *	Gamma in Air	Quarterly
D-88 Louisa Co. - Rt. 700 (near station) *	Gamma in Air	Quarterly
D-89 Louisa County - Aspen Hill *	Gamma in Air	Quarterly
Fish		
F-24 North Anna Lake - Second Cooling Lagoon	Edible Fish	Semi-annually
Silt		
S-24 NAPS Waste Treatment shoreline soil	Soil	Semi-annually

Surface Water

W-27 North Anna River - Route 522 *	Surface Water	Weekly
W-33 North Anna Discharge Canal *	Surface Water	Weekly

Vegetation

V-98C Louisa County – local farmers *	Edible Vegetation	Annually

*** Virginia and Virginia Power Duplicate Sampling Sites**

Sampling Locations - Babcock & Wilcox

SAMPLE	LOCATION	TYPE	FREQUENCY
AIR			
A-101	Eastern Site Boundary Ballfield	Air Particulate	Quarterly
SURFACE WATER			
W-101	James River 3 mi. downstream of plant at eastern site boundary	Surface Water	Annually
W-102	James River 1.5 mi. upstream of plant at Six Mile Bridge control	Surface Water	Annually
SOIL			
S-101	Eastern Site Boundary Ballfield	Soil	Annually
S-102	James River Shoreline 1.5 mi. upstream At Six Mile Bridge Control	Soil	Annually
VEGETATION			
V-101	Eastern Site Boundary Ballfield	Grass	Annually
V-102	James River Shoreline 1.5 mi. upstream At Six Mile Bridge Control	Grass	Annually

Other Sampling Locations in Virginia

	LOCATION	TYPE	FREQUENCY
	Air		
A-40	Pocahontas State Park	Air Particulate	Weekly
	Silt		
S-15A	James River - NNSB - Pier 1	Silt	Quarterly
S-16	James River - NNSB- Shipway 11	Silt	Quarterly
S-18	Elizabeth River - NNSY - Drydock #8	Silt	Quarterly
S-19	Elizabeth River - NNSY - Drydock #4	Silt	Quarterly
S-20	Elizabeth River - NNSY - Wet Slip #1	Silt	Quarterly
	Charcoal Filter		
C-40	Pocahontas State Park	Air Particulate	Weekly
	Dosimeters		
D-40	Pocahontas State Park	Air Gamma	Quarterly
	Surface Water		
W-15	James River - NNSB- Pier 1	Surface Water	Quarterly
W-16	James River - NNSB- Shipway 11	Surface Water	Quarterly
W-37	Elizabeth River - NNSY - Drydock #8	Surface Water	Quarterly
W-38	Elizabeth River - NNSY - Drydock #4	Surface Water	Quarterly
W-39	Elizabeth River - NNSY - Wet Slip #1	Surface Water	Quarterly

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APPENDIX III
EMERGENCY PREPAREDNESS

EMERGENCY PREPAREDNESS

The Office of Radiological Health (ORH) is one of the lead response agencies for emergencies involving the potential or actual release of radioactive materials. Overall, state level emergency response is described in the Commonwealth of Virginia Radiological Emergency Response Plan (COVRERP), which is developed and maintained by the Virginia Department of Emergency Management (VDEM) for the Commonwealth of Virginia. In addition to generic guidelines for responding to any major radiological emergency, the response procedures contain segments addressing response to several specific types of radiological incidents – including sections, which provide information needed for response to Licensee and Transportation accidents. Other sections contain background information and response guidance for accidents at fixed nuclear facilities. Plans are also being developed to respond to nefarious attacks, including terrorism, which may include a Radioactive Exposure Device (RED), a radiological dispersion device (RDD aka “dirty bomb”), an improvised nuclear device (IND), or a nuclear Weapon of Mass Destruction (WMD).

When responding to any radiological emergency, the primary tasks of VDH-ORH are to locate, identify, and predict the impact of any radioactive materials released to the environment. Based on the predicted or known impact, VDH then recommends appropriate measures to protect the public. ORH is also be tasked with helping to oversee the cleanup of radiological contamination and ensuring the proper disposal of radioactive waste. A VDH-ORH duty officer maintains 24-hour coverage to provide initial assessment/assistance for local responders and may also initiate the mobilization/deployment of other trained staff to respond to a radiological emergency when needed.

Under the provisions of current Federal Emergency Management Agency (FEMA) guidance, ORH conducts or participates in periodic drills that are designed to provide team training and to test emergency plans and procedures. The scope of these drills ranges from receiving and acknowledging simulated emergency communications to full-scale team deployment. In the latter case, ORH personnel are presented with problems similar to those that might be encountered during an actual radiological emergency.

Federal regulations for commercial nuclear power generating facilities stipulate that a full-scale exercise involving appropriate local government participation and testing all significant response elements must be conducted and evaluated every other year. Because there are two such facilities, Surry and North Anna Nuclear Power Stations, Commonwealth of Virginia agencies will participate in exercise activities on a yearly basis, alternating between the sites each year. VDH, ORH, and VDEM, among other agencies, will participate as specified by extent-of-play demonstration criteria negotiated with FEMA.