ENVIRONMENTAL MONITORING REPORT

JANUARY 1 - DECEMBER 31, 1978

SURRY POWER STATION

VIRGINIA ELECTRIC AND POWER COMPANY

MIDWESTERN FACILITY
EBERLINE INSTRUMENT CORPORATION
WEST CHICAGO, ILLINOIS

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VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION

LICENSE NOS. DPR-32 and DPR-37

RECORDED ANNUAL WHOLE BODY EXPOSURES
CALENDAR YEAR 1978

Dose Range (mrem)	Number of Individuals
No measureable exposure	1301
1-99	1077
100-249	215
250-499	111
500-749	76
750-999	77
1000-1999	341
2000-2999	147
3000-3999	75
4000-4999	40
5000-5999	24
6000-6999	14
7000-7999	6
8000-8999	0
9000-9999	0
10000-10999	0
11000-11999	0
12000-plus	0
Total Number of Individuals reported	3504

The above information is submitted for the total number of individuals for whom individual monitoring was provided during the calendar year.

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION
LICENSE NOS. DPR-32 AND DPR-37
MAN REM EXPOSURE - JOB FUNCTION
JANUARY TO DECEMBER 1978

TECHNICAL SPECIFICATION 6.6b (3)

Station Employees			Utility Employees			Sub-Contractural Employees		
Job Function	Number of Individuals	Total Dose Rem	Job Function	Number Individuals	Total Dose Rem	Job Function	Number of Individuals	Total Dose Rem
Routine Surveillance	366	502.363	Routine Surveillance	21	5.928	Routine Surveillance	150	177.456
Refueling	5	15.022	Refueling	8	5.313	Refueing	6	1.941
Steam Generator Tube Eddy Current, Removal and Plugging	17	51.495	Steam Generator Tube Eddy Current, Removal and Plugging	33	59.728	Steam Generator Tube Eddy Current, Removal and Plugging	385	676.818
Primary System Maintenance	24	101.232	Primary System Maintenance	0	0	Primary System Maintenance	51	83.376
Liquid Waste I.X.	10	10.264	Liquid Waste I.X.	0	0	Liquid Waste I.X.	0	0
Resin Transfer	4	5.938	Resin Transfer	0	0	Resin Transfer	0	0
Rad Waste (Solid)	8	5.243	Rad Waste (Solid)	0	0	Rad Waste (Solid)	38	32.009

INTRODUCTION

The Surry Power Station of Virginia Electric and Power Company consists of two Westinghouse pressurized water reactors each with a generating capacity of 788 MWE. The station is located on a peninsula in the James River approximately 25 miles upstream of the Chesapeake Bay. Cooling water is taken in downstream of the site and discharged 5.7 miles upstream of the intake. The Surry Power Station has been designed to minimize radioactive releases and insure that radiation doses attributed to the operation of the station will be "as low as reasonably achievable".

Various environmental samples are collected at indicator and control or background locations and analyzed to determine if changes in radioactivity levels may be attributable to the operation of the station. This environmental radiological monitoring program provides surveillance to assure compliance with the NRC Regulations and the Surry Power Station Technical Specifications.

The program outlined in Tables I and II has in some cases more frequent collection and analysis of certain samples than called for in the Technical Specifications. The accompanying map shows the plant environs. Table III summarizes the results of the radiological environmental surveillance measurements during calendar year 1978.

TABLE I

Monitoring or Sampling Locations and Frequencies

	Air Particulate	Ambient Radiation	Precipitation	Milk	Well Water	Surface Water	Soil
Surry Station	BW	Q	M		SA		A
Hog Island Reserve	BW	Q			SA		
Bacon's Castle	BW	Q		M(2 ea.)	SA		A
Chippokes Creek						SA	
Alliance	BW	Q					A
Colonial Parkway	BW	Q		M			A
Williamsburg						SA	
Jamestown		Q			SA		
Dow	BW	Q					A
Fort Eustis	BW	Q					A
Newport News	BW	Q	M			SA	
Scotland Wharf		Q					
Lee Hall		Q		M			
Routes 10 and 676		Q					
Smithfield		Q		M		SA	
Guard Booth		Q					
Station Intake		Q					
Kings Mill		Q					
Budweiser		Q					
Station Discharge		Q					

BW - Bi-weekly
BM - Bi-monthly
SA - Semi-annually
M - Monthly
Q - Quarterly
A - Annually
A(3) - Annually corn, peanuts, and soybeans
SM - Summer Months (two Samplings: July - September)

TABLE I (continued)

	Crops	Fowl	James River Water	Silt	Oyster	Clams	Fish	Crab
Bacon's Castle	A(3)							
Hog Island Reserve		SA						
Jamestown						BM		
Newport News			BM	SA	BM			
Chickahominy			BM	SA		BM		
Station Discharge			BM	SA		BM		
Hog Island Point			BM	SA		BM		
Station Intake			BM	SA			SA	SM
Lawnes Creek						BM		
Deep Water Shoals					BM			
Point of Shoals				SA	BM			

BW - Bi-weekly

BM - Bi-monthly

SA-Semi-annually

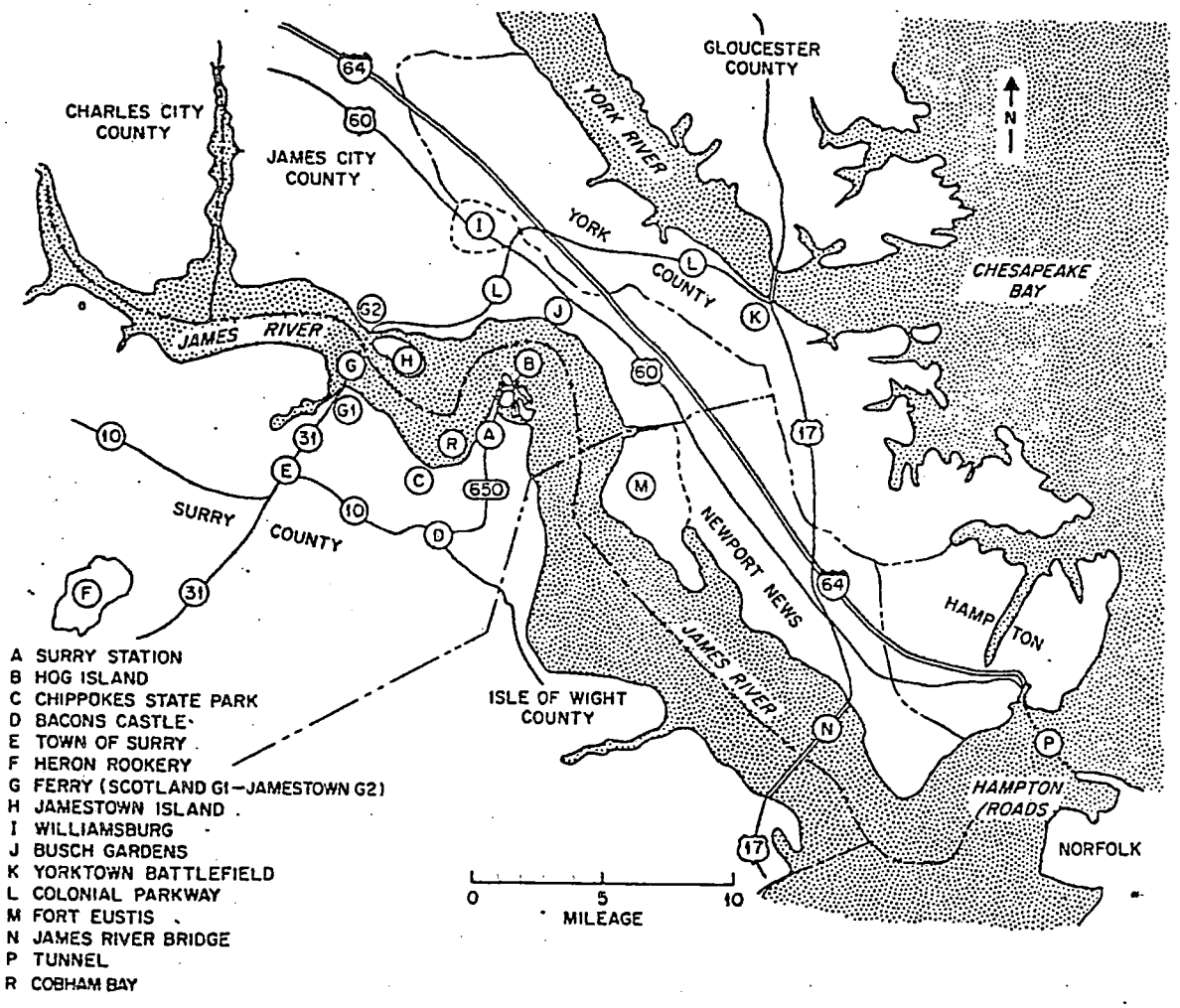
M - Monthly

Q - Quarterly

A - Annually

A(3) - Annually corn, peanuts, and soybeans

SM - Summer Months (three Samplings: July - August - September)



Environs of Surry Power Station.

TABLE II

Environmental Measurement
and
Sample Analysis Program

Sample or Measurement	Frequency	Analysis
Airborne Effluent		
Air Particulate	Bi-weekly	Gross alpha and beta (1)
	Quarterly Composite	Gamma Isotopic (2)
Thermoluminescent Dosimetry	Quarterly	Radiation Dose
Precipitation	Monthly	Gross beta (3)
		Tritium
	Quarterly Composite	Gross beta
		Tritium
Milk	Monthly	Iodine-131
		Sr-89,90
		Gamma Isotopic
		Stable Calcium
Soil	Annually	Gamma Isotopic
Crops	Annually	Gamma Isotopic
		Sr-89,90
Surface Water	Semi-annually	Gross alpha and beta
		Tritium
Liquid Effluent		
James River	Bi-monthly	Gamma Isotopic
Water	Semi-annually Composite	Tritium
Oysters and Clams	Bi-monthly	Gamma Isotopic (4)
Crab	Three Summer Months	Gamma Isotopic
Silt	Semi-annually	Gamma Isotopic
Fish	Semi-annually	Gamma Isotopic
Liquid and/or Airborne		
Well Water	Semi-annually	Gross alpha and beta
Fowl	Semi-annually	Gamma Isotopic (4)

NOTES TO TABLE II

(1) Gamma isotopic analysis if gross beta exceeds 10 pCi/m^3.

(2) Quarterly composites of bi-weekly air particulate samples will be analyzed for gamma emitters in three groups as follows:

Stations 1 and 2 analyzed as one sample.
Stations 3,5,6,9 and 10 analyzed as one sample.
Station 11 analyzed as one sample.

Strontium-90 determined radiochemically if significant amounts of fission products attributable to the Station are detected by the gamma isotopic analysis.

(3) Perform gamma isotopic analysis if gross beta exceeds 15 nCi/m^2.

(4) Entire sample analyzed for gamma emitters. Sr-90 to be determined if a significant amount of fission products attributable to the Station are noted in the gamma analysis.

TABLE III

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Surry Power Plant Docket No. 50-280 50-281

Location of Facility Surry, Virginia (County, State) Reporting Period 01 January through 31 December 1978

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (f)[b] Range	Location with Highest Annual Mean Name Distance & Direction	Mean (f)[b] Range	Control Locations Mean (f)[b] Range	Number of Nonroutine Reported Measurements
Air Particulates (pCi/m^3)	Gross β 221	.01	0.11 (187/193) .01 - .61	Surry Station -	0.12 (27/28) .02 - .61	0.13 (28/28) .01 - .66	0
	Gross α 213	.01	.01 (1/194) .01	Ft. Eustis 4.8 Mi. N.	.01 (1/27) .01	.01 (1/27) .01	0
	γ Isotopic 12	.01					
	Co-144		.04 (3/4) .02 - .07	Composite-Surry Sta., Hog Is. Reserve	.04 (3/4) .02 - .07	.08 (4/8) .04 - .16	0
	Ru-106		.01 (1/4)	Sta., Hog Is. Reserve	.01 (1/4)	.02 (1/8)	0
	Cs-134		All LLD	Not Applicable		All LLD	0
	Cs-137		All LLD	Not Applicable		All LLD	
Gamma Dose (mR/wk)	Dose 96	0.5	1.8 (76/76) 0.6 - 17.4	Surry Station On Site	17.4 (4/4) 13.4 - 21.0	1.0 (12/12) 0.8 - 1.2	0
Precipitation (pCi/l) H-3 (nCi/m^2) β	Gross β 28	5	1.1 (15/15) .03 - 3.4	Surry Station On Site	1.1 (15/15) .03 - 3.4	0.8 (15/15) 0.4 - 2.4	0
	Tritium 30	300	780 (12/16) 400 - 2200	Surry Station On Site	780 (12/15) 400 - 2200	730 (12/16) 360 - 1700	0
Milk (pCi/l)	I-131 58	0.5	1.1 (1/35) 1.1	Bacon's Castle (Judkins)	1.1 (1/11) 1.1	0.9 (2/23) 0.6 - 1.2	0
	Sr-89 58	5	All LLD	Not Applicable		All LLD	0
	Sr-90 58	2	5 (43/46) 1 - 17	Bacon's Castle (Judkins)	8 (9/10) 4 - 16	5 (11/11) 2 - 12	

[b] Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)

TABLE III (continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Surry Power Plant Docket No. 50-280 50-281

Location of Facility Surry, Virginia (County, State) Reporting Period 01 January through 31 December 1978

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (f)[b] Range	Location with Highest Annual Mean Name Distance & Direction Mean (f)[b] Range	Control Locations Mean (f)[b] Range	Number of Nonroutine Reported Measurements
Milk (cont'd)	Cs-137 58	15	19 (4/35) 16 - 23	Bacon's Castle 21 (2/11) Judkins 18 - 23	17 (3/23) 13 - 21	0
	Ba-La-140 58	15	All LLD	Not Applicable	All LLD	0
River Water (pCi/l)	Sr-89 3	5	All LLD	Not Applicable	All LLD	0
	Sr-90 3	2	" "	" "	" "	0
	H-3 8	330	2500 (4/4) 300 - 8400	Station Discharge 2500 (4/4) 300 - 8400	All LLD	
	Ba-La-140 34	15	All LLD	Not Applicable	All LLD	0
	Cs-134 34	15	" "	" "	" "	0
	Cs-137 34	15	" "	" "	" "	0
	Zr-Nb-95 34	10	" "	" "	" "	0
	Co-58 34	15	" "	" "	" "	0
	Mn-54 34	15	" "	" "	" "	0
	Zn-65 34	15	" "	" "	" "	0
	Fe-59 34	30	" "	" "	" "	0
Clams (pCi/kg)	Mn-54 30	130	" "	" "	" "	0
	Fe-59 30	260	" "	" "	" "	0

[b]Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)

TABLE III (continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

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Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (f)[b] Range	Location with Highest Annual Mean Name Distance & Direction	Mean (f)[b] Range	Control Locations Mean (f)[b] Range	Number of Nonroutine Reported Measurements
Clams (cont'd)	Co-58	30	130	All LLD	Not Applicable		All LLD	0
	Co-60	30	130	" "	" "		" "	0
	Zn-65	30	260	" "	" "		" "	0
	Cs-134	30	130	" "	" "		" "	0
	Cs-137	30	130	All LLD	Not Applicable		All LLD	0
	Sr-90	3	10	10 (1/3) 10	Station Discharge 10	(1/3) 10	Analysis not Required	0
	Sr-89	3	10	All LLD	Not Applicable		Analysis not Required	0
Oysters (pCi/kg)	Mn-54	16	130	" "	" "		All LLD	0
	Fe-59	16	260	" "	" "		" "	0
	Co-58	16	130	" "	" "		" "	0
	Co-60	16	130	" "	" "		" "	0
	Zn-65	16	260	" "	" "		" "	0
	Cs-134	16	130	" "	" "		" "	0
	Cs-137	16	130	All LLD	Not Applicable		All LLD	0
Fish (pCi/kg)	Cs-137	4	130	190 (1/4) 190	Surry Station Vicinity 190	(1/4) 190	Not Required	0
	Mn-54	4	130	All LLD	Not Applicable		Not Required	0
	Fe-59	4	260	" "	" "		" "	0
	Co-58	4	130	" "	" "		" "	0
	Co-60	4	130	" "	" "		" "	0

[b]Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)

TABLE III (continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Surry Power Plant Docket No. 50-280 50-281

Location of Facility Surry, Virginia (County, State) Reporting Period 01 January through 31 December 1978

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed		Lower Limit of Detection (LLD)	All Indicator Locations Mean (f)[b] Range	Location with Highest Annual Mean Name Distance & Direction	Mean (f)[b] Range	Control Locations Mean (f)[b] Range	Number of Nonroutine Reported Measurements
Fish (cont'd)	Zn-65	4	260	All LLD	Not Applicable		Not Required	0
	Cs-134	4	130	" "	" "		" "	0
Crabs (pCi/kg)	Mn-54	3	130	" "	" "		" "	0
	Fe-59	3	260	" "	" "		" "	0
	Co-58	3	130	" "	" "		" "	0
	Co-60	3	130	" "	" "		" "	0
	Zn-65	3	260	" "	" "		" "	0
	Cs-134	3	130	" "	" "		" "	0
	Cs-137	3	130	All LLD	Not Applicable		Not Required	0
Silt (pCi/kg)	Cs-134	12	150	620 (1/10) 620	Station Discharge	620 (1/10) 620	All LLD	0
	Cs-137	12	150	910 (8/10) 300 - 2000	Station Discharge	2000 (1/2) 2000	400 (2/2) 400	0
	Co-58	12	150	All LLD	Not Applicable			0
	Co-60	12	150	700 (3/10) 300 - 1400	Station Discharge	1900 (1/2) 1400	All LLD	0
	Mn-54	12	150	All LLD	Not Applicable			0
	Zn-65	12	260	All LLD	Not Applicable			0
Soil (pCi/kg)	Cs-134	12	150	All LLD	Not Applicable		All LLD	0
	Cs-137	12	150	1600 (9/12) 300 - 2300	Ft. Eustis	1750 (2/2) 1700 - 1800	Not Applicable	0
Fowl (pCi/kg)	Cs-134	2	80	All LDD	Not Applicable		Not Applicable	0
	Cs-137	2	80	" "	" "		" "	0

[b]Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)

TABLE III (continued)

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

Name of Facility Surry Power Plant Docket No. 50-280 50-281

Location of Facility Surry, Virginia (County, State) Reporting Period 01 January through 31 December 1978

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean (f)[b] Range	Location with Highest Annual Mean Name Distance & Direction	Mean (f)[b] Range	Control Locations Mean (f)[b] Range	Number of Nonroutine Reported Measurements
Food Crops (pCi/kg)	Cs-134 6	80	All LLD	Not Applicable		Not Applicable	0
	Cs-137 6	80	" "	"	"	"	0
	Sr-89 6	10	All LLD	Not Applicable		Not Applicable	0
	Sr-90 6	10	150 (1/6) 150	Slade	150 (1/3) 150	Not Applicable	0
Well Water (pCi/l)	Gross α 8	1	3.5 (2/6) 2 - 5	Hog Is. Reserve 1.9 Mi.	5 (1/2) 5	2 (1/2) 2	0
	Gross β 8	1	4.2 (5/6) 2 - 5	Hog Is. Reserve	5.5(2/2) 3 - 8	3.5(2/2) 3 - 4	0
	Tritium 8	330	300 (1/1) 300	Surry Station	300 (1/1)	500 (1/2) 500	0
Surface Water (pCi/l)	Gross α 8	1	2.8 (2/4) 2 - 3	Williamsburg Reserve	2.5(2/2) 2 - 3	3 (2.4) 3	0
	Gross β 8	1	3 (3/4)	Williamsburg	2.5(2/2) 2 - 3	4.5(4/4) 2 - 9	0
	Tritium 8	500	600 (2/4) 600	Williamsburg Chippokes Creek	600 (2/4) 600	800 (2/4) 700 - 900	0

[b]Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parentheses. (f)

SUMMARY

Environmental monitoring results showed that the radiation dose to a member of the general population did not exceed Technical Specifications of 1% of the 10 CFR 20 limit during 1978.

Radionuclides released to the air and water from Surry Station may contribute to the radiation background through both external and internal exposure.

The most significant environmental dose pathways are direct dose from the gaseous effluent and thyroid dose due to ingestion of milk. The area contains only a very small milk shed which limits general population dose potential from this source and since James River water is not used for drinking, dose potential from this source is also minimal.

A nuclear explosive was detonated in the atmosphere in the People's Republic of China in mid-March of 1978. Radioactive debris (fallout) from this event was detected throughout the continental United States in the later part of March chiefly as I-131 in milk samples and elevated concentrations of beta and gamma emitters in air particulate filters collected during the following several months. Effects on other media were generally minimal or masked by the usual ambient levels encountered in those media. A second nuclear device was exploded in mid-December at the Lop Nor test site. Fallout from this event was apparently too diffused to be detected in routine environmental monitoring programs.

Table III summarizes the range and average concentrations for measurements at the indicator and control locations, and the location with the highest annual mean. Complete information is given in the Sample Data Tables. (Appendix I)

Specific findings for various environmental media are discussed below:

Air Particulate Samples

Air particulate samples collected in late March showed the arrival of fallout associated with the nuclear test conducted by the People's Republic of China. All sampling locations showed increased gross beta concentration, with elevated levels persisting until late July. The average concentration for the year for all indicator stations was 0.11 pCi/m^3. and for the control location was 0.13 pCi/m^3. The single highest concentration, 0.66±.09 pCi/m^3, was noted at Newport News on 04/11/78, and is attributable to fallout and not operation of nuclear power plants.

The presence of significant and variable amounts of radionuclides due to fallout in this and previous years' samples does not permit meaningful trend analysis or comparison of average concentrations in the samples. Data for analyses of individual filters are given on pages 2-1 through 2-3 of Appendix I.

Gamma spectrometry of quarterly composites of air particulate filters indicated that concentrations of Cs-134 and Cs-137 were below 0.01 pCi/m^3 throughout the year. Small amounts of Ce-144 and occasionally Ru-106 were detected in first and second quarter composites from all locations. These nuclides were found to be present in similar collections throughout the continental U. S. and are attributed to fallout from the Spring Chinese nuclear test. By the third quarter of the year, concentrations of all gamma emitters had fallen below LLD's for the most part. None of the radioactivity detected is attributable to operation of Surry Station, since effects of the station, if any, are masked by the more abundant fallout. Analytical data are given on page 2-4 of Appendix I.

Environmental Dosimetry

Measurements of environmental dose rates were made at twenty-three locations plus a control (shielded) location on a quarterly basis using thermoluminescent dosimeters (TLD's). Data are summarized below and in tables on pages 6-1 of Appendix I.

ENVIRONMENTAL DOSIMETRY BY THERMOLUMINESCENT DOSIMETRY

Location		Average mR/week				
		1st Q	2nd Q	3rd Q	4th Q	Year
Control	-00	0.5±0.1	0.8±0.1	0.7±0.1	0.7±0.2	0.7
Surry Station	-01	13.4±2.8	19.4±1.9	15.9±1.6	21.0±2.0	17.4
Guard Booth	-02	1.3±0.2	1.6±0.2	1.5±0.2	1.6±0.2	1.5
Surry East	-03	1.1±0.2	1.4±0.1	1.2±0.1	1.2±0.1	1.2
Surry North	-04	0.9±0.2	1.2±0.1	0.9±0.1	1.2±0.2	1.1
Hog Island Reserve	-05	0.7±0.1	1.1±0.1	0.9±0.1	1.0±0.1	0.9
Surry West	-06	0.6±0.1	1.0±0.2	0.8±0.1	0.9±0.1	0.8
Station Discharge	-07	0.6±0.1	0.8±0.1	0.6±0.1	0.5±0.1	0.6
Station Intake	-08	0.7±0.1	0.8±0.1	0.6±0.1	0.7±0.1	0.7
Surry South	-09	0.9±0.1	1.1±0.1	0.9±0.1	1.1±0.1	1.0
Bacons Castle	-10	0.7±0.1	0.9±0.1	0.8±0.1	0.9±0.1	0.8
Alliance	-11	1.0±0.1	0.9±0.1	0.7±0.1	0.8±0.1	0.9
Scotland Wharf	-12	0.7±0.1	1.0±0.1	0.9±0.1	0.9±0.1	0.9
Jamestown	-13	0.8±0.1	0.9±0.1	0.8±0.1	0.9±0.2	0.9
Colonial Parkway	-14	0.8±0.2	0.9±0.1	0.8±0.1	0.9±0.1	0.9
Kings Mill	-15	0.6±0.2	0.9±0.1	0.8±0.1	0.9±0.1	0.8
Budweiser	-16	1.0±0.3	1.1±0.1	1.0±0.1	1.0±0.1	1.0
Dow	-17	1.3±0.3	1.2±0.2	1.0±0.1	1.1±0.1	1.2
Lee Hall	-18	1.4±0.2	1.2±0.1	1.2±0.1	1.4±0.3	1.3
Fort Eustis	-19	1.1±0.2	1.0±0.1	0.9±0.1	1.1±0.1	1.0
Newport News	-20	1.2±0.3	1.1±0.1	1.0±0.1	1.1±0.1	1.1
Smithfield(Subst.)	-21	1.2±0.3	1.2±0.1	1.1±0.1	1.2±0.1	1.2
Smithfield(10&258)	-22	1.1±0.2	1.1±0.2	0.9±0.1	0.9±0.2	1.0
Rt 10 and 676	-23	0.9±0.2	0.8±0.1	0.8±0.1	0.8±0.1	0.8

As observed in previous years, the Surry Station location displays clearly elevated dose rates throughout the year.

Other on-site locations appear to be only very slightly above nearby locations and the badges located near the station intake and discharges consistently give some of the lowest readings observed. The major fraction of the dose at the Surry Station location is undoubtedly due to operation of the station. The doses at other on-site locations may be partially due to the station, but only by a few tenths of a millirem per week at most. Doses due to the plant at locations away from the site, if they exist, are masked by doses from the usual natural environmental sources such as uranium, thorium and their daughters, and possibly worldwide fallout.

Precipitation Samples

Precipitation samples collected at the Surry Station and at Newport News. The samples are collected and analyzed on a monthly basis and as quarterly composties for gross beta deposition and tritium concentrations. Data which are summarized in Table III and on page 2-5 of Appendix I. Some samples collected at the Surry Station displayed gross beta deposition slightly higher than the Newport News location especially during the first half of the year. Gross beta measurements, the only measurements other than tritium required on these samples are not capable of indicating whether the differences are due to station operations or not. Some if not most of the activity during the first half of the year is due to worldwide fallout from both the well-known "Spring Peak" which is due to injection of long term radioactive debris from the stratosphere into the troposphere during early part of the year, and the Chinese nuclear test previously referred to.

Tritium concentrations in precipitation were comparable at both locations throughout the year, and were generally in the range to be expected from measurements of this nuclide in this medium.

The cause of the somewhat elevated concentrations in the February sample is unknown to us, but the increase was observed at both locations suggesting that it is due to large scale meteorological processes and not releases from Surry Station.

Milk Samples

Radionuclides attributable to worldwide fallout are found in milk samples throughout the country. The most prevalent nuclides are Cs-137 and Sr-90, which were detected in the usual low and variable concentrations to be expected in most of the milk samples collected during the year. Occasionally, I-131 is detected in milk samples collected for a few weeks after intrusion of debris for an atmospheric nuclear explosion. Such was the case with samples from Judkins, Gwaltney and Smith farms during March, shortly after the April nuclear detonation in the People's Republic of China (see also air particulates). All other milk samples collected during the year were below the detection limit (0.5 pCi/l) for I-131.

Strontium-89 and Ba-La-140 were below the detection limits in all samples collected during the year.

Radioactivity attributable to operation of Surry Station was not detected in any milk samples collected during the year. What activity was detected, is due to worldwide fallout and effects of the station, if any, were masked by the more abundant debris from that source.

Comparisons of average concentrations for all nuclides assayed and other statistical information are given in Table III and data for analyses on each sample are given on pages 3-1 and 3-2 of Appendix I.

Well Water Samples

Samples of water were collected from each of four wells once during the Spring and once in the Fall.

Gross alpha and gross beta activity were detected in most of the samples at the usual low levels encountered in environmental media. There was no statistically significant difference in concentrations, which were similar to those measured previously, between indicator and background stations and the activity is attributable to naturally occurring nuclides.

Tritium was detected above minimum detection limit of 330 pCi/1 in only one sample (Jamestown, 04/11/78, 530±110 pCi/1). This concentration is within the range to be expected in environmental samples and is not due to operation of the Surry Plant. The Fall sample from the Jamestown location was below MDL.

Analytical data are given on page 5-1 (Appendix I) and summarized in Table III.

Surface Water Samples

Surface water samples were collected in the Spring and Fall from each of four locations. Gross alpha and gross beta concentrations were all at the low concentrations usually expected to be found in environmental surface water, with no significant differences between indicator and background stations or concentrations measured during 1977.

Tritium at typical environmental levels was detected in Spring samples, but was below the minimum detection levels in Fall samples. The tritium in the spring samples is attributable to either normal environmental level fluctuations or fallout from recent atmospheric nuclear explosions and not operation at nuclear power stations.

Average concentrations for indicator and background stations are given in Table III, and analytical data for all samples are given on page 5-1 of Appendix I.

James River Water Samples

Samples of water from the James River are collected bi-monthly from five locations including the station inlet and dishcharge and are analyzed for gamma emitters. Semi-annual composites of the collections from the Chickahominy and Newport News locations are also analyzed for tritium. Quarterly samples are collected from the discharge. These samples are split with a State agency and are analyzed for tritium, Sr-89 and Sr-90 in addition to gamma emitters. Analytical data are presented on pages 4-1 through 4-3 of Appendix I and are summarized in Table III of this report.

Gamma emitters were below the detection requirements of this program in all samples collected as were Sr-89 and Sr-90 in those samples requiring analyses for these latter nuclides.

Tritium was detected in all of the Station Discharge (State Split) samples. The April and October samples were in the range frequently encountered in environmental surface water. The January and July samples displayed concentrations somewhat higher than usually expected in the environment. It is possible that these measurements represent releases from the Station.

Tritium in the semi-annual composites from Chickahominy and Newport News was below the detection limit of 300 pCi/l for both halves of the year.

Silt Samples

Silt Samples are collected semi-annually from six locations and analyzed for gamma emitters.

Silt is one of the few environmental media in which radioactive effluents from nuclear power stations are usually detected. Most of the samples collected contained measurable concentrations of Cs-137, several contained Co-60 above the MDL's, and the Fall sample from the Station Discharge contained Cs-134. The Spring sample from the same location was anomalous in that no radioactivity was detected in a sample which is expected to be one of the highest areas. This probably represents a sampling problem rather than an actual "absence" of activity in the area. The levels of activity measured are generally comparable with those encountered in previous years. Precise comparison cannot be made because of the variability of concentrations at a given location and the relatively infrequent collections.

Data are summarized in Table III and detailed in Appendix I, page 4-8.

Clam Samples

Clam samples are collected bi-monthly from five locations near the station including the Station Discharge and are analyzed for gamma emitters. Samples from this location are frequently designated "State Split Samples" and such samples are analyzed for Sr-89 and Sr-90 as well as gamma emitters. Gamma emitters were below the LLD's of the program in all samples collected during the year. Analysis of State Split clam samples for radiostrontium revealed the presence of only Sr-90 at levels attributable to worldwide fallout in one sample (May).

Analytical data are presented on page 4-5 of Appendix I and summarized in Table III.

Oyster Samples

Samples of oysters are collected from Deep Water Shoal, Point of Shoal, and Newport News on a bi-monthly basis and analyzed for gamma emitters.

Some of the collections from Newport News are designated State Split samples. Data presented on page 4-6 of Appendix I show that concentrations of gamma emitters were below the LLD's of the program throughout the year.

Fish Samples

Fish are collected from the vicinity of the Station twice a year and analyzed for gamma emitters by gamma spectroscopy. A sample of catfish collected in February contained 1.9±1.6 pCi/kg (wet weight) Cs-137. This concentration of Cs-137 is not considered to be especially unusual in bottom feeders. This and other gamma emitters were below the LLD's for the program in other samples of this and other species collected during the year. Data are presented on page 4-7 of Appendix I.

Crab Samples

Samples of crabs from the vicinity of Surry Station are collected in July, August and September. Results of analyses on each of the collections as given on page 4-7 of Appendix I indicate that gamma emitters were below the LLD's for the program in all samples.

Soil Samples

Soil samples are collected annually from six locations and analyzed by gamma spectrometry for gamma emitters. The only nuclide detected at concentrations greater than the LLD's for the program was Cs-137. Because the samples collected during the scheduled collection yielded unexpected concentrations of Cs-137, a second series of samples were obtained and analyzed. The concentrations of Cs-137 have been quite variable throughout the years as is illustrated in the table below. This is probably due to the well recognized difficulty of obtaining truly representative samples of soil. There are no clear trends and the origin of the cesium is unclear.

Long and short term worldwide fallout are probably the major factors and contributions to the total by the station can not be ruled out. If, however, the major fraction were due to the station, significant amounts of Cs-134 and Co-60 might be expected in the samples, but this was not the case. Detailed analytical data for the current year's samples are found on page 5-2 of Appendix I.

Cs-137 Concentrations in Soil Samples
10^2pCi/kg*

	1975	1976	1977	1978(Aug)	1978(Sept)
Surry Station	35	1	17	<2	4
Ft. Eustis	--	18	10	17	18
Dow	10	2	2	<2	3
Bacon's Castle	8	24	2	23	9
Alliance	2	3	2	<2	3
Colonial Parkway	--	15	12	22	7

*Data rounded to nearest whole unit, statistical errors omitted.

Crop Samples

Samples of food crops (corn, peanuts) are collected from two farms in the area annually and analyzed for gamma emitters, Sr-89 and Sr-90. No radioactivity was detected in any of the samples at the LLD's applicable to this program. Data may be found on page 5-2 of Appendix I.

Fowl Samples

A Canadian Goose from the Hog Island Reserve was collected in March and an American Egret was obtained on Hog Island Point in September. The fowl were analyzed by spectrometry for gamma emitters, specifically Cs-134 and Cs-137. Concentrations of these nuclides were below the LLD of 80 pCi/kg for both samples. Data are given on page 5-2 of Appendix I.

ANALYTICAL PROCEDURES

Samples received at the laboratory are analyzed for the various radioactive components by standard radiochemical methods. These methods are equal to, and in most cases identical with, those of the U. S. DOE [1] or those of the Federal E. P. A. [2].

Brief descriptions of analytical procedures are available in the Laboratory Procedures Manual available at Surry Station and in the radioanalytical contractor's laboratory.

Air Particulate Filters

Gross Beta - Exposed air particulate filters are counted in low background Geiger or proportional flow beta counters using anti-coincidence background suppression. Filters are counted long enough to ensure that the required sensitivity (LLD) will be met.

Gamma Isotopic - quarterly composites of air particulate filters are counted in high resolution (GeLi) gamma spectrometers for periods of time long enough to ensure that the required program sensitivity (LLD) is met. (See also intro. to data tables, Appendix I).

Water Samples (including surface, well, James River waters and precipitation).

Gross Beta - a measured aliquot of sample is digested, "wet-ashed", evaporated, transferred to a tared 47mm stainless steel planchet, dried and weighed. The planchetted sample is counted long enough in a low background beta counter to ensure that the LLD of the program will be met.

(1) HASL Procedures Manual, edited by John H. Harley, Health and Safety Laboratory, U. S. Atomic Energy Commission, 1972 edition, revised annually.

(2) National Environmental Research Center, Environmental Protection Agency; Handbook of Radiochemical Analytical Methods. Program Element 1HA 325. Office of Research and Development, Las Vegas, Nevada 89114.

Gamma Isotopic - a measured aliquot of the sample is evaporated to a small controlled volume and counted in a standard geometry in a high resolution (Geli) gamma spectrometer long enough to ensure meeting the sensitivity requirements of the program. See also the Introduction to Data Tables.

Strontium-89 and Strontium-90 - carrier strontium is added to a measured aliquot of sample. The strontium is then separated and purified by either ion exchange chromatography (EPA method) or straight wet chemistry (HASL method). The chemical yield for strontium is determined by atomic adsorption spectrometry or gravimetric methods. After a suitable period (usually 14 days) to allow for ingrowth of Y-90 the sample is counted in a low background beta counter (equilibrim or total Sr count). The strontium is next put into solution, carrier yttrium added, and the strontium and yttrium fractions separated. The yttrium is counted and from the Y-90 (Sr-90 daughter) count, the Sr-90 concentration can be determined. The difference between the total strontium concentration as determined by the equilibrium count and the Sr-90 concentration as determined from the Y-90 count is the Sr-89 concentration. Equations are available to permit calculation of Sr-89 and Sr-90 by counting the purified Sr fraction at two points during ingrowth of the Sr-90 daughter Y-90. While either method is acceptable, we find the former method to provide more consistent results.

Tritium - tritium as tritiated water is analyzed by liquid scintillation counting after distillation. If high sensitivity is not required (ie. LLD $\sim$500 pCi/l) the sample is distilled, mixed with the appropriate counting phosphors and counted with no further treatment. If higher sensitivity is required (ie. $<\sim$500 pCi/l) the sample is isotopically enriched in tritium concentration prior to liquid scintillation counting.

Isotopic enrichment is done by the classical method of Ostlund which involves alkaline electrolysis of a purified aliquot of sample under controlled conditions of temperature and electrode current density.

Milk Samples

I-131 - measured amounts of carrier iodide are added to a known volume of milk and the iodine extracted on anion exchange resin. The iodine is recovered and purified by classical iodine chemistry methods which are similar to those given in former Regulatory Guide 4.3. The yield or recovery of iodine is measured gravimetrically and the precipitated sample is mounted and counted in a low level beta detector for a long enough period to ensure that the required LLD is met.

Gamma Isotopic - a measured aliquot of sample is evaporated and oven dried to a standard volume and counted in a fixed geometry in a high resolution (GeLi) gamma spectrometer for a long enough period to ensure that the required LLD's are reached (see also Introduction to data Tables).

Sr-89 and Sr-90 - Stable strontium carrier is added to an aliquot of the sample which is then dried and ashed at high temperature (>700^{o}c). The ash is dissolved and the solution treated from this point on in the same manner as are water samples (Q.V.).

Organic Samples (including Clams, Oysters, Fish, Crabs, Food Crops and Fowl).

Gamma Isotopic Analysis - a measured aliquot of sample is oven dried or ashed as appropriate, placed in a controlled geometry and counted in a high resolution (GeLi) gamma spectrometer for a period long enough to ensure that the LLD's of the program will be met (see also intro. to Data Tables).

In the case of samples such as fish and fowl, the edible flesh is separated from bones and entrails prior to drying.

Sr-89 and Sr-90 - stable strontium carrier is added to a weighed aliquot of the sample and the sample is ashed at high temperature (>700°c). The ashed sample is then dissolved and processed in the same manner as are water or milk samples.

Soil and Silt Samples

Gamma Isotopic Analysis - the sample is oven dried to facilitate handling and then sieved to remove pieces of stone and/or other large pieces of material. An appropriate sized, weighed aliquot of the sample is then transferred into a standard geometry container and counted for a period long enough to ensure that the LLD of the program will be met. (See also Introduction to Data Tables).

Thermoluminescent Dosimeters (TLD)

Environmental radiation doses are measured using badges comprizing five chips sealed in plastic protective holders having a density of 50 mg/cm^2. The TLD chips are 1/8" x 1/8" x 1/32 LiF (thallium activated) known commercially as Harshaw-100. The chips are all selected to provide uniform response to within 5% of the mean for the batch.

Prior to installation, the chips are annealed by a standard cycle of 60 minutes at 400°c and immediate cooling to ambient temperature by placing the tray containing the annealed chips on an aluminum block 12" x 12" x 1".

After exposure the chips are read on an Eberline Instrument Corporation Model TLR-5 reader. The system employs a preheat cycle which removes low temperature peaks and integrates and digitizes only the light output in a selected temperature range.

The dose is calculated from the average light output for the five chips and the statistical uncertainty is the standard deviation of the five readings. Control badges are used to detect any unusual exposure to the badge which might occur during shipment.

TABLE A

Detection Capabilities for Environmental Sample Analysis

	Lower Limit of Detection (LLD)					
Anaysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m^3)	Fish (pCi/kg,wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
gross beta	2	1×10^{-2}				
^{3}H	330					
^{54}Mn	15		130			
^{59}Fe	30		260			
$^{58,60}Co$	15		130			
^{65}Zn	30		260			
^{95}Zr-Nb	10					
^{131}I	1	7×10^{-2}		1	25	
$^{134,137}Cs$	15	1×10^{-2}	130	15	80	150
^{140}Ba-La	15			15		

TABLE B

Lower Limits of Detection (LLD) for Analyses Not Required in Regulatory Guide 4.8

Media	Analysis	LLD
Water	Gross α	1 pCi/l
	Sr-89	5 pCi/l
	Sr-90	2 pCi/l
Precipitation	Gross β	5 pCi/l
	Tritium	330 pCi/l
Air Particulates	Gross α	0.01 pCi/m^3
Fowl	Gamma Isotopic	(1)
Food Crops	Sr-89	20 pCi/kg
	Sr-90	10 pCi/kg
Oysters	Gamma Isotopic	(2)
Clam	Gamma Isotopic	(2)
	Sr-89	20 pCi/kg
	Sr-90	10 pCi/kg
Crab	Gamma Isotopic	(2)
Milk	Sr-89	5 pCi/l
	Sr-90	2 pCi/l
Soil	Gamma Isotopic	(3)

(1) Same as RG. 4.8 for Food Crops.
(2) Same as RG. 4.8 for Fish.
(3) Same as RG. 4.8 for Sediment.

APPENDIX I

Data Tables

1.0 Introduction to the Data Tables

In this section are given items of information helpful in understanding the presentation of the data in the Tables.

1. Error Terms

Data preceded by the "less than" symbol (<) are at the 3σ (99% confidence) level. The error terms on other data are 2σ (95% confidence).

2. Sensitivities - LLD's

Analytical sensitivities or LLD's (Lower Limits of Detection) are those given in the most recent NRC Branch Position on Regulatory Guide 4.8. (Table A) For analyses not required in RG. 4.8, Federal EPA, former requirements for similar programs, or other appropriate guides are used (Table B). The LLD's are calculated as per RG. 4.8 at the 3σ level.

The Guide specifically states that the LLD's are a priori not a posteriori; limits for a particular measurement. When, however, RG. 4.8 or other LLD's have not been achieved, a footnote giving a brief explanation has been inserted.

3. Gamma Isotopic Analyses

All samples to be analyzed for gamma emitters are assayed using high resolution gamma spectrometers. (Geli). The spectra are computer scanned using recognized programs. The energy search programs specifically examine the peak areas of gamma energies for the expected effluents from nuclear power plants. Only the nuclides required by NRC Reg. Guide 4.8 are reported in the Data Tables. If other gamma emitters associated with either power station operation or worldwide fallout from nuclear weapons tests are detected, this information is either given in discussions of the data or entered as footnotes to the data tables.

Naturally occurring gamma emitters are frequently detected in environmental samples. Analyses of these nuclides is not required by the NRC and they are neither quantified when detected nor reported in the Data Tables.

4. Exponents

Exponents necessary to prevent data tables from being cumbersome are handled in the conventional manner of including them in column headings.

2.0 Airborne Radioactivity

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GROSS ALPHA AND BETA CONCENTRATIONS IN AIR PARTICULATES
(Bi-Weekly Collections)

Collection Date	SS - Surry Station			HIR - Hog Island Reserve			BC - Bacon's Castle		
	Volume (m^3)	10^{-2} pCi/m^3		Volume (m^3)	10^{-2} pCi/m^3		Volume (m^3)	10^{-2} pCi/m^3	
		Gross α	Gross β		Gross α	Gross β		Gross α	Gross β
01/10/78	330	< 1	8 ± 1	295	< 1	2 ± 1	280	< 1	9 ± 1
01/24/78	330	< 1	2 ± 1	290	< 1	3 ± 1	285	< 1	5 ± 1
02/07/78	335	< 1	10 ± 1	295	< 1	8 ± 1	300	< 1	3 ± 1
02/22/78	355	< 1	5 ± 1	315	< 1	9 ± 1	330	< 1	3 ± 1
03/07/78	325	< 1	8 ± 1	270	< 1	10 ± 1	285	< 1	9 ± 1
03/21/78	330	< 1	13 ± 1	270	< 1	11 ± 1	285	< 1	11 ± 1
04/11/78	495	< 1	61 ± 9	455	< 1	48 ± 7	445	< 1	59 ± 9
04/18/78	160	< 1	31 ± 3	140	< 1	25 ± 3	150	< 1	28 ± 3
05/02/78	330	< 1	21 ± 3	160	< 1	6 ± 1	285	< 1	17 ± 3
05/21/78	307	< 1	10 ± 1	166	< 1	15 ± 2	277	< 1	9 ± 1
05/30/78	342	< 1	6 ± 1	319	< 1	8 ± 1	293	< 1	11 ± 2
06/13/78	330	< 1	18 ± 3	295	< 1	10 ± 2	270	< 1	18 ± 3
06/27/78	315	< 1	16 ± 2	300	< 1	17 ± 2	285	< 1	21 ± 2
07/11/78	310	< 1	14 ± 1	295	< 1	14 ± 1	300	< 1	15 ± 2
07/25/78	312	< 1	13 ± 1	293	< 1	13 ± 1	296	< 1	13 ± 1
08/04/78	345	< 1	5 ± 1	317	< 1	3 ± 1	306	< 1	7 ± 1
08/22/78	303	< 1	7 ± 1	275	< 1	5 ± 1	267	< 1	6 ± 1
09/05/78	201	< 1	9 ± 1	278	< 1	10 ± 2	301	< 1	6 ± 1
09/19/78	330	< 1	< 1	285	< 1	7 ± 1	290	< 1	< 1
10/03/78	308	< 1	6 ± 1	266	< 1	6 ± 1	287	< 1	1 ± 1
10/17/78	24	< 1	9 ± 3	280	< 1	5 ± 1	310	< 1	1 ± 1
10/31/78	180	< 1	4 ± 1	280	< 1	3 ± 1	290	< 1	8 ± 1
11/14/78	150	< 1	9 ± 2	280	< 1	12 ± 2	305	< 1	4 ± 1
11/29/78	178	< 1	8 ± 1	299	< 1	5 ± 1	331	< 1	4 ± 1
12/13/78	215	< 1	4 ± 1	245	< 1	1 ± 1	290	< 1	4 ± 1
12/17/78	125	< 1	6 ± 2	100	< 1	4 ± 2	110	< 1	1 ± 1
12/19/78	49	< 1	3 ± 1	40	< 1	2 ± 2	43	< 1	< 1
12/21/78	43	< 1	7 ± 1	39	< 1	5 ± 1	45	< 1	< 1

(a) Not available - out of order.

VEPCO

GROSS ALPHA AND BETA CONCENTRATIONS IN AIR PARTICULATES
(Bi-Weekly Collections)

Collection Date	ALL - Alliance			CP - Colonial Parkway			Dow		
	Volume (m^3)	10^{-2} pCi/m^3		Volume (m^3)	10^{-2} pCi/m^3		Volume (m^3)	10^{-2} pCi/m^3	
		Gross α	Gross β		Gross α	Gross β		Gross α	Gross β
01/10/78	310	< 1	6 ± 1	30	<1	< 3	300	< 1	7 ± 1
01/24/78	315	< 1	4 ± 1	(a)	-	-	305	< 1	7 ± 1
02/07/78	305	< 1	8 ± 1	(a)	-	-	325	< 1	9 ± 1
02/22/78	380	< 1	9 ± 1	195	<1	7 ± 1	360	< 1	9 ± 1
03/07/78	295	< 1	7 ± 1	190	<1	6 ± 1	300	< 1	9 ± 1
03/21/78	315	< 1	12 ± 1	185	<1	11 ± 1	315	< 1	11 ± 1
04/11/78	505	< 1	60 ± 9	320	<1	48 ± 7	470	< 1	59 ± 8
04/18/78	165	< 1	11 ± 2	90	<1	26 ± 3	170	< 1	26 ± 3
05/02/78	340	< 1	17 ± 3	90	<1	37 ± 6	305	< 1	22 ± 3
05/21/78	461	< 1	7 ± 1	199	<1	7 ± 1	279	< 1	14 ± 1
05/30/78	216	< 1	11 ± 2	217	<1	10 ± 2	324	< 1	7 ± 1
06/13/78	340	< 1	14 ± 2	200	<1	12 ± 2	300	< 1	15 ± 2
06/27/78	300	< 1	18 ± 2	200	<1	21 ± 2	300	< 1	13 ± 1
07/11/78	320	< 1	14 ± 1	220	<1	14 ± 2	300	< 1	6 ± 1
07/25/78	313	< 1	11 ± 1	218	<1	13 ± 1	302	< 1	13 ± 1
08/04/78	329	< 1	5 ± 1	235	<1	5 ± 1	313	< 1	5 ± 1
08/22/78	297	< 1	5 ± 1	205	<1	7 ± 1	279	< 1	6 ± 1
09/05/78	302	< 1	6 ± 1	222	<1	10 ± 2	282	< 1	10 ± 2
09/19/78	315	< 1	7 ± 1	255	<1	8 ± 2	290	< 1	7 ± 1
10/03/78	302	< 1	5 ± 1	215	<1	8 ± 2	276	< 1	5 ± 1
10/17/78	280	< 1	5 ± 1	(a)	-	-	290	< 1	3 ± 1
10/31/78	285	< 1	6 ± 1	565	<1	6 ± 1	295	< 1	7 ± 1
11/14/78	290	< 1	16 ± 2	290	<1	29 ± 4	290	< 1	13 ± 2
11/29/78	324	< 1	5 ± 1	595	<1	4 ± 1	301	< 1	6 ± 1
12/13/78	300	< 1	3 ± 1	565	<1	5 ± 1	265	< 1	4 ± 1
12/17/78	115	< 1	4 ± 2	120	<1	5 ± 2	105	< 1	5 ± 2
12/19/78	45	< 1	3 ± 1	38	<1	2 ± 2	43	< 1	3 ± 2
12/21/78	47	< 1	6 ± 1	44	<1	5 ± 1	53	< 1	4 ± 1

(a) Not available - out of order.

VEPCO

GROSS ALPHA AND BETA CONCENTRATIONS IN AIR PARTICULATES
(Bi-Weekly Collections)

Collection Date	FE - Fort Eustis			NN - Newport News		
	Volume (m^3)	10^{-2} pCi/m^3		Volume (m^3)	10^{-2} pCi/m^3	
		Gross α	Gross β		Gross α	Gross β
01/10/78	320	<1	2 ± 1	280	< 1	10 ± 1
01/24/78	225	<1	8 ± 1	325	< 1	8 ± 1
02/07/78	65	<1	8 ± 2	285	< 1	11 ± 1
02/22/78	145	<1	6 ± 1	255	< 1	10 ± 1
03/07/78	325	<1	9 ± 1	275	< 1	10 ± 1
03/21/78	335	<1	9 ± 1	295	< 1	12 ± 1
04/11/78	475	<1	50 ± 7	455	< 1	66 ± 9
04/18/78	160	<1	29 ± 3	150	< 1	31 ± 3
05/02/78	300	<1	28 ± 4	305	< 1	21 ± 3
05/21/78	412	<1	9 ± 1	283	< 1	12 ± 1
05/30/78	322	<1	10 ± 2	329	< 1	9 ± 2
06/13/78	300	<1	11 ± 2	300	< 1	17 ± 3
06/27/78	300	<1	1 ± 1	310	< 1	16 ± 2
07/11/78	280	<1	4 ± 1	305	< 1	15 ± 2
07/25/78	299	<1	3 ± 1	302	< 1	14 ± 1
08/04/78	220	<1	5 ± 1	324	< 1	8 ± 1
08/22/78	279	<1	6 ± 1	281	< 1	7 ± 1
09/05/78	298	<1	8 ± 1	303	< 1	10 ± 2
09/19/78	295	<1	8 ± 2	305	< 1	7 ± 1
10/03/78	286	<1	4 ± 1	291	< 1	4 ± 1
10/17/78	290	<1	5 ± 1	300	< 1	5 ± 1
10/31/78	295	<1	6 ± 1	290	< 1	6 ± 1
11/14/78	160	<1	9 ± 2	270	< 1	13 ± 2
11/29/78	234	<1	4 ± 1	313	< 1	7 ± 1
12/13/78	134	<1	2 ± 1	275	< 1	1 ± 1
12/17/78	90	<1	5 ± 2	105	< 1	9 ± 2
12/19/78	36	1±1	< 1	45	< 1	3 ± 1
12/21/78	36	<1	3 ± 1	40	1 ± 1	5 ± 1

GAMMA EMITTERS IN AIR PARTICULATE FILTER COMPOSITE
(Quarterly Composites of Bi-Weekly Collections)

Stations in composite: SS, HIR

Collection Period	10^{-2} pCi/m^3			
	Ce-144	Ru-106	Cs-137	Cs-134
1st Quarter	2±1	1±1	<1	<1
2nd Quarter	7±2	<2*	<1	<1
3rd Quarter	2±1	<1	<1	<1
4th Quarter	<1	<1	<1	<1

Stations in composite: BC, ALL, CP, DOW, FE

Collection Period	10^{-2} pCi/m^3			
	Ce-144	Ru-106	Cs-137	Cs-134
1st Quarter	4±1	<1	<1	<1
2nd Quarter	5±1	2±1	<1	<1
3rd Quarter	<1	<1	<1	<1
4th Quarter	<1	<1	<1	<1

Stations in composite: NN

Collection Period	10^{-2} pCi/m^3			
	Ce-144	Ru-106	Cs-137	Cs-134
1st Quarter	5±1	<1	<1	<1
2nd Quarter	16±4	<4*	<1	<1
3rd Quarter	<3*	<2*	<1	<1
4th Quarter	<1	<1	<1	<1

*Higher LLD due to larger Compton and/or smaller sample composite volume.

GROSS BETA DEPOSITION AND TRITIUM CONCENTRATIONS
IN PRECIPITATION SAMPLES
(Monthly Collections)

Collection Period	Surry Station Gross β pCi/l	Surry Station Gross β nCi/m²	Surry Station Tritium pCi/l	Newport News Gross β pCi/l	Newport News Gross β nCi/m²	Newport News Tritium pCi/l
January	21±6	2.5±0.6	360±100	31±6	2.2±0.4	360±100
February	60±8	3.4±0.5	2200±700	50±7	1.8±0.3	1700±700
March	25±6	2.5±0.6	550±100	15±6	0.9±0.3	<500
April	57±6	2.6±0.3	<500	43±4	2.4±0.2	<500
May	24±2	3.3±0.3	600±100	15±2	1.9±0.2	600±100
June	11±2	1.0±0.2	<500	7±2	0.4±0.1	<500
July	10±2	0.3±0.1	500±300	11±2	0.3±0.1	500±300
August	8±2	0.5±0.1	500±300	11±2	0.2±0.1	<500
September	14±2	0.2±0.1	400±300	3±2	0.1±0.1	800±300
October	12±2	0.2±0.1	560±340	4±1	0.1±0.1	400±330
November	11±2	0.2±0.1	1700±400	7±2	0.1±0.1	950±500
December	3±2	0.2±0.1	<500	8±2	0.1±0.1	410±310

GROSS BETA DEPOSITION AND TRITIUM CONCENTRATIONS
IN PRECIPITATION SAMPLES
(Quarterly Composites of Monthly Collections)

Collection Period	Surry Station Gross β nCi/m²	Surry Station Tritium pCi/l	Newport News Gross β nCi/m²	Newport News Tritium pCi/l
1st Quarter	*	700±100	*	700±100
2nd Quarter	0.38±0.04	810±130	0.11±0.02	800±130
3rd Quarter	0.13±0.03	400±300	0.05±0.02	800±300
4th Quarter	0.03±0.01	690±100	0.04±0.02	1100±200

*Sample lost in transit.

3.0 Radioactivity in Milk

VEPCO - Surry

RADIOACTIVITY IN MILK SAMPLES
(Monthly Collections)

Bacon's Castle (EPPS) - State Split Samples

Collection Date	pCi/l as of collection date					g/l
	I-131	Sr-89	Sr-90	Cs-137	Ba-La-140	Stable Ca
01/10/78	<0.5	<5	3±1	<15	<15	1.7
02/01/78	<0.5	<5	3±1	<15	<15	1.6
03/20/78	<0.5	<5	3±1	<15	<15	1.6
04/18/78	<0.5	<5	5±1	<15	<15	1.8
05/16/78	<0.5	<5	2±1	<15	<15	1.6
06/27/78	<0.5	<5	6±1	<15	<15	2.2
07/25/78	<0.5	<5	4±1	<15	<15	1.8
08/22/78	<0.5	<5	6±1	<15	<15	1.6
09/05/78	<0.5	<5	4±2	<15	<15	1.2
10/03/78	<0.5	<5	17±2	<15	<15	1.6
11/28/78	<0.5	<5	4±2	<15	<15	1.2
12/12/78	<0.5	<5	4±2	<15	<15	1.1

Bacon's Castle (Judkins)

	pCi/l as of collection date					g/l
	I-131	Sr-89	Sr-90	Cs-137	Ba-La-140	Stable Ca
01/24/78	<0.5	<5	5±2	<15	<15	2.2
02/22/78	<0.5	<5	7±1	18±13	<15	1.8
03/07/78	<0.5	<5	15±2	<15	<15	1.7
04/11/78	1.1±0.3	<5	7±3	<15	<15	0.9
05/02/78	<0.5	<5	11±2	23±6	<15	2.1
06/20/78	Sample lost during shipment					
07/25/78	<0.5	<5	4±3	<15	<15	1.9
08/09/78	<0.5	<5	8±2	<15	<15	1.5
09/19/78	<0.5	<5	<2	<15	<15	1.2
10/17/78	<0.5	<5	16±2	<15	<15	1.3
11/14/78	<0.5	<5	6±1	<15	<15	1.0
12/12/78	<0.5	<5	4±3	<15	<15	1.4

Lee Hall (Ross) - State Split Samples

	pCi/l as of collection date					g/l
	I-131	Sr-89	Sr-90	Cs-137	Ba-La-140	Stable Ca
01/10/78	<0.5	<5	2±2	16±14	<15	1.8
02/01/78	<0.5	<5	1±1	<15	<15	1.7
03/20/78	<0.5	<5	3±1	20±11	<15	1.6
04/18/78	<0.5	<5	9±4	<15	<15	1.4
05/16/78	<0.5	<5	2±1	<15	<15	1.7
06/27/78	<0.5	<5	3±1	<15	<15	1.6
07/25/78	<0.5	<5	3±2	<15	<15	1.1
08/22/78	<0.5	<5	7±3	<15	<15	1.2
09/05/78	<0.5	<5	5±2	<15	<15	1.2
10/03/78	<0.5	<5	5±2	<15	<15	1.4
11/27/78	<0.5	<5	<2*	<15	<15	1.1
12/12/78	<0.5	<5	2±2	<15	<15	1.3

*Low chemical yield.

VEPCO - Surry

RADIOACTIVITY IN MILK SAMPLES
(Monthly Collections)

Smithfield (Gwaltney)

Collection Date	pCi/l as of collection date					g/l
	I-131	Sr-89	Sr-90	Cs-137	Ba-La-140	Stable Ca
02/07/78	<0.5	<5	3±1	<15	<15	1.9
02/23/78	<0.5	<5	6±1	21±13	<15	1.7
03/07/78	<0.5	<5	5±2	<15	<15	1.7
04/18/78	1.2±0.3	<5	2±1	<15	<15	1.6
05/30/78	<0.5	<5	6±2	<15	<15	1.7
06/27/78	<0.5	<5	4±1	<15	<15	1.1
07/25/78	<0.5	<5	7±2	<15	<15	1.5
08/20/78	Sample lost in shipment					
09/19/78	<0.5	<5	10±2	<15	<15	1.3
10/17/78	<0.5	<5	4±1	<15	<15	1.4
11/29/78	<0.5	<5	4±4	<15	<15	
12/21/78	<0.5	<5	7±2	<15	<15	1.1

Colonial Parkway (Smith)

	pCi/l as of collection date					g/l
	I-131	Sr-89	Sr-90	Cs-137	Ba-La-140	Stable Ca
01/24/78	<0.5	<5	3±1	<15	<15	1.7
02/07/78	<0.5	<5	4±1	16±12	<15	1.6
03/07/78	<0.5	<5	2±1	<15	<15	1.8
04/11/78	0.6±0.2	<5	3±1	<15	<15	1.1
05/02/78	<0.5	<5	7±2	13± 5	<15	1.7
06/27/78	<0.5	<5	6±1	<15	<15	1.2
07/25/78	<0.5	<5	7±2	<15	<15	1.3
08/09/78	<0.5	<5	4±1	<15	<15	1.3
09/19/78	<0.5	<5	3±2	<15	<15	1.3
10/17/78	<0.5	<5	3±2	<15	<15	1.0
11/14/78	<0.5	<5	3±1	<15	<15	1.5
12/19/78	<0.5	<5	<2	<15	<15	0.9

4.0 Samples from the Aquatic Environment

VEPCO -Surry

GAMMA EMITTERS IN JAMES RIVER WATER SAMPLES
(Bimonthly Collections)

Month Collected	pCi/1								
	Ba-La-140	Cs-134	Cs-137	Zr-Nb-95	Co-58	Mn-54	Zn-65	Co-60	Fe-59
				STATION INTAKE					
January	<15	<15	<15	<10	<15	<15	<30	<15	<30
March	<15	<15	<15	<10	<15	<15	<30	<15	<30
May	<15	<15	<15	<10	<15	<15	<30	<15	<30
July	<15	<15	<15	<10	<15	<15	<30	<15	<30
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30
				STATION DISCHARGE					
January	<15	<15	<15	<10	<15	<15	<30	<15	<30
March	<15	<15	<15	<10	<15	<15	<30	<15	<30
May	<15	<15	<15	<10	<15	<15	<30	<15	<30
July	<15	<15	<15	<10	<15	<15	<30	<15	<30
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30

VEPCO - Surry

GAMMA EMITTERS IN JAMES RIVER WATER SAMPLES
(Bimonthly Collections)

Month Collected	pCi/l								
	Ba-La-140	Cs-134	Cs-137	Zr-Nb-95	Co-58	Mn-54	Zn-65	Co-60	Fe-59
CHICKAHOMINY									
January	<15	<15	<15	<10	<15	<15	<30	<15	<30
March	<15	<15	<15	<10	<15	<15	<30	<15	<30
May	<15	<15	<15	<10	<15	<15	<30	<15	<30
July	<15	<15	<15	<10	<15	<15	<30	<15	<30
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30
HOG ISLAND POINT									
January	<15	<15	<15	<10	<15	<15	<30	<15	<30
March	<15	<15	<15	<10	<15	<15	<30	<15	<30
May	<15	<15	<15	<10	<15	<15	<30	<15	<30
July	<15	<15	<15	<10	<15	<15	<30	<15	<30
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30
NEWPORT NEWS									
January	<15	<15	<15	<10	<15	<15	<30	<15	<30
March	<15	<15	<15	<10	<15	<15	<30	<15	<30
May	<15	<15	<15	<10	<15	<15	<30	<15	<30
July	<15	<15	<15	<10	<15	<15	<30	<15	<30
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30

VEPCO - Surry

RADIOACTIVITY IN JAMES RIVER WATER SAMPLES
FROM THE STATION DISCHARGE
-STATE SPLIT SAMPLES-
(Quarterly Collections)

Collection Date:	01/24/78	04/11/78	07/11/78	10/03/78
Nuclide	pCi/l			
Sr-89	Not Required	<5	<5	<5
Sr-90	this sample	<2	<2	<2
Tritium	8400±800	470±110	1000±300	300±300
Ba-La-140	<15	<15	<15	<15
Cs-134	<15	<15	<15	<15
Cs-137	<15	<15	<15	<15
Zr-Nb-95	<10	<10	<10	<10
Co-58	<15	<15	<15	<15
Mn-54	<15	<15	<15	<15
Zn-65	<30	<30	<30	<30
Co-60	<15	<15	<15	<15
Fe-59	<30	<30	<30	<30

TRITIUM IN JAMES RIVER WATER SAMPLES
(Semiannual Composites of Bimonthly Samples)

Sample Location	pCi/l	
	1st half 1978	2nd half 1978
Chickahominy	<330	<330
Newport News	<330	<330

VEPCO - Surry

GAMMA EMITTERS IN CLAM SAMPLES
(Bi-Monthly Collections)

Sample Site	Month Collected	10^2 pCi/kg Wet Weight						
		Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
CHICKAHOMINY	January	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	March	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	May	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	July	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	September	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	November	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
LAWNES CREEK	January	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	March	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	May	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	July	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	September	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	November	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
JAMESTOWN	January	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	March	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	May	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	July	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	September	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	November	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
HOG ISLAND POINT	January	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	March	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	May	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	July	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	September	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	November	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3

VEPCO - Surry

GAMMA EMITTERS IN CLAM SAMPLES

State Split Samples from
Station Discharge

Month Collected	10^2 pCi/kg Wet						
	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
January*	<1.6*	<3.2*	<1.6*	<2.0*	<3.2*	<2.0*	<1.9*
March	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
May	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
July	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
September**	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
November	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3

* This sample is not a State Split. Instrument problems prevented achieving usual sensitivity.

** Not a State Split Sample.

Strontium-89 and Strontium-90 in Clams
(State Split Samples from
Station Discharge)

Collection Date	pCi/kg Wet Weight	
	Sr-89	Sr-90
March	Insufficient sample for Analysis.	
May	< 10	10 ± 10
July	< 10	< 10
November	<200	<200(a)

(a) Insufficient sample for more sensitive analysis.

VEPCO - Surry

GAMMA EMITTERS IN OYSTER SAMPLES
(Bi-Monthly Collections)

Location	Month Collected	10^2 pCi/kg Wet Weight						
		Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
Deep Water Shoal	January	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	March	Sample lost in shipment						
	May	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	July	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	September	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	November	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
Point of Shoal	January	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	March	Sample lost in shipment						
	May	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	July	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	September	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	November	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
Newport News	February	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	March*	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	May*	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	July*	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	September*	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
	November*	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3

* State Split Sample.

VEPCO - Surry

GAMMA EMITTERS IN FISH SAMPLES COLLECTED
IN THE VICINITY OF SURRY STATION
(Semi-Annual Collection)

Collection Date	Sample Type	10^2 pCi/kg Wet Weight						
		Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
February '78	Catfish	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	1.9±1.6
February '78	Perch	<2.2*	<4.5*	<2.2*	<2.8*	<4.5*	<2.5*	<2.8*
08/24/78	Catfish	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
08/24/78	Catfish	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3

*Insufficient sample available for more sensitive analysis.

GAMMA EMITTERS IN CRAB SAMPLES
COLLECTED IN THE VICINITY OF SURRY STATION
(July, August, September Collection)

Month Collected	10^2 pCi/kg Wet Weight						
	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
July	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
August	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3
September	<1.3	<2.6	<1.3	<1.3	<2.6	<1.3	<1.3

VEPCO - Surry

GAMMA EMITTERS IN SILT SAMPLES
(Semiannual Collections)

Collection Period: April

Collection Site	10^2pCi/kg Dry Weight					
	Cs-134	Cs-137	Co-58	Co-60	Mn-54	Zn-65
Chickahominy	<1.5	10.0±4.0	<1.5	<1.5	<1.5	<2.6
Station Discharge	<1.5	<1.5	<1.5	<1.5	<1.5	<2.6
Hog Island Point	<1.5	5.0±0.2	<1.5	<1.5	<1.5	<2.6
Station Intake	<1.5	8.0±0.2	<1.5	4.0±0.2	<1.5	<2.6
Point of Shoals	<1.5	3.0±0.1	<1.5	<1.5	<1.5	<2.6
Newport News	<1.5	4.0±0.1	<1.5	<1.5	<1.5	<2.6

Collection Period: September

Chickahominy	<1.5	9.0±2.0	<1.5	<1.5	<1.5	<2.6
Station Discharge	6.2±1.5	20.0±3.0	<1.5	14.0±3.0	<1.5	<2.6
Hog Island Point	<1.5	<1.5	<1.5	<1.5	<1.5	<2.6
Station Intake	<1.5	8.0±2.0	<1.5	<1.5	<1.5	<2.6
Point of Shoals	<1.5	10.0±2.0	<1.5	3.0±1.0	<1.5	<2.6
Newport News	<1.5	4.0±1.0	<1.5	<1.5	<1.5	<2.6

5.0 Radioactivity in the Terrestrial Environment

VEPCO - Surry

RADIOACTIVITY IN WELL WATER SAMPLES
(Semi-Annual Collections)

	1st Half Coll. 04/11/78 pCi/l			2nd Half Coll. 10/03/78 pCi/l		
	Gross α	Gross β	Tritium*	Gross α	Gross β	Tritium*
Surry Station	<1	<1	300±100	<1	3±2	<300
Hog Island Res.	<2**	3±2	<300	5±2	8±2	<300
Bacon's Castle	2±1	2±2	<300	<2**	5±2	<300
Jamestown	<1	4±2	530±110	2±1	3±2	<300

* Tritium Analyzed by enrichment method.

** Dissolved solids too high for more sensitive analysis.

RADIOACTIVITY IN SURFACE WATER SAMPLES
(Semi-Annual Collections)

	1st Half Coll. 04/11/78 pCi/l			2nd Half Coll. 10/03/78 pCi/l		
	Gross α	Gross β	Tritium*	Gross α	Gross β	Tritium*
Chippokes Creek	<1	<2	600±300	3±1	4±2	<500
Williamsburg Reserve	2±1	3±1	600±300	3±1	2±1	<500
Newport News Reserve	<1	4±1	900±300	3±1	2±2	<500
Smithfield	<1	4±1	700±300	2±1	9±2	<500

* Tritium Analyzed by direct L. S. Counting.

VEPCO - Surry

GAMMA EMITTERS IN SOIL SAMPLES
(Annual Collection)

Location	Samples Collected 08/11/78 10^2pCi/kg Cs-134	Cs-137	Samples Collected 09/19/78 10^2pCi/kg Cs-134	Cs-137
Surry Station	<1.5	<1.5	<1.5	4±1
Fort Eustis	<1.5	17±8	<1.5	18±2
Dow	<1.5	<1.5	<1.5	3±1
Bacon's Castle	<1.5	23±6	<1.5	9±1
Alliance	<1.5	<1.5	<1.5	3±1
Colonial Parkway	<1.5	22±6	<1.5	7±1

GAMMA EMITTERS IN FOWL
(Semi-Annual Collections)

Collection Area	Month Collected	Sample Type	10^2pCi/kg Cs-134	Cs-137
Hog Island Reserve	March	Canada Goose	<0.8	<0.8
Hog Island Point	September	American Egret	<0.8	<0.8

RADIOACTIVITY IN FOOD CROPS
(Annual Collection)

State Split Samples

Date Collected	Farm	Type	10^2pCi/kg, Wet Weight Cs-134	Cs-137	Sr-89	Sr-90
10/10/78	Slade	Corn	<0.8	<0.8	<0.1	<0.1
10/10/78	Brock	Corn	<0.8	<0.8	<0.1	<0.1
10/10/78	Slade	Peanuts	<0.8	<0.8	<0.1	<0.1
10/10/78	Brock	Peanuts	<0.8	<0.8	<0.1	<0.1
11/08/78	Brock	Soybeans	<0.8	<0.8	<0.1	<0.1
11/13/78	Slade	Soybeans	<0.8	<0.8	<0.3	0.15±0.03

VEPCO - Surry

GAMMA RADIATION
TOTAL mR/QTR. USING THERMOLUMINESCENT DOSIMETERS

VEPCO-ENVIRONMENTAL TLD'S 1978

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Date Installed:	01/10/78	04/11/78	07/11/78	10/04/78
Date Removed:	04/11/78	07/11/78	10/04/78	01/03/79
Location	ΣmR			
Control -00	9± 2	14± 1	11± 1	11±3
Surry Station -01	242±50	329±33	268±27	340±30
Guard Booth -02	23± 3	27± 4	25± 3	25±3
Surry East -03	19± 3	23± 2	21± 2	19±2
Surry North -04	17± 3	20± 2	16± 1	19±3
Hog Island Reserve -05	13± 2	19± 2	16± 1	16±2
Surry West -06	11± 1	17± 3	13± 1	14±1
Station Discharge -07	11± 2	13± 1	10± 1	9±2
Station Intake -08	12± 1	13± 1	10± 1	12±1
Surry South -09	16± 2	19± 1	16± 1	14±2
Bacons Castle -10	12± 2	16± 2	14± 1	14±1
Alliance -11	18± 2	15± 2	12± 1	12±2
Scotland Wharf -12	13± 1	17± 1	15± 1	14±2
Jamestown -13	15± 2	16± 2	14± 1	15±3
Colonial Parkway -14	14± 3	16± 1	13± 1	14±1
Kings Mill -15	11± 3	15± 1	13± 1	14±1
Budweiser -16	18± 5	18± 1	16± 1	17±2
Dow -17	24± 6	21± 3	16± 1	18±2
Lee Hall -18	25± 3	21± 1	20± 2	22±4
Fort Eustis -19	19± 2	17± 1	15± 1	18±2
Newport News -20	21± 5	19± 2	17± 1	17±2
Smithfield(Subst.) -21	22± 4	21± 1	18± 1	20±2
Smithfield(10&258) -22	19± 2	18± 1	15± 1	14±3
Rt 10 and 676 -23	16± 4	14± 1	13± 1	13±1

VEPCO - Surry

GAMMA RADIATION
TOTAL mR/QTR. USING THERMOLUMINESCENT DOSIMETERS

VEPCO-AREA TLD'S 1978

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Date Installed:	01/10/78	04/11/78	07/11/78	10/04/78
Date Removed:	04/11/78	07/11/78	10/04/78	01/03/79
Location			ΣmR	
Control -00	10±3	13±2	11±1	11±1
Training Center -01	12±2	14±1	12±1	13±1
Admin Bldg Entrance-02	24±4	23±1	22±2	21±2
Admin Bldg Recep -03	30±2	31±2	34±1	33±3
Admin Bldg Kitchen -04	24±3	22±1	23±1	21±2
Admin Bldg (Men) -05	27±5	29±3	30±1	30±3
Admin Bldg Conf -06	20±2	21±4	20±2	20±2
Cafeteria -07	28±3	30±4	31±1	28±3
Maintenance Shop -08	22±3	22±2	19±2	20±2
Storeroom East End -09	21±5	24±1	33±3	32±3
Storeroom West End -10	28±5	29±3	34±3	29±3
Control Room East -11	11±2	13±1	13±1	13±1
Control Room West -12	10±3	10±1	10±1	9±1
Intrument Shop -13	870±70	780±40	550±60	430±40
Clean Change Room -14	90±10	96±7	74±7	54±5
Security Bldg. -15	New Station beginning 3rd Qtr.		90±10	70±9
East Fence -16	"	"	400±40	380±40
North Fence -17	"	"	120±10	160±20
West Fence -18	"	"	270±30	210±20
South Fence -19	"	"	15±2	16±2
Electrical Shop -20	New Station beginning 4th Qtr.			120±10