VIRGINIA ELECTRIC POWER COMPANY

SURRY POWER STATION

RADIOLOGICAL ENVIRONMENTAL MONITORING

ANNUAL REPORT

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EBERLINE INSTRUMENT CORPORATION

Midwest Facility

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SURRY POWER STATION

OPERATIONAL ENVIRONMENTAL RADIOLOGICAL SURVEILLANCE PROGRAM

Annual Report

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Prepared for

VIRGINIA ELECTRIC POWER COMPANY

By

EBERLINE INSTRUMENT CORPORATION
NUCLEAR SERVICES DIVISION - MIDWEST FACILITIES
245 WEST ROOSEVELT ROAD
BLDG. 2, SUITE 9
WEST CHICAGO, IL 60185

as a contractor to

VIRGINIA ELECTRIC POWER COMPANY

Compiled by: Kathryn A. Kohl
Kathryn A. Kohl, Administrator

Written, Reviewed and Approved by: Chandrasekaran
Chandrasekaran, E.S., PhD, Manager

Date: 02/23/81

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SECTION I

PREFACE

ABSTRACT

This report presents the data obtained from the analyses of environmental samples collected through the Virginia Electric Power Company Surry Station Environmental Radiological Surveillance Program for the period 01 January 1980 through 31 December 1980.

The activity present above detection limits in the routinely collected sample media was observed to be of natural and atmospheric fallout origin. The results show that the radiation dose to a member of the general population did not exceed the technical specifications of 1% of the 10 CFR 20 limit during 1980.

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 1 and 2 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 izes the results of the radiological environmental surveillance measurements during calendar year 1980.

SUMMARY
1980

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 1980.

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.

Table 4 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 in Section 4.

SECTION 2

SAMPLING PROGRAM

All samples are collected by VEPCO Environmental Services Personnel and shipped to the Eberline laboratory in West Chicago, Illinois.

Upon receipt of the samples, the laboratory staff enters the samples in a log book identifying them as to sample type, collection date, and sample code number or location, then verifies the specific analyses to be performed on each sample. The samples are then stored, awaiting analysis, on shelves expressly for this purpose to assure accountability through the laboratory processes.

Table 1 lists the sampling locations and frequencies. Figure 1 shows the locations of the various sampling environs.

TABLE 1

Monitoring or Sampling Locations and Frequencies

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

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)

(a) Thermoluminescent dosimeters (TLDs) are monitored quarterly. A full listing of the 43 locations is shown on page 63.

TABLE 1 (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)

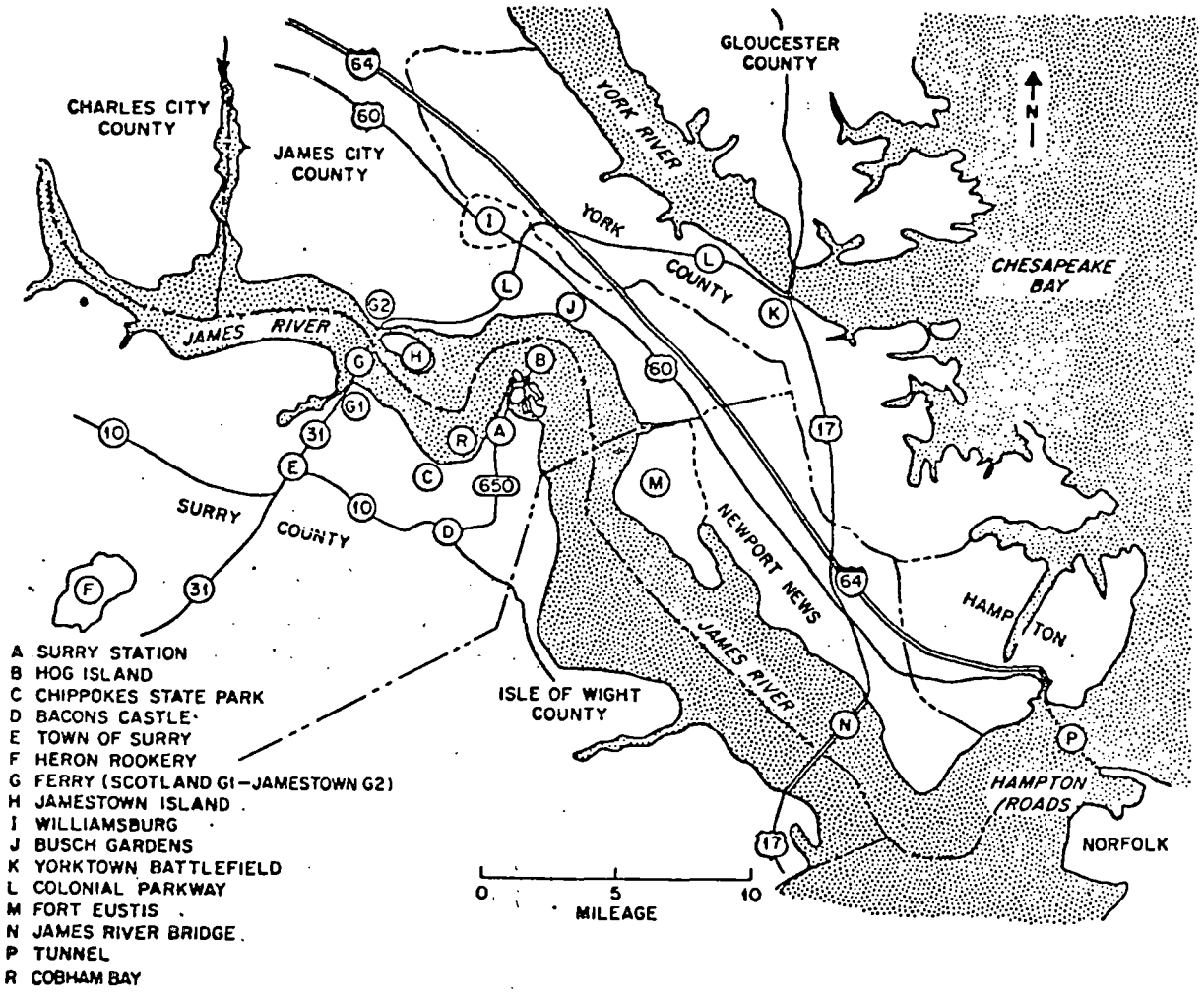

Figure 1: Environs of Surry Power Station.

SECTION 3

ANALYSIS PROGRAM

Table 2 lists the sample analysis program - sample class, frequency, and the type of analysis required.

Table 3 lists the LLD's (Lower Limits of Detection) for the analytical program. These LLD's are based on Regulatory Guide 4.8. For analyses not required in Regulatory Guide 4.8, Federal EPA, former requirements for similar programs, or other appropriate guides are used. 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 (after the fact) limit 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.

TABLE 2

Environmental Measurement
and
Sample Analysis Program

Sample Class	Frequency	Analysis
Air Particulate	Weekly	Gross alpha and beta (1)
	Quarterly Comp.	Gamma Isotopic (2)
Airborne Iodine	Weekly	Iodine-131
Thermoluminiscent Dosimetry (TLD)	Quarterly	Radiation Dose
Precipitation	Monthly	Gross beta (3) Tritium
	Quarterly Comp.	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
Well Water	Semi-annually	Gross alpha and beta Tritium
Fowl	Semi-annually	Gamma Isotopic (4)
James River Water	Bi-monthly Semi-annual Comp.	Gamma Isotopic Tritium
Oysters and Clams	Bi-monthly	Gamma Isotopic (4)
Crabs	3 summer months	Gamma Isotopic
Silt	Semi-annually	Gamma Isotopic
Fish	Semi-annually	Gamma Isotopic

NOTES TO TABLE 2

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

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

Stations SS and HIR analyzed as one sample.
Stations BC, ALL, CP, DOW, and FE analyzed as one sample.
Station NN 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 3

Lower Limits of Detection
(LLD's)

Sample Class	Analysis	LLD 3σ	Units
Airborne Particulates	Gross Beta	0.01	pCi/m^3
	Gross Alpha	0.01	pCi/m^3
	Gamma Isotopic	0.01	pCi/m^3
	Iodine-131	0.07	pCi/m^3
Background Radiation (TLD)	Gamma dose	0.5	mR/wk
Precipitation	Gross Beta	5	nCi/m^2
	LS Tritium	500	pCi/l
	Enriched Tritium	330	pCi/l
Other Waters	Gross Beta	2	pCi/l
	Gross Alpha	1	pCi/l
	LS Tritium	500	pCi/l
	Enriched Tritium	330	pCi/l
	Gamma Isotopic		
	Cs-134/137	15	pCi/l
	La/Ba-140	15	pCi/l
	Co-58/60	15	pCi/l
	Mn-54	15	pCi/l
	Zr/Nb-95	10	pCi/l
	Fe-59, Zn-65	30	pCi/l
	Strontium-89	5	pCi/l
	Strontium-90	2	pCi/l
Milk	Iodine-131	1	pCi/l
	Strontium-89	5	pCi/l
	Strontium-90	2	pCi/l
	Cs-137	15	pCi/l
	La/Ba-140	15	pCi/l
Oysters, Clams, Crabs, Fish	Cs-134/137	130	pCi/kg wet
	Mn-54	130	pCi/kg wet
	Co-58/60	130	pCi/kg wet
	Fe-59, Zn-65	260	pCi/kg wet
	Strontium-89	20	pCi/kg wet
	Strontium-90	10	pCi/kg wet
Silt, Soil	Cs-134/137	150	pCi/kg dry
Fowl	Cs-134/137	80	pCi/kg wet
Vegetation	Cs-134/137	80	pCi/kg wet
	Strontium-89	20	pCi/kg wet
	Strontium-90	10	pCi/kg wet

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.D.O.E.[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 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 after the short-lived naturally-occuring radon and thoron daughters have decayed. 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 introduction to data tables, Section 5.)

Water Samples (Includes Surface, Well, Precipitation, James River)

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, US 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$300 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°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-6 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.

QUALITY ASSURANCE PROGRAM

A. Design of Plan

Quality of product or service has always been a primary key to increase is sales, customer satisfaction, and profit. The management of Eberline Instrument Corporation recognizes the ever increasing demand for higher quality and reliability for services related to protection of workers and the environment. It is our firm belief that in order to judge the worth of a support service, one must know the philosophy behind it. Eberline will provide only those services for which it is qualified and these will be provided in a manner that is reliable, with a quality assurance program that maintains a high degree of client confidence. This quality assurance program has been prepared consistent with the following specifications, per the Technical and Quality Assurance Requirements for Special Purposes.

ANSI-N45.2, American National Standards Institute

NRC Branch Technical Position of November 1979

NRC Regulatory Guide 4.15, Revision 1 of February 1979.

B. Intercomparison Program

Results of Eberline's Midwestern Facility participation in the USEPA's Crosscheck Program will be included in the monthly reports provided to the client. Other intercomparisons in which we routinely participate include:

Environmental Protection Agency
Environmental Measurement Lab DOE Quality Assessment Program
Battelle Northwest Laboratories
IAEA Analytical Quality Control Service
US National Bureau of Standards
Eberline's Albuquerque Laboratory.

Each of the laboratory managers is responsible for preparing spikes and blanks to be run routinely. Every tenth sample is a spike, a blank, or a split sample.

Regular QC reports are prepared by the laborary manager on a monthly

schedule and forwarded to each client. Each report routinely includes:

results from EIC interlaboratory comparison,
results from EPA Crosscheck program, and
results from other intercomparison programs.

Results are reviewed by the laboratory manager. If a problem is indicated by the data, the nature of the problem is investigated and corrective steps taken immediately. A copy of each report is also provided to the Quality Assurance Manager of the Nuclear Services Division.

C. Quality Assurance Plan

The Quality Assurance Program follows the requirments of Company and Division Manuals. The discussion below outlines Quality Assurance Programs as conducted in the laboratory and as required in our QA Manual.

Procedure Approval

Each procedure goes through a vigorous evaluation and review process before it is incorporated into the EIC Procedures Manual. Established procedures of the Environmental Protection Agency (EPA) or the Environmental Measurements Laboratory of the US Department of Energy (EML) are used unless thorough testing has demonstrated that an alternate procedure is equal to or better than the EPA or EML procedure. Uniform procedures are used at both laboratories to the fullest extent possible, except when deviations are necessary to meet the specific requirements of the client. The manager of each laboratory and the quality assurance manager review and approve significant procedural changes before they are implemented.

Equipment Calibration and Maintenance

Equipment used for qualitative or quantitative measurements is carefully calibrated and maintained with records of each calibration or maintenance action kept in appropriate logbooks. To the extent possible, certified standards are used for all primary calibrations. The following standards are used for the application indicated:

Measurement	Calibration Standard
Gross Beta	Solution of Standard ^{137}Cs certified by NBS or Amersham Searle
Tritium	Solution standard of ^{3}H certified by NBS
Gamma Spectrometry	Solution standards of various gamma emitters certified by NBS or Amersham Searle. Standards are used to calibrate each counting geometry used.
Strontium-89 and 90	Solution standards of ^{90}Sr certified by Amersham Searle or NBS
Gross Alpha	Solution standards of ^{239}Pu certified by NBS or Amersham Searle.
Radiation Dose	^{137}Cs gamma source cross-referenced with NBS using R-meters. ^{226}Ra is used for some special application.

When suitable standards are not available for a specific gamma emitter, quantitative gamma isotopic analysis is based on an energy calibration of the gamma spectrometer and the gamma energy and abundance information provided in Table of Isotopes, Sixth Edition by Ledrer, Hollander, and Perlman.

The results of the Quality Control Programs are summarized in Section 6.

SECTION 4

RESULTS AND DISCUSSION

Table 4

Environmental Radiological Monitoring Program Annual Summary

Name of Facility: Surry Power Station Docket Number: 50-280, 50-281

Location of Facility: Surry County, Virginia State Reporting Period: 01 January - 31 December 1980

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean[1] (Range)	Location with Highest Mean Name	Mean (Range)	Control Locations Mean[1] (Range)	Number of Non-routine Reported Measurements
Air Particulates (pCi/m³)	Gross β 423	0.01	0.04 (343/370) 0.01-0.30	Surry Station	0.05 (53/53) 0.01-0.17	0.05 (52/53) 0.01-0.14	0
	Gross α 423	0.01	0.01 (6/370) 0.01	Bacon's Castle	0.01 (2/52) 0.01	0.01 (2/53) 0.01	0
	Zr/Nb-95 12	0.01	All LLD	Not Applicable		0.01 (1/4) 0.01	0
	Other γ 12	0.01	All LLD	Not Applicable		All LLD	0
Airborne Iodine (pCi/m³)	I-131 421	0.07	All LLD	Not Applicable		All LLD	0
Background Radiation (TLD) (mR/wk)	γ Dose 181	0.5	1.2 (163/169) 0.4-15.8	Surry Station	9.5 (4/4) 6.8-15.8	0.8 (12/12) 0.3-1.2	0
Precipitation (nCi/m²) β (pCi/l) HTO	Gross β 28	5.0	All LLD	Not Applicable		All LLD	0
	LS HTO 21	500	624 (5/9) 400/1100	Surry Station	654 (5/9) 400-1100	913 (2/12) 860-966	0
	Enr. HTO 7	330	All LLD	Not Applicable		400 (1/4) 400	0
Milk (pCi/l)	I-131 58	1.0	All LLD	Not Applicable		All LLD	0
	Sr-89 58	5.0	All LLD	Not Applicable		All LLD	0

[1] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

Table 4 (continued)

Facility: Surry Power Station

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean[1] (Range)	Location with Highest Mean Name	Location with Highest Mean Mean (Range)	Control Locations Mean[1] (Range)	Number of Non-routine Reported Measurements
Milk (continued) (pCi/l)	Sr-90 58	2.0	4.6 (34/46) 2-12	Bacon's Castle (Judkins)	5.8 (12/12) 2-12	4.8 (10/12) 3-11	0
	Cs-137 58	15.0	All LLD	Not Applicable		All LLD	0
	Ba-La-140 58	15.0	All LLD	Not Applicable		All LLD	0
River Water (pCi/l)	Cs-137 25	15.0	All LLD	Not Applicable		All LLD	0
	La-Ba-140 Cs-134 Co-58-60 Mn-54 25	15.0	All LLD	Not Applicable		All LLD	0
	Zr-Nb-95 25	10.0	All LLD	Not Applicable		All LLD	0
	Fe-59 Zn-65 25	30.0	All LLD	Not Applicable		All LLD	0
	HTO 5	500	All LLD	Not Applicable		Not Measured	0
	HTO 4	330	310 (2/2) 280-340	Newport News	310 (2/2) 280-340	295 (2/2) 220-370	0
	Sr-89 5	5	All LLD	Not Applicable		Not Measured	0
	Sr-90 5	2	All LLD	Not Applicable		Not Measured	0
Clams (pCi/kg)	Cs-134-137 Mn-54 Co-58-60 25	130	All LLD	Not Applicable		All LLD	0

[1] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

Table 4 (continued)

Facility: Surry Power Station

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean[1] (Range)	Location with Highest Mean Name	Mean (Range)	Control Locations Mean[1] (Range)	Number of Non-routine Reported Measurements
Clams (continued) (pCi/kg)	Fe-59, Zn-65 25	260	All LLD	Not Applicable		All LLD	0
	Sr-89 2	20	All LLD	Not Applicable		Not Measured	0
	Sr-90 2	10	20 (1/2) 20	Station Discharge	20 (1/2) 20	Not Measured	0
Oysters (pCi/kg)	Cs-134-137, Mn-54, Co-58-60 15	130	All LLD	Not Applicable		Not Measured	0
	Fe-59, Zn-65 15	260	All LLD	Not Applicable		Not Measured	0
Fish (pCi/kg)	Cs-134-137, Mn-54, Co-58-60 4	130	All LLD	Not Applicable		Not Measured	0
	Fe-59, Zn-65 4	260	All LLD	Not Applicable		Not Measured	0
Crabs (pCi/kg)	Cs-134-137, Mn-54, Co-58-60 1	130	All LLD	Not Applicable		Not Measured	0
	Fe-59, Zn-65 1	260	All LLD	Not Applicable		Not Measured	0
Silt (pCi/kg)	Cs-134 12	150	All LLD	Not Applicable		All LLD	0
	Cs-137 12	150	893 (7/10) 190-1210	Station Discharge	1155 (2/2) 1100-1210	820 (2/2) 690-950	0

[1] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

Table 4 (continued)

Facility: Surry Power Station

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean[1] (Range)	Location with Highest Mean Name	Mean (Range)	Control Locations Mean[1] (Range)	Number of Non-routine Reported Measurements
Silt (continued) (pCi/kg)	Co-60 12	150	3220 (1/10) 3220	Point of Shoals	3220 (1/2) 3220	All LLD	0
Soil (pCi/kg)	Cs-134 6	150	All LLD	Not Applicable		Not Measured	0
	Cs-137 6	150	478 (6/6) 200-1040	Colonial Parkway	1040 (1/1) 1040	Not Measured	0
Fowl (pCi/kg)	Cs-134 Cs-137 2	80	All LLD	Not Applicable		Not Measured	0
Food Crops (pCi/kg)	Cs-134 6	80	All LLD	Not Applicable		Not Measured	0
	Cs-137 6	80	All LLD	Not Applicable		Not Measured	0
	Sr-89 6	20	All LLD	Not Applicable		Not Measured	0
	Sr-90 6	10	68 (4/6) 10-120	Slades Farm	70 (2/3) 20-120	Not Measured	0
Well Water (pCi/l)	Gross β 8	2	7.3 (6/6) 3-12	Surry Station	9 (2/2) 9	3 (2/2) 3	0
	Gross α 8	1	2 (3/6) 1-3	Bacon's Castle	3 (1/2) 3	All LLD	0
	HTO 8	330	All LLD	Not Applicable		All LLD	0
Surface Water (pCi/l)	Gross β 8	2	3.1 (6/6) 2-5	Chippokes Creek	4 (2/2) 3-5	7 (2/2) 4-10	0

[1] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

Table 4 (continued)

Facility: Surry Power Station

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations Mean[1] (Range)	Location with Highest Mean		Control Locations Mean[1] (Range)	Number of Non-routine Reported Measurements
				Name	Mean (Range)		
Surface Water (continued) (pCi/l)	Gross α 8	1	1.4 (5/6) 1-3	Williamsburg Reserve	2 (2/2) 1-3	1 (1/2) 1	0
	HTO 8	500	808 (5/6) 350-1260	Williamsburg Reserve	805 (2/2) 350-1260	690 (2/2) 500-880	0

[1] Mean and range based on detectable measurements only. Fractions indicated in parentheses.

Results of all the analyses for January through December 1980 are presented in full in Section 5, Data Tables pages 40 through 65.

Table 4 summarizes the range and average concentrations for measurements at the indicator and control locations with the highest annual mean. 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 1980.

Specific findings for the various environmental media are discussed below:

AIR PARTICULATE SAMPLES

Atmospheric particulate matter at a field location is accumulated for a one-week period on a glass fiber filter using a low-volume air sampler at a collection rate of one cubic foot per minute. This particulate matter contained on the filter is counted for beta activity in a low-background counting system after the short-lived naturally-occuring radon and thoron daughters have decayed.

The average gross beta concentration for the year for all indicator stations was 0.04 pCi/m^3, and for the control location it was 0.05 pCi/m^3. Data for analyses of individual filters are given on pages 40 through 45 in Section 5. Small elevations in the gross beta activity for all locations during December is attributed to atmospheric fallout.

The gross alpha concentrations for the indicator and background stations remained at or below the detection limit of 0.02 pCi/m^3.

Gamma spectrometry of quarterly composites of air particulate filters indicated that the concentrations of Cs-134 and Cs-137 were below 0.01 pCi/m^3 throughout the year. Small amounts (0.01 pCi/m^3) of Zr-Nb-95 detected in the 4th quarter is attributable to atmospheric fallout.

ENVIRONMENTAL DOSIMETRY

Measurements of environmental dose rates were made at 54 locations in the first quarter and at 43 locations in the remaining quarters of 1980. The results are tabulated on pages 62 through 65 of Section 5.

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 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 are analyzed on a monthly basis and as quarterly composites for gross beta depositions and tritium concentrations. Data are summarized in page 47 of Section 5.

Gross beta measurements, the only measurement other than tritium required on these samples, are not capable of indicating whether the differences are due to station operations or not. The gross beta levels at the control location were higher in the first and second quarter, compared to the indicator location. The levels in general were in the range to be expected from measurements of these nuclides in this medium and does not indicate to be attributable to releases from Surry Station.

The tritium levels were comparable at both the indicator and control location throughout the year, and were generally in the range to be expected from measurements of this nuclide in this medium.

MILK SAMPLES

Radionuclides Cs-137 and I-131 were below the detection limits (15 pCi/l for Cs-137 and 1.0 pCi/l for I-131) for all milk samples collected during the year. Sr-90 was detected in the usual low and variable concentrations to be expected in most of the milk samples collected during the year. Sr-89 and Ba-La-140 were below the detection limits (5 pCi/l for Sr-89 and 15 pCi/l for Ba-La-140) in all samples collected.

Radioactivity attributable to operation of Surry Station was not detected in any milk samples collected during the year.

Comparisons of the average concentrations for all nuclides assayed and other statistical information are given in Table 4 and the data summary on each sample by location are given on pages 48 through 50 of Section 5.

JAMES RIVER WATER SAMPLES

Samples of water from the James River are collected bi-monthly from five locations including the station inlet and discharge and are analyzed for gamma emitters. Semi-annual composites of the collections from the Chickahominy and Newport News locations are also analyzed for tritium.

Samples collected quarterly from the discharge are split with a state agency and are analyzed for tritium, Sr-89, Sr-90, and gamma emitters.

Analytical data are presented in pages 51 through 53 of Section 5.

Gamma emitters were below the detection limits of this program in all samples collected bimonthly.

Sr-89, Sr-90, and tritium were below the detection limits in all of the station discharge (State Split) samples.

Tritium levels in the semi-annual composites for Chickahominy and Newport News were slightly above the detection limit of 330 pCi/l. These levels were in the range to be expected from measurements of this nuclide in this medium.

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 the station discharge 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 detection limits 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 world-wide fallout in one sample (November).

Analytical data are presented in pages 54 and 55 of Section 5.

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. Analytical data are presented in page 56 of Section 5.

Gamma emitters were below the detection limits of the program in all samples collected throughout the year.

FISH SAMPLES

Fish samples are collected in the vicinity of the station twice a year and analyzed for gamma emitters. Data are presented in page 57 of Section 5.

Gamma emitters were below the detection limits of the program specifications.

CRAB SAMPLES

Samples of crab in the vicinity of Surry Station are collected in September and analyzed for gamma emitters. The gamma emitters were below the detection limits of the program and are listed in page 57 of Section 5.

SILT SAMPLES

Silt samples are collected semi-annually from six locations (five indicator and one control location) 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 and one indicator sample contained Co-60 above the detection limit. The levels of activity measured are generally comparable with those encountered in the previous years. Co-60 presence could be due to station operation. Data are summarized on page 59 of Section 5.

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 detection limit for the program was Cs-137. The concentrations of Cs-137 have been quite variable thoughout the years as is illustrated in the table below. The is probably due to the well recognized difficulty of obtaining truly representative samples of soil. Modified sampling techniques by station personnel appear to have eliminated this problem from 1978 to the present. There are no clear trends and the origin of the cesium is unclear.

Cs-137 Concentrations is Soil Samples

	10^2pCi/kg*						
	1975	1976	1977	(Aug) 1978	(Sept) 1978	1979	1980
Surry Station	35	1	17	<2	4	2	2
Fort Eustis	—	18	10	17	18	2	4
Dow	10	2	2	<2	3	<2	2
Bacon's Castle	8	24	2	23	9	11	10
Alliance	2	3	2	<2	3	3	6
Colonial Parkway	—	15	12	22	7	<2	4

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

Long and short term worldwide fallout are probably the major factors and contributions to the total by the station cannot be ruled out. If however the major fraction were due to the station, significant amounts of Cs-137 and Co-60 might be expected in the samples, but this was not the case. Detailed analytical data are presented in page 60 of Section 5.

FOWL SAMPLES

A Mallard duck from the Hog Island Reserve was collected in March and a coot was obtained from the same location in October. They were analyzed for gamma emitters, specifically for Cs-134 and Cs-137. Concentrations of these nuclides were below the detection limit of 80 pCi/kg for both samples. Data are given in page 60 of Section 5.

CROP SAMPLES

Samples of food crops (corn, peanuts, and soybeans) are collected from two farms in the area and analyzed for gamma emitters, Sr-89, and Sr-90. Gamma emitters and Sr-89 were below the detection limits of the program.

Sr-90 was detected in most of the samples in low and variable concentrations. Long and short term worldwide fallout deposits are probably the reason for this.

The results are tabulated in page 60 of Section 5.

WELL WATER SAMPLES

Samples of water were collected from each of four wells (three indicator and one control location) once in April (spring) and once in October (fall). These were analyzed for gross alpha, gross beta, and tritium.

Gross alpha and 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 occuring nuclides.

Tritium concentrations were at or below the detection limits in samples collected during the year.

Analytical data are given in page 58 of Section 5.

SURFACE WATER SAMPLES

Surface water samples were collected in April (spring) and October (fall) from each of four locations. They were analyzed for gross alpha, gross beta, and tritium.

Gross alpha and gross beta levels 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 in the previous years.

Tritium concentrations were above the detection limits of the program both in spring and fall collections. The fall collections were somewhat higher than the spring collections. The levels of tritium measured were comparable at both indicator and background locations, and were generally in the range to be expected from measurements of this nuclide in this medium.

SECTION 5

DATA TABLES

VEPCO

LISTING OF MISSED SAMPLES
1980

Sample Type	Location	Expected Collection Date	Reason
Milk	CP	January	Lost in transit.
AP/CC	FE	05/06	Out of order.
Precipitation	SS	June	No rainfall.
Clams	All stations	July	Damaged and lost in UPS shipment.
Oysters	All stations	July	Damaged and lost in UPS shipment.
Crabs	SS	July, August	Damaged and lost in UPS shipment.
James River Water	All stations	July	Damaged and lost in UPS shipment.
Precipitation	SS	August	No rainfall.
Milk	CP	August	Missing.
Precipitation	SS	December, 4th Quarter	Lost in UPS shipment.

AIRBORNE IODINE-131, GROSS ALPHA and BETA in AIR PARTICULATE FILTERS
(Weekly Collections)

10^{-2} pCi/m^3

Collection Date	SS Volume (m^3)	SURRY STATION Gross Alpha	Gross Beta	I-131	HIR Volume (m^3)	HOG ISLAND RESERVE Gross Alpha	Gross Beta	I-131	BC Volume (m^3)	BACON'S CASTLE Gross Alpha	Gross Beta	I-131
01/02/80	155	<1	3±1	<7	170	<1	3±1	<7	160	<1	3±1	<7
01/08/80	130	<1	4±1	<7	120	<1	4±1	<7	140	<1	3±1	<7
01/15/80	150	<1	6±1	<7	170	<1	4±1	<7	160	<1	6±1	<7
01/22/80	155	<1	5±1	(a)	170	<1	3±1	<7	160	<1	3±1	<7
01/29/80	310(a)	<1	4±1	<7	170	<1	1±1	<7	160	<1	3±1	<7
02/05/80	150	<1	2±1	<7	170	<1	4±1	<7	150	<1	3±1	<7
02/12/80	150	<1	3±1	<7	170	<1	3±1	<7	165	<1	2±1	<7
02/19/80	165	<1	17±2	<7	165	<1	5±1	<7	165	<1	6±1	<7
02/26/80	150	<1	3±1	<7	160	<1	4±1	<7	160	<1	3±1	<7
03/07/80	180	<1	4±1	<7	215	<1	2±1	<7	175	<1	3±1	<7
03/12/80	125	<1	4±1	<7	150	<1	2±1	<7	135	<1	3±1	<7
03/18/80	145	<1	2±1	<7	165	<1	1±1	<7	160	<1	2±1	<7
03/25/80	310	<1	1±1	<7	150	<1	1±1	<7	165	<1	5±1	<7
04/01/80	295	<1	2±1	<7	170	<1	<1	<7	165	<1	<1	<7
04/08/80	305	<1	4±1	<7	180	<1	3±1	<7	165	<1	3±1	<7
04/16/80	285	<1	4±1	<7	195	<1	3±1	<7	190	<1	3±1	<7
04/22/80	330	<1	3±1	<7	155	<1	4±1	<7	140	<1	4±1	<7
04/29/80	205	<1	4±1	<7	155	<1	5±1	<7	160	<1	3±1	<7
05/06/80	280	<1	3±1	<7	170	<1	4±1	<7	165	<1	2±1	<7
05/14/80	345	<1	4±1	<7	190	<1	4±1	<7	185	<1	4±1	<7
05/20/80	250	<1	3±1	<7	145	<1	1±1	<7	135	<1	1±1	<7
05/27/80	295	<1	3±1	<7	165	<1	3±1	<7	160	<1	3±1	<7
06/04/80	275(b)	<1	4±1	<7	155	<1	<1	<7	180	<1	4±1	<7
06/10/80	265	<1	4±1	<7	115	<1	3±1	<7	140	1±1	3±1	<7
06/17/80	285	<1	4±1	<7	135	<1	1±1	<7	160	<1	4±1	<7
06/24/80	280	<1	4±1	<7	135	<1	3±1	<7	155	<1	3±1	<7

(a) Charcoal cartridge in field 01/15-29/80.
(b) Collected 06/03/80

VEPCO

AIRBORNE IODINE-131, GROSS ALPHA and BETA in AIR PARTICULATE FILTERS
(Weekly Collections)

10^{-2} pCi/m^3

Collection Date	SS (I) SURRY STATION Volume (m^3)	Gross Alpha	Gross Beta	I-131	HIR (I) HOG ISLAND RESERVE Volume (m^3)	Gross Alpha	Gross Beta	I-131	BC (I) BACON'S CASTLE Volume (m^3)	Gross Alpha	Gross Beta	I-131
07/01/80	280	<1	4±1	<7	130	<1	4±1	<7	155	<1	3±1	<7
07/08/80	290	<1	3±1	<7	130	<1	3±1	<7	160	<1	3±1	<7
07/15/80	255	<1	4±1	<7	140	<1	2±1	<7	170	<1	2±1	<7
07/22/80	260	<1	3±1	<7	130	<1	4±1	<7	160	<1	3±1	<7
07/29/80	270	<1	1±1	<7	135	<1	9±1	<7(a)	150	<1	3±1	<7
08/05/80	280	<1	6±1	<7	135	1±1	5±1	<7	140	1±1	9±1	<7
08/12/80	305	<1	4±1	<7	160	<1	3±1	<7	140	<1	4±1	<7
08/19/80	265	<1	3±1	<7	140	<1	3±1	<7	175	<1	3±1	<7
08/26/80	270	<1	3±1	<7	285	<1	2±1	<7	285	<1	2±1	<7
09/02/80	250	<1	5±1	<7	120	<1	3±1	<7	175	<1	5±1	<7
09/09/80	275	<1	3±1	<7	105	<1	3±2	<7	155	<1	5±1	<7
09/16/80	250	<1	5±1	<7	110	<1	2±1	<7	155	<1	4±1	<7
09/23/80	280	<1	6±1	<7	135	<1	3±1	<7	150	<1	5±1	<7
09/30/80	270	1±1	5±1	<7	135	<1	5±1	<7	155	<1	3±1	<7
10/08/80	285	<1	3±1	<7	175(b)	<1	5±1	<7	175	<1	3±1	<7
10/14/80	240	<1	6±1	<7	270	<1	2±1	<7	135	<1	6±2	<7
10/21/80	255	<1	6±1	<7	130	<1	4±2	<7	145	<1	5±2	<7
10/28/80	255	<1	4±1	<7	135	<1	<1	<7	145	<1	2±1	<7
11/04/80	245	<1	4±1	<7	135	<1	4±2	<7	150	<1	3±1	<7
11/12/80	285	<1	6±1	<7	350	<1	3±1	<7	345	<1	8±1	<7
11/18/80	380	<1	4±1	<7	405	<1	4±1	<7	405	<1	5±1	<7
11/25/80	260	<1	7±1	<7	250	<1	4±1	<7	285	<1	5±1	<7
12/03/80	285	<1	8±1	<7	245	<1	1±1	<7	330	<1	7±1	<7
12/09/80(c)	235	<1	15±1	<7	215	<1	13±1	<7	240	<1	13±1	<7
12/16/80	210	<1	17±2	<7	245	<1	13±1	<7	250	<1	15±1	<7
12/23/80	230	<1	11±1	<7	255	<1	12±1	<7	255	<1	10±1	<7
12/30/80	230	<1	8±1	<7	245	<1	8±1	<7	235	<1	8±1	<7

(a) Read as one sample with FE.
(b) HIR collected 10/09/80.
(c) SS collected 12/10/80.

AIRBORNE IODINE-131, GROSS ALPHA and BETA in AIR PARTICULATE FILTERS
(Weekly Collections)

10^{-2} pCi/m^3

Collection Date	ALL ALLIANCE Volume (m^3)	Gross Alpha	Gross Beta	I-131	CP COLONIAL PARKWAY Volume (m^3)	Gross Alpha	Gross Beta	I-131	DOW Volume (m^3)	Gross Alpha	Gross Beta	I-131
01/02/80	180	<1	3±1	<7	300	<1	3±1	<7	150	<1	<1	<7
01/08/80	155	<1	4±1	<7	260	<1	1±1	<7	130	<1	<1	<7
01/15/80	180	<1	5±1	<7	300	<1	9±1	<7	150	<1	<1	<7
01/22/80	180	<1	3±1	<7	300	<1	5±1	<7	150	<1	<1	<7
01/29/80	180	<1	6±1	<7	300	<1	5±1	<7	170	<1	<1	<7
02/05/80	180	<1	2±1	<7	280	<1	3±1	<7	155	<1	<1	<7
02/12/80	180	<1	2±1	<7	260	<1	7±1	<7	165	<1	3±1	<7
02/19/80	200	<1	4±1	<7	165	<1	3±1	<7	155	<1	6±1	<7
02/26/80	190	<1	2±1	<7	150	<1	2±1	<7	165	<1	3±1	<7
03/07/80	185(a)	<1	3±1	<7	185(a)	<1	3±1	<7	180	<1	2±1	<7
03/12/80	215	<1	4±1	<7	110	<1	4±2	<7	140	<1	3±1	<7
03/18/80	285	<1	2±1	<7	150	<1	2±1	<7	170	<1	2±1	<7
03/25/80	160	<1	1±1	<7	305	<1	2±1	<7	165	<1	<1	<7
04/01/80	285	<1	1±1	<7	150	<1	1±1	<7	150	<1	1±1	<7
04/08/80	280	<1	3±1	<7	155	<1	4±1	<7	335	<1	1±1	<7
04/16/80	305	<1	2±1	<7	180	<1	1±1	<7	155	<1	3±1	<7
04/22/80	255	<1	4±1	<7	135	<1	4±1	<7	140	<1	5±1	<7
04/29/80	300	<1	2±1	<7	155	<1	2±1	<7	135	<1	2±1	<7
05/06/80	250	<1	2±1	<7	150	<1	7±1	<7	185	<1	2±1	<7
05/14/80	345	<1	3±1	<7	180	<1	4±1	<7	195	<1	3±1	<7
05/20/80	245	<1	1±1	<7	130	<1	<1	<7	160	<1	1±1	<7
05/27/80	250	<1	3±1	<7	160	<1	3±1	<7	185	<1	2±1	<7
06/04/80	340	1±1	5±1	<7	180	<1	4±1	<7	210	<1	<1	<7
06/10/80	255	<1	3±1	<7	135	<1	3±1	<7	160	<1	<1	<7
06/17/80	150	<1	7±1	<7	140	<1	4±1	<7	185	<1	2±1	<7
06/24/80	245	<1	4±1	<7	145	<1	3±1	<7	180	<1	2±1	<7

(a) Timer malfunction; calculation based on estimated average volume.

AIRBORNE IODINE-131, GROSS ALPHA and BETA in AIR PARTICULATE FILTERS
(Weekly Collections)

10^{-2} pCi/m^3

Collection Date	ALL Volume (m^3)	ALL Gross Alpha	(I) ALLIANCE Gross Beta	(I) ALLIANCE I-131	CP Volume (m^3)	(I) COLONIAL PARKWAY Gross Alpha	(I) COLONIAL PARKWAY Gross Beta	(I) COLONIAL PARKWAY I-131	DOW (I) Volume (m^3)	DOW (I) Gross Alpha	DOW (I) Gross Beta	DOW (I) I-131
07/01/80	250	<1	4±1	<7	130	<1	5±1	<7	165	<1	2±1	<7
07/08/80	245	<1	4±1	<7	145	<1	3±1	<11(a)	185	<1	2±1	<7
07/15/80	265	<1	3±1	<7	140	<1	4±1	<7	160	<1	1±1	<7
07/22/80	280	<1	3±1	<7	140	<1	3±1	<7	160	<1	1±1	<7
07/29/80	280	<1	2±1	<7	150	<1	2±1	<7	170	<1	5±1	<7
08/05/80	285	<1	6±1	<7	150	<1	6±1	<7	175	<1	2±1	<7
08/12/80	175	<1	5±1	<7	145	<1	4±1	<7	175	<1	4±1	<7
08/19/80	240	<1	4±1	<7	140	<1	3±1	<7	165	<1	2±1	<7
08/26/80	335	<1	2±1	<7	135	<1	4±1	<7	160	<1	2±1	<7
09/02/80	270	<1	4±1	<7	135	<1	4±1	<7	175	<1	<1	<7
09/09/80	165(b)	<1	<1	<7	145	<1	4±1	<7	175	<1	<1	<7
09/16/80	140	<1	2±1	<7	125	<1	7±1	<7	150	<1	<1	<7
09/23/80	280	<1	4±1	<7	145	<1	4±1	<7	175	<1	1±1	<7
09/30/80	250	<1	3±1	<7	145	<1	4±1	<7	160	<1	2±1	<7
10/08/80	280	<1	3±1	<7	160	<1	3±1	<7	190	<1	2±1	<7
10/14/80	250	<1	5±1	<7	135	<1	7±2	<7	110	<1	3±2	<7
10/21/80	245	<1	5±1	<7	140	<1	5±2	<7	170	<1	<1	<7
10/28/80	240	<1	3±1	<7	140	<1	<1	<7	170	<1	<1	<7
11/04/80	245	<1	5±1	<7	145	<1	4±1	<7	175	<1	<1	<7
11/12/80	285	<1	7±1	<7	320	<1	7±1	<7	325	<1	2±1	<7
11/18/80	385	<1	6±1	<7	350	<1	4±1	<7	375	<1	4±1	<7
11/25/80	270	<1	4±1	<7	295	<1	3±1	<7	305	<1	3±1	<7
12/03/80	290	<1	6±1	<7	315	<1	7±1	<7	0(c)	<1	<1	<7
12/09/80	200	<1	14±1	<7	235	<1	15±1	<7	245	<1	13±1	<7
12/16/80	235	<1	14±1	<7	290	<1	12±1	<7	295	<1	12±1	<7
12/23/80	240	<1	11±1	<7	290	<1	12±1	<7	295	<1	7±1	<7
12/30/80	290	<1	7±1	<7	285	<1	12±1	<7	295	<1	8±1	<7

(a) Lower sensitivy due to low sample volume
(b) Calculation based on average volume.
(c) Pump found inoperable.

AIRBORNE IODINE-131, GROSS ALPHA and BETA in AIR PARTICULATE FILTERS
(Weekly Collections)

10^{-2} pCi/m^3

Collection Date	FE FORT EUSTIS Volume (m^3)	Gross Alpha	Gross Beta	I-131	NN NEWPORT NEWS Volume (m^3)	Gross Alpha	Gross Beta	I-131
01/02/80	315	<1	1±1	<7	150	<1	3±1	<7
01/08/80	125	<1	4±1	<7	130	<1	4±1	<7
01/15/80	165	<1	2±1	<7	150	<1	6±1	<7
01/22/80	170	<1	3±1	<7	150	<1	4±1	<7
01/29/80	170	<1	6±1	<7	150	<1	4±1	<7
02/05/80	180	<1	4±1	<7	140	<1	3±1	<7
02/12/80	170	<1	3±1	<7	150	<1	4±1	<7
02/19/80	155	<1	6±1	<7	140	<1	5±1	<7
02/26/80	165	<1	2±1	<7	165	<1	4±1	<7
03/07/80	185	<1	3±1	<7	180	<1	4±1	<7
03/12/80	140	<1	2±1	<7	110	<1	4±2	<7
03/18/80	170	<1	<1	<7	170	<1	3±1	<7
03/25/80	140	<1	7±2	<7	170	0.9±0.4	4±1	<7
04/01/80	165	<1	<1	<7	175	<1	1±1	<7
04/08/80	170	<1	3±1	<7	170	<1	3±1	<7
04/16/80	190	<1	3±1	<7	175	<1	3±1	<7
04/22/80	145	<1	2±1	<7	130	<1	5±1	<7
04/29/80	60	<1	1±1	<7	150	<1	3±1	<7
05/06/80	(a)	-	-	-	140	<1	4±1	<7
05/14/80	115	<1	4±1	<7	165	<1	<1	<7
05/20/80	135	<1	<1	<7	120	<1	4±2	<7
05/27/80	155	<1	3±1	<7	145	<1	3±1	<7
06/04/80	185	<1	2±1	<7	175	<1	5±1	<7
06/10/80	140	1±1	4±1	<7	130	<1	3±1	<7
06/17/80	150	<1	5±1	<7	135	<1	6±1	<7
06/24/80	145	<1	3±1	<7	140	<1	4±1	<7

(a) See Listing of Missed Samples page.

VEPCO

AIRBORNE IODINE-131, GROSS ALPHA and BETA in AIR PARTICULATE FILTERS
(Weekly Collections)

	10^{-2} pCi/m^3							
	FE		(I) FORT EUSTIS		NN		(C) NEWPORT NEWS	
Collection Date	Volume (m^3)	Gross Alpha	Gross Beta	I-131	Volume (m^3)	Gross Alpha	Gross Beta	I-131
07/01/80	140	<1	3±1	<7	140	<1	4±1	<7
07/08/80	140	<1	2±1	<7	170	<1	3±1	<7
07/15/80	135	<1	2±1	<7	130	<1	2±1	<7
07/22/80	150	<1	3±1	<7	140	<1	3±1	<7
07/29/80	150	<1	<1	<7(a)	145	<1	3±1	<7
08/05/80	155	<1	1±1	<7	145	<1	6±1	<7
08/12/80	90	<1	5±1	<7	155	<1	3±1	<7
08/19/80	95	<1	2±2	<7	145	<1	4±1	<7
08/26/80	130	<1	3±1	<7	145	<1	3±1	<7
09/02/80	135	<1	4±1	<7	135	<1	5±1	<7
09/09/80	150	<1	3±1	<7	150	<1	2±1	<7
09/16/80	130	<1	4±1	<7	125	<1	5±1	<7
09/23/80	140	<1	4±1	<7	150	<1	5±1	<7
09/30/80	135	<1	5±1	<7	140	1±1	5±1	<7
10/08/80	160	<1	2±1	<7	175	<1	3±1	<7
10/14/80	110	<1	2±2	<7	140	<1	4±1	<7
10/21/80	130	<1	3±1	<7	170	<1	6±1	<7
10/28/80	130	<1	2±1	<7	185	<1	3±1	<7
11/04/80	135	<1	4±1	<7	180	<1	4±1	<7
11/12/80	285	<1	6±1	<7	320	<1	6±1	<7
11/18/80	355	<1	2±1	<7	220	<1	7±1	<7
11/25/80	285	<1	4±1	<7	275	<1	5±1	<7
12/03/80	245	<1	4±1	<7	320	<1	5±1	<7
12/09/80	250	<1	30±2	<7	215	<1	12±1	<7
12/16/80	280	<1	16±1	<7	255	<1	14±1	<7
12/22/80	285	<1	12±1	<7	250	<1	11±1	<7
12/30/80	280	<1	7±1	<7	260	<1	8±1	<7

(a) Read as one sample with HIR.

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 γ Emitters
1st Quarter	<0.01
2nd Quarter	<0.01
3rd Quarter	<0.01
4th Quarter	<0.01

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

Collection Period	10^{-2} pCi/m^3 γ Emitters
1st Quarter	<0.01
2nd Quarter	<0.01
3rd Quarter	<0.01
4th Quarter	<0.01

Stations in composite: NN

Collection Period	10^{-2} pCi/m^3 γ Emitters
1st Quarter	<0.01
2nd Quarter	<0.01
3rd Quarter	<0.01
4th Quarter	<0.01, Zr-Nb-95 = 0.01±0.01

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

Collection Period	Surry Station (I) Gross β pCi/l	Gross β nCi/m²	Tritium pCi/l	Newport News (C) Gross β pCi/l	Gross β nCi/m²	Tritium pCi/l
January	9±2	0.14±0.02	<500	130±10	1.60±0.20	<500
February	4±1	0.07±0.03	<500	57±6	0.86±0.05	<500
March	3±1	0.90±0.30	400±340	12±2	0.9±0.2	<500
April	3±1	0.12±0.04	<500	71±4	2.2±0.2	<500
May	7±2	<0.10	1110±350	8±2	<0.1	860±350
June (a)	-	-	-	3±2	0.04±0.03	966±376
July	31±3	1.00±0.10	<500	10±2	0.6±0.1	<500
August (a)	-	-	-	3±1	0.14±0.05	<500
September	39±4	0.22±0.02	400±400	6±2	0.10±0.04	<500
October	6±2	0.23±0.07	860±340	6±2	0.42±0.14	<500
November	<2	<0.76	500±400	6±2	0.29±0.10	<500
December (a)	-	-	-	11±2	0.14±0.03	<500

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

Collection Period	Surry Station (I) Gross β pCi/l	Gross β nCi/m²	Tritium pCi/l	Newport News (C) Gross β pCi/l	Gross β nCi/m²	Tritium pCi/l
1st Quarter	6±1	0.7±0.1	<330	44±4	8.0±0.8	<330
2nd Quarter	2±1	0.2±0.1	300±100	30±3	4.1±0.4	400±100
3rd Quarter	43±4	1.6±0.2	<330	21±2	2.6±0.3	<330
4th Quarter(a)	-	-	-	8±2	0.1±0.1	<330

(a) See Listing of Missing Samples page.

RADIOACTIVITY IN MILK SAMPLES
(Monthly Collections)

(I) 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
01/14/80	<1	<5	2±1	<15	<15	0.9
02/11/80	<1	<5	<2	<15	<15	1.7
03/10/80	<1	<5	<2	<15	<15	1.6
04/07/80	<1	<5	2±2	<15	<15	1.2
05/05/80	<1	<5	3±2	<15	<15	1.6
06/02/80	<1	<5	<2	<15	<15	1.5
07/08/80	<1	<5	3±2	<15	<15	0.9
08/11/80	<1	<5	<2	<15	<15	1.6
09/02/80	<1	<5	<2	<15	<15	0.8
10/14/80	<1	<5	5±2	<15	<15	1.6
11/03/80	<1	<5	10±3	<15	<15	1.3
12/01/80	<1	<5	4±1	<15	<15	1.3

(I) 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
01/08/80	<1	<5	6±2	<15	<15	1.6
02/12/80	<1	<5	6±2	<15	<15	1.4
03/12/80	<1	<5	3±2	<15	<15	1.4
04/25/80	<1	<5	5±2	<15	<15	1.1
05/27/80	<1	<5	10±2	<15	<15	1.6
06/10/80	<1	<5	3±2	<15	<15	1.2
07/08/80	<1	<5	12±3	<15	<15	1.4
08/12/80	<1	<5	6±3	<15	<15	1.4
09/09/80	<1	<5	2±1	<15	<15	1.4
10/14/80	<1	<5	3±1	<15	<15	1.8
11/12/80	<1	<5	3±1	<15	<15	2.1
12/09/80	<1	<5	10±2	<15	<15	1.4

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RADIOACTIVITY IN MILK SAMPLES
(Monthly Collections)

(C) 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
01/16/80	<1	<5	3±1	<15	<15	0.9
02/26/80	<1	<5	3±1	<15	<15	1.4
03/19/80	<1	<5	4±2	<15	<15	1.7
04/25/80	<1	<5	11±6	<15	<15	1.4
05/20/80	<3(b)	<5	6±3	<15	<15	1.4
06/17/80	<1	<5	<2	<15	<15	2.2
07/25/80	<1	<5	4±2	<15	<15	1.0
08/26/80	<1	<5	<2	<15	<15	1.7
09/16/80	<1	<5	4±1	<15	<15	1.5
10/21/80	<1	<5	5±2	<15	<15	2.1
11/18/80	<1	<5	3±1	<15	<15	1.6
12/16/80	<1	<5	5±2	<15	<15	0.8

(I) Colonial Parkway (Smith)

	pCi/l as of collection date					g/l
	I-131	Sr-89	Sr-90	Cs-137	Ba-La-140	Stable Ca
January(a)	-	-	-	-	-	-
02/12/80	<1	<5	4±2	<15	<15	1.7
03/11/80	<1	<5	7±2	<15	<15	1.3
04/08/80	<1	<5	<3(b)	<15	<15	1.3
05/14/80	<1	<5	<2	<15	<15	1.4
06/10/80	<1	<5	4±3	<15	<15	1.5
07/08/80	<1	<5	<2	<15	<15	2.0
09/09/80	<1	<5	5±2	<15	<15	2.0
10/14/80	<1	<5	5±2	<15	<15	1.4
11/12/80	<1	<5	3±2	<15	<15	2.2
12/09/80	<1	<5	4±2	<15	<15	0.9

(a) See Listing of Missing Samples page.
(b) Lower sensitivity due to low chemical yield.

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RADIOACTIVITY IN MILK SAMPLES
(Monthly Collections)

(I) Lee Hall (Ross) - State Split Samples

Collection Date	bCi/l as of collection date					g/l
	I-131	Sr-89	Sr-90	Cs-137	Ba-La-140	Stable Ca
01/14/80	<1	<5	2±2	<15	<15	1.2
02/11/80	<1	<5	2±2	<15	<15	1.5
03/10/80	<1	<5	8±5	<15	<15	1.1
04/07/80	<1	<5	<2	<15	<15	1.6
05/05/80	<1	<5	<2	<15	<15	2.4
05/12/80	<1	<5	2±2	<15	<15	1.3
06/02/80	<1	<5	3±2	<15	<15	1.8
07/08/80	<1	<5	<2	<15	<15	1.2
08/11/80	<1	<5	8±3	<15	<15	1.9
09/02/80	<1	<5	<2	<15	<15	0.9
10/14/80	<1	<5	2±1	<15	<15	1.0
11/03/80	<1	<5	2±2	<15	<15	1.6
12/01/80	<1	<5	2±1	<15	<15	1.6

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 (C)					
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 (a)	-	-	-	-	-	-	-	-	-
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30
				HOG ISLAND POINT (I)					
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 (a)	-	-	-	-	-	-	-	-	-
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30
				NEWPORT NEWS (I)					
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 (a)	-	-	-	-	-	-	-	-	-
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30

(a) see Listing of Missing Samples page.

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
STATION INTAKE (I)									
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 (a)	-	-	-	-	-	-	-	-	-
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30
STATION DISCHARGE (I)									
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 (a)	-	-	-	-	-	-	-	-	-
September	<15	<15	<15	<10	<15	<15	<30	<15	<30
November	<15	<15	<15	<10	<15	<15	<30	<15	<30

(a) See Listing of Missing Samples page.

VEPCO - Surry

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

Collection Date:	01/11/80	04/08/80	07/07/80	12/01/80
Nuclide	pCi/l			
Sr-89	<5	<5	<5	<5
Sr-90	<2	<2	<2	<2
Tritium	<500	<500	<500	<500
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 1980	2nd half 1980
Chickahominy	220±110	370±190
Newport News	340±110	280±130

RADIOACTIVITY IN JAMES RIVER WATER
Collected 12/01/80 from the Lower Chippokes
-State Split Sample-

	pCi/l
Tritium	<500
Ba-La-140	<15
Cs-134/137	<15
Zr-Nb-95	<10
Co-58/60	<15
Mn-54	<15
Zn-65	<30
Fe-59	<30
Sr-89	<5
Sr-90	<2

VEPCO - Surry

GAMMA EMITTERS IN CLAM SAMPLES
(Bi-Monthly Collections)

Sample Site	Month Collected	pCi/kg Wet Weight						
		Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
CHICKAHOMINY (C)	January	<130	<260	<130	<130	<260	<130	<130
	March	<130	<260	<130	<130	<260	<130	<130
	May	<130	<260	<130	<130	<260	<130	<130
	July (a)	-	-	-	-	-	-	-
	September	<130	<260	<130	<130	<260	<130	<130
	November	<130	<260	<130	<130	<260	<130	<130
LAWNES CREEK (I)	January	<130	<260	<130	<130	<260	<130	<130
	March	<130	<260	<130	<130	<260	<130	<130
	May	<130	<260	<130	<130	<260	<130	<130
	July (a)	-	-	-	-	-	-	-
	September	<130	<260	<130	<130	<260	<130	<130
	November	<130	<260	<130	<130	<260	<130	<130
JAMESTOWN (I)	January	<130	<260	<130	<130	<260	<130	<130
	March	<130	<260	<130	<130	<260	<130	<130
	May	<130	<260	<130	<130	<260	<130	<130
	July (a)	-	-	-	-	-	-	-
	September	<130	<260	<130	<130	<260	<130	<130
	November	<130	<260	<130	<130	<260	<130	<130
HOG ISLAND POINT (I)	January	<130	<260	<130	<130	<260	<130	<130
	March	<130	<260	<130	<130	<260	<130	<130
	May	<130	<260	<130	<130	<260	<130	<130
	July (a)	-	-	-	-	-	-	-
	September	<130	<260	<130	<130	<260	<130	<130
	November	<130	<260	<130	<130	<260	<130	<130
STATION DISCHARGE (I)	January	<130	<260	<130	<130	<260	<130	<130
	March	<130	<260	<130	<130	<260	<130	<130
	May	<130	<260	<130	<130	<260	<130	<130
	July (a)	-	-	-	-	-	-	-
	September	See State Split results next page.						
	November	See State Split results next page.						

(a) See Listing of Missing Samples page.

VEPCO - Surry

GAMMA EMITTERS IN CLAM SAMPLES

State Split Samples from
Station Discharge

Month Collected	pCi/kg Wet						
	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
July(a)	-	-	-	-	-	-	-
September	<130	<260	<130	<130	<260	<130	<130
November	<130	<260	<130	<130	<260	<130	<130

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

Collection Date	pCi/kg Wet Weight	
	Sr-89	Sr-90
July(a)	-	-
September	<20	<10
November	<20	20±10

(a) See Listing of Missed Samples page.

VEPCO - Surry

GAMMA EMITTERS IN OYSTER SAMPLES
(Bi-Monthly Collections)

Location	Month Collected	pCi/kg Wet Weight						
		Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
Deep Water Shoal (I)	January	<130	<260	<130	<130	<260	<130	<130
	March	<130	<260	<130	<130	<260	<130	<130
	May	<130	<260	<130	<130	<260	<130	<130
	July (a)	-	-	-	-	-	-	-
	September	<130	<260	<130	<130	<260	<130	<130
	November	<130	<260	<130	<130	<260	<130	<130
Point of Shoal (I)	January	<130	<260	<130	<130	<260	<130	<130
	March	<130	<260	<130	<130	<260	<130	<130
	May	<130	<260	<130	<130	<260	<130	<130
	July (a)	-	-	-	-	-	-	-
	September	<130	<260	<130	<130	<260	<130	<130
	November	<130	<260	<130	<130	<260	<130	<130
Newport News (I)	January	<130	<260	<130	<130	<260	<130	<130
	March	<130	<260	<130	<130	<260	<130	<130
	May	<130	<260	<130	<130	<260	<130	<130
	July (a)	-	-	-	-	-	-	-
	September	<130	<260	<130	<130	<260	<130	<130
	November	<130	<260	<130	<130	<260	<130	<130

(a) See Listing of Missing Samples page.

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

Collection Date	Sample Type	pCi/kg Wet Weight						
		Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
02/80	Catfish	<130	<260	<130	<130	<260	<130	<130
	Perch	<130	<260	<130	<130	<260	<130	<130
08/80	Catfish	<130	<260	<130	<130	<260	<130	<130
	Perch	<130	<260	<130	<130	<260	<130	<130

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

Month Collected	pCi/kg Wet Weight						
	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Cs-134	Cs-137
July (a)	-	-	-	-	-	-	-
August (a)	-	-	-	-	-	-	-
September	<130	<260	<130	<130	<260	<130	<130

(a) See Listing of Missing Samples page.

VEPCO - Surry

RADIOACTIVITY IN WELL WATER SAMPLES
(Semi-Annual Collections)

	1st Half Coll.: April pCi/l			2nd Half Coll: October pCi/l		
	Gross α	Gross β	Tritium*	Gross α	Gross β	Tritium*
(I)Surry Station	<1	9±2	<330	1±1	9±2	<330
(I)Hog Island Res.	2±1	12±3	<330	<1	3±1	<330
(I)Bacon's Castle	<1	7±2	300±120	3±1	4±1	<330
(C)Jamestown	<1	3±2	<330	<1	3±2	<330

* Tritium Analyzed by enrichment method.

RADIOACTIVITY IN SURFACE WATER SAMPLES
(Semi-Annual Collections)

	1st Half Coll.: April pCi/l			2nd Half Coll. October pCi/l		
	Gross α	Gross β	Tritium*	Gross α	Gross β	Tritium*
(I)Chippokes Creek	1±1	3±1	<500	1±1	5±2	1220±370
(I)Williamsburg Reserve	1±1	2±1	350±350	3±1	3±2	1260±370
(I)Newport News Reserve	1±1	3±1	730±350	<1	3±1	480±360
(C)Smithfield	1±1	4±2	500±350	<1	10±2	880±360

* Tritium Analyzed by direct L. S. Counting.

VEPCO - Surry

GAMMA EMITTERS IN SILT SAMPLES
(Semiannual Collections)

Collection Period: 03/12-27/80

Collection Site	pCi/kg dry Cs-134	Cs-137
(C)Chickahominy	<150	950±100
(I)Station Discharge	<150	1210±120
(I)Hog Island Point	<150	760±80
(I)Station Intake	<150	<150
(I)Point of Shoals	<150	190±40
(I)Newport News	<150	<150

Collection Period: 09/19-29/80

Chickahominy	<150	690±160
Station Discharge	<150	1100±250
Hog Island Point	<150	<150
Station Intake	<150	1070±210
Point of Shoals	<150	1430±410, Co-60 = 3220±410
Newport News	<150	490±140

VEPCO - Surry

GAMMA EMITTERS IN SOIL SAMPLES
(Annual Collection)

Samples Collected: 08/05/80

Location	pCi/kg Cs-134	Cs-137
(I)SS	<150	200±50
(I)BC	<150	420±50
(I)ALL	<150	230±30
(I)CP	<150	1040±100
(I)DOW	<150	600±70
(I)FE	<150	380±50

GAMMA EMITTERS IN FOWL
(Semi-Annual Collections)

Collection Area	Month Collected	Sample Type	pCi/kg Cs-134	Cs-137
(I)HIR	March	Mallard Duck	<80	<30
HIR	October	Coot	<80	<80

RADIOACTIVITY IN FOOD CROPS
(Annual Collection)

State Split Samples

Date Collected	Farm	Type	pCi/kg, Wet Weight Cs-134	Cs-137	Sr-89	Sr-90
10/21/80	(I) Slades	Peanuts	<80	<80	<20	10±10
10/21/80	Slades	Corn(a)	<80	<80	<20	20±10
10/21/80	(I) Brocks	Peanuts(a)	<80	<80	<20	<10
10/21/80	Brocks	Corn	<80	<80	<20	<10
12/03/80	Brocks	Soybeans	<80	<80	<20	120±10
	Slades	Soybeans	<80	<80	<20	120±10

(a) State split.

VEPCO - Surry

GAMMA RADIATION
TOTAL mR/QTR. USING THERMOLUMINESCENT DOSIMETERS

VEPCO-AREA TLD'S 1980

	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
Date Annealed:	12/21/79		03/24/80		06/20/80		09/19/80	
Date Read:	05/05/80		08/19/80		10/24/80		01/20/81	
Location	ΣmR	mR/wk	ΣmR	mR/wk	ΣmR	mR/wk	ΣmR	mR/wk
Control -00	12.2±1.1	0.6±0.1	33.3±2.3	1.6±0.1	5.3±0.8	0.3±0.1	10.3±1.1	0.6±0.1
Training Center -01	22.2±2.0	1.1±0.1	23.6±3.9	1.1±0.2	11.4±1.4	0.6±0.1	15.8±2.1	0.9±0.1
Admin Bldg Entrance-02	35.9±3.2	1.8±0.2	32.1±2.2	1.5±0.1	18.5±5.3	1.1±0.3	26.1±1.5	1.5±0.1
Admin Bldg Recep -03	47.0±2.9	2.4±0.1	41.9±4.1	2.8±0.2	28.0±3.0	1.6±0.2	37.8±8.8	2.1±0.5
Admin Bldg Kitchen -04	32.2±3.3	1.7±0.2	28.6±5.7	1.4±0.3	18.2±3.5	1.0±0.2	24.3±3.3	1.4±0.2
Admin Bldg (Men) -05	40.6±4.7	2.1±0.2	31.6±3.9	1.5±0.2	23.7±3.0	1.3±0.2	32.7±4.2	1.9±0.2
Admin Bldg Conf -06	29.5±2.5	1.5±0.1	29.0±12.3	1.4±0.6	18.1±2.5	1.0±0.1	25.4±2.8	1.4±0.1
Cafeteria -07	37.9±2.3	2.0±0.1	34.6±6.4	1.6±0.3	21.5±1.6	1.2±0.1	26.7±1.4	1.5±0.1
Maintenance Shop -08	29.5±3.9	1.5±0.2	26.2±2.3	1.2±0.1	19.5±2.9	1.1±0.2	21.1±9.0	1.2±0.1
Storeroom East End -09	missing		76.0±16.8	3.6±0.8	21.7±2.6	1.2±0.1	27.5±4.3	1.6±0.2
Storeroom West End -10	36.1±4.4	1.9±0.2	30.8±8.3	1.5±0.4	19.7±2.5	1.1±0.1	20.6±1.5	1.2±0.1
Control Room East -11	21.2±2.4	1.1±0.1	23.3±4.9	1.1±0.2	12.0±1.8	0.7±0.1	16.2±3.3	0.9±0.2
Control Room West -12	18.8±2.7	1.0±0.1	16.9±2.7	0.8±0.1	8.4±0.8	0.5±0.1	10.7±3.5	0.6±0.2
Intrument Shop -13	432.0±75.0	22.3±4.1	305.6±86.6	14.5±4.1	310.6±12.0	17.5±0.7	336.3±14.8	19.1±0.8
Clean Change Room -14	61.2±0.4	3.2±0.4	49.4±3.7	2.3±0.2	39.9±3.3	2.3±0.2	43.1±3.5	2.5±0.2
Security Bldg. -15	74.1±3.8	3.8±0.2	57.9±6.2	2.7±0.4	47.5±9.9	2.7±0.5	37.0±3.8	2.1±0.2
East Fence -16	14.4±1.3	1.0±0.1	73.3±6.4	3.5±0.3	76.6±5.2	4.3±0.3	78.3±10.7	4.4±0.6
North Fence -17	14.3±1.5	1.0±0.1	(a)					
West Fence -18	14.3±1.3	0.7±0.1						
South Fence -19	14.8±1.7	0.8±0.1						
Electrical Shop -20	237.7±55.7	12.3±2.9						

(a) Stations 17-20 deleted as of 2nd quarter.

VEPCO - Surry

GAMMA RADIATION
TOTAL mR/QTR. USING THERMOLUMINISCENT DOSIMETERS

VEPCO-ENVIRONMENTAL TLD'S

1st Quarter 1980

Date Annealed: 12/10/79, 12/21/79*

Date Read: 05/05/80

Location	ΣmR	mR/wk	Location	ΣmR	mR/wk
Vepe-00 *	12.3±1.5	0.6±0.1	Vepe-28	10.9±2.1	0.5±0.1
-01 *	306±33	15.8±1.7	-29	9.7±1.7	0.5±0.1
-02 *	13.4±2.7	0.7±0.1	-30	14.9±1.5	0.7±0.1
-03 *	27.3±2.0	1.4±0.1	-31	missing	
-04 *	15.0±1.1	0.8±0.1	-32	14.0±2.0	0.7±0.1
-05	missing		-33	12.0±1.7	0.6±0.1
-06 *	14.8±1.2	0.8±0.1	-34	13.8±3.5	0.7±0.2
-07	missing		-35	12.0±2.5	0.6±0.1
-08	missing		-36	14.9±1.5	0.7±0.1
-09 *	23.1±2.4	1.2±0.1	-37	13.7±2.3	0.7±0.1
-10 *	18.9±3.0	1.0±0.2	-38	15.4±1.8	0.7±0.1
-11 *	15.9±1.6	1.0±0.1	-39	13.9±2.2	0.7±0.1
-12 *	16.8±3.0	1.0±0.2	-40	14.6±2.3	0.7±0.1
-13 *	16.9±3.9	1.0±0.2	-41	13.9±2.4	0.7±0.1
-14 *	17.4±2.3	1.0±0.1	-42	5.9±0.9	0.3±0.1
-15 *	6.0±0.9	0.3±0.1	-43	13.3±1.3	0.6±0.1
-16 *	6.1±0.9	0.3±0.1	-44	14.7±2.3	0.7±0.1
-17 *	10.8±1.8	0.6±0.1	-45	missing	
-18 *	12.3±4.9	0.6±0.3	-46	12.0±2.8	0.6±0.1
-19 *	11.0±1.5	0.6±0.1	-47	15.4±2.2	0.7±0.1
-20 *	10.3±2.5	0.5±0.1	-48	15.8±1.6	0.8±0.1
-21 *	6.1±0.6	0.3±0.1	-49	11.8±1.3	0.6±0.1
-22 *	6.2±0.7	0.3±0.1	-50	7.4±0.7	0.4±0.1
-23 *	11.9±2.2	0.6±0.1	-51	7.4±0.7	0.4±0.1
-24	10.3±2.5	0.5±0.1	-52	7.4±0.9	0.4±0.1
-25	13.6±1.4	0.6±0.1	-53	7.4±0.7	0.4±0.1
-26	13.0±1.7	0.6±0.1	-54	7.1±0.8	0.3±0.1
-27	11.2±3.3	0.5±0.2			

VEPCO - Surry

GAMMA RADIATION
TOTAL mR/QTR. USING THERMOLUMINISCENT DOSIMETERS

VEPCO-ENVIRONMENTAL TLD'S 1980

2nd Quarter

Date Annealed: 03/24/80
Date Read: 08/19/80

Location		ΣmR	mR/wk
Control (Site)	-00	14.7±2.7	0.7±0.1
Surry Station	-01	185.6±10.4	8.8±0.9
WNW	-02	41.3±7.5	2.0±0.4
Discharge Canal	-03	24.7±6.6	1.2±0.3
NNW	-04	33.3±3.3	1.6±0.2
North	-05	33.2±5.5	1.6±0.3
NNE	-06	31.8±8.3	1.5±0.4
NE	-07	32.4±5.6	1.5±0.3
ENE	-08	34.1±3.7	1.6±0.2
East exclusion area	-09	35.3±3.8	1.7±0.2
WEST	-10	43.6±9.3	2.1±0.4
WSW	-11	41.9±5.8	2.0±0.2
SW	-12	51.1±5.8	2.4±0.3
SSW	-13	47.4±5.3	2.2±0.3
South	-14	44.5±7.3	2.1±0.3
SSE	-15	48.5±4.3	1.9±0.2
SE	-16	37.8±2.1	1.8±0.1
East	-17	36.7±4.9	1.7±0.2
Intake Canal	-18	29.9±2.2	1.4±0.1
Hog Island Reserve	-19	33.1±2.5	1.6±0.1
Bacons Castle	-20	30.7±4.4	1.5±0.2
Route 633	-21	31.0±1.7	1.5±0.1
Alliance	-22	29.8±3.2	1.4±0.2
Surry	-23	31.0±4.0	1.5±0.2
Routes 637 & 635	-24	29.3±3.1	1.4±0.1
Scotland Wharf	-25	30.4±4.5	1.4±0.2
Jamestown	-26	28.5±2.6	1.3±0.1
Colonial Parkway (NW)	-27	27.3±2.1	1.3±0.1
Route 617 & 618	-28	26.9±2.5	1.3±0.1
Kingsmill (North)	-29	26.8±1.5	1.3±0.1
Williamsburg	-30	34.2±2.0	1.6±0.1
Kingsmill (NNE)	-31	28.8±6.7	1.4±0.3
Budweiser	-32	30.8±7.4	1.5±0.4
Water Plant	-33	29.3±3.6	1.4±0.2
Dow Chemical	-34	30.4±1.9	1.4±0.1
Lee Hall	-35	34.9±8.2	1.7±0.4
Goose Island	-36	31.6±3.4	1.5±0.2
Fort Eustis	-37	27.5±5.9	1.3±0.3
Newport News	-38	29.3±4.3	1.4±0.2
Control (J.R. Bridge)	-39	25.2±4.3	1.2±0.2
Control (Benn's Church)	-40	22.3±2.9	1.1±0.1
Smithfield	-41	25.4±2.7	1.2±0.1
Rushmere	-42	24.1±3.2	1.1±0.2
Route 628	-43	23.2±2.1	1.1±0.1

VEPCO - Surry

GAMMA RADIATION
TOTAL mR/QTR. USING THERMOLUMINISCENT DOSIMETERS

VEPCO-ENVIRONMENTAL TLD'S 1980

3rd Quarter

Date Annealed: 06/20/80
Date Read: 10/25/80

Location		ΣmR	mR/wk
(C) Control (Site)	-00	6.1±0.7	0.3±0.1
Surry Station	-01	123.0±22.0	6.8±1.2
WNW	-02	14.1±1.9	0.8±0.1
Discharge Canal	-03	7.8±0.1	0.4±0.1
NNW	-04	13.8±1.0	0.8±0.1
North	-05	14.4±0.6	0.8±0.1
NNE	-06	14.7±1.5	0.8±0.1
NE	-07	14.2±1.6	0.8±0.1
ENE	-08	13.9±2.0	0.8±0.1
East exclusion area	-09		missing
WEST	-10	14.5±1.8	0.8±0.1
WSW	-11	15.2±1.4	0.8±0.1
SW	-12	14.3±1.7	0.8±0.1
SSW	-13	14.0±1.6	0.8±0.1
South	-14	13.7±1.4	0.8±0.1
SSE	-15	13.6±0.4	0.8±0.1
SE	-16	13.2±2.8	0.7±0.2
East	-17	13.3±1.6	0.7±0.1
Intake Canal	-18	8.9±0.4	0.5±0.1
Hog Island Reserve	-19	13.1±0.8	0.7±0.1
Bacons Castle	-20	11.4±2.4	0.6±0.1
Route 633	-21	11.2±1.9	0.6±0.1
Alliance	-22	10.3±1.2	0.6±0.1
Surry	-23	9.9±1.7	0.6±0.1
Routes 637 & 635	-24	10.4±1.7	0.6±0.1
Scotland Wharf	-25	9.8±2.1	0.5±0.1
Jamestown	-26	11.1±1.8	0.6±0.1
Colonial Parkway (NW)	-27	11.3±1.3	0.6±0.1
Route 617 & 618	-28	11.4±1.8	0.6±0.1
Kingsmill (North)	-29	8.8±1.5	0.5±0.1
Williamsburg	-30	10.5±1.0	0.6±0.1
Kingsmill (NNE)	-31	10.9±1.5	0.6±0.1
Budweiser	-32	11.8±1.4	0.7±0.1
Water Plant	-33	11.8±2.6	0.7±0.2
Dow Chemical	-34	12.9±0.9	0.7±0.1
Lee Hall	-35	13.4±3.0	0.7±0.2
Goose Island	-36	14.5±0.8	0.8±0.1
Fort Eustis	-37	12.2±1.6	0.7±0.1
Newport News	-38	13.0±1.7	0.7±0.1
(C) Control (J.R. Bridge)	-39	11.4±0.6	0.6±0.1
(C) Control (Benn's Church)	-40	8.1±0.3	0.5±0.1
Smithfield	-41	9.8±1.3	0.5±0.1
Rushmere	-42	11.6±1.6	0.6±0.1
Route 628	-43	9.5±1.1	0.5±0.1

VEPCO - Surry

GAMMA RADIATION
TOTAL mR/QTR. USING THERMOLUMINISCENT DOSIMETERS

VEPCO-ENVIRONMENTAL TLD'S 1980

4th Quarter

Date Annealed: 09/19/80
Date Read: 01/19/81

Location		ΣmR	mR/wk
Control (Site)	-00	11.1±4.4	0.6±0.3
Surry Station	-01	198.4±6.1	6.8±0.3
WNW	-02	24.5±3.6	1.4±0.2
Discharge Canal	-03	16.1±1.9	0.9±0.1
NNW	-04	23.8±1.6	1.4±0.1
North	-05	23.5±1.3	1.4±0.1
NNE	-06	24.4±4.7	1.4±0.3
NE	-07	25.0±3.4	1.4±0.2
ENE	-08	23.8±2.0	1.4±0.2
East exclusion area	-09	28.3±3.6	1.6±0.2
WEST	-10	19.2±3.0	1.1±0.2
WSW	-11	19.2±1.9	1.1±0.1
SW	-12	19.9±1.9	1.1±0.1
SSW	-13	20.2±1.2	1.2±0.1
South	-14	21.1±2.2	1.2±0.1
SSE	-15	20.1±1.5	1.2±0.1
SE	-16	21.9±4.0	1.3±0.2
East	-17	22.1±2.0	1.3±0.1
Intake Canal	-18	12.8±1.5	0.7±0.6
Hog Island Reserve	-19	18.8±2.1	1.1±0.1
Bacons Castle	-20	21.5±4.1	1.2±0.2
Route 633	-21	17.1±1.9	1.8±0.1
Alliance	-22	13.9±0.5	0.8±0.1
Surry	-23	20.8±1.3	1.2±0.1
Routes 637 & 635	-24	18.8±1.8	1.1±0.1
Scotland Wharf	-25	18.7±1.4	1.1±0.1
Jamestown	-26	40.6±4.3	2.3±0.2
Colonial Parkway (NW)	-27	20.2±5.0	1.2±0.3
Route 617 & 618	-28	18.5±2.9	1.1±0.2
Kingsmill (North)	-29	17.7±1.8	1.0±0.1
Williamsburg	-30	18.7±2.4	1.1±0.1
Kingsmill (NNE)	-31	15.7±2.2	0.9±0.1
Budweiser	-32	22.0±3.9	1.3±0.2
Water Plant	-33	20.4±3.1	1.2±0.2
Dow Chemical	-34	22.7±2.4	1.3±0.1
Lee Hall	-35	21.6±1.7	1.2±0.1
Goose Island	-36	24.1±3.6	1.4±0.2
Fort Eustis	-37	19.6±1.9	1.1±0.1
Newport News	-38	17.9±1.0	1.0±0.1
Control (J.R. Bridge)	-39	18.9±3.6	1.1±0.2
Control (Benn's Church)	-40	15.4±2.3	0.9±0.1
Smithfield	-41	17.4±2.3	1.0±0.1
Rushmere	-42	19.4±2.1	1.1±0.1
Route 628	-43	16.9±1.2	1.0±0.1

SECTION 6

QUALITY ASSURANCE DATA

TLD Intercomparison Badges
Irradiated by Battelle Northwest Labs

1980

	Total mR less transportation control							
	1st Qtr		2nd Qtr		3rd Qtr		4th Qtr	
Badge	Known	Measured	Known	Measured	Known	Measured	Known	Measured
A	8	5±1	10	10.1±3.4	100	102.0±15.0	100	94±9
B	16	13±2	20	21.0±4.1	10	10.2±2.6	50	47±6
C	24	22±7	30	29.0±5.5	15	15.5±3.8	25	24±5
D	100	103±10	60	63.4±8.6	30	29.3±9.0	25	23±2
E	80	77±6	70	62.8±5.9	35	32.5±8.8	50	47±6
F	64	59±6	100	91.8±14.4	45	41.4±7.2	75	66±7
G	28	27±3	30	26.6±5.3	60	56.9±7.1	100	97±11
H	32	29±3	40	37.5±3.8	80	74.3±10.6	75	67±7
J	40	36±4	60	52.2±6.5	10	8.4±1.3	25	26±5
K	37	38±4	80	70.4±10.5	100	82.4±12.4	50	48±7

QUALITY CONTROL ANALYSES SUMMARY

1980

The tables below summarize results of samples run for process quality control purposes during the subject month. These listings are in addition to such measurements as detector backgrounds, check source values, radiometric-gravimetric comparisons, system calibrations, etc. Detailed listings of each measurement are maintained at the laboratory and are available for inspection if required.

BLANK SAMPLES

Nuclide Analyzed	Number of Determinations	Number of analyses exceeding the LLD for that analysis
Gross beta	68	0
Gross alpha	43	0
Strontium-89	49	0
Strontium-90	178	0
Iodine-131	152	0
Tritium	87	0
Gamma emitters	46	0

SPLIT SAMPLES

Nuclide Analyzed	Number of Det'ns	No. agreeing within 2σ	No. agreeing within 3σ	No. differing by > 3σ
Gross beta	99	94	5	0
Gross alpha	25	23	1	0
Strontium-89	48	48	0	0
Strontium-90	48	48	0	0
Tritium	134	134	0	0
Iodine-131	77	77	0	0
Gamma emitters	121	120	0	0
Calcium-45	2	2	1	0

SPIKED SAMPLES

Nuclide Analyzed	No. of Det'ns	Within 2σ of known	Within 3σ of known	differing from known by > 3σ
Gross beta	44	43	1	0
Strontium-89	23	23	2	0
Strontium-90	73	73	4	0
Tritium	52	51	1	0
Gamma emitters	29	29	0	0
Iodine-131	29	27	2	0

EPA INTERCOMPARISON RESULTS

1980

Sample Type	Analysis	Agency Value	Control Limits (3σ,n=1)	MWF Measured ±2σ error	Units
Water	I-131	53	15	49±5	pCi/l
Air Filter	Gross α	10	15	11±1	pCi/filter
Air Filter	Gross β	31	15	34±3	pCi/filter
Air Filter	Sr-90	10	5	6±1	pCi/filter
Air Filter	Cs-137	12	15	16±4	pCi/filter
Water	Gross α	21	15	26±3	pCi/l
Water	Gross β	49	15	50±5	pCi/l
Water	Sr-90	7	5	8±1	pCi/l
Water	Co-60	33	15	37±4	pCi/l
Water	Cs-134	56	15	58±6	pCi/l
Water	Cs-137	0	0	<5	pCi/l
Water	Gross α	12	15	13±1	pCi/l
Water	Gross β	27	15	29±3	pCi/l
Air Filter	Gross α	24	6	29±3	pCi/filter
Air Filter	Gross β	28	5	41±4	pCi/filter
Air Filter	Sr-90	8	2	9±1	pCi/filter
Air Filter	Cs-137	12	5	14±2	pCi/filter
Water	H-3	2040	1040	2260±230	pCi/l
Air Filter	Gross α	10	5	11±1	pCi/filter
Air Filter	Gross β	29	5	33±3	pCi/filter
Air Filter	Sr-90	9	1.5	10±1	pCi/filter
Air Filter	Cs-137	10	5	12±1	pCi/filter
Water	Gross α	30	8	30±3	pCi/l
Water	Gross β	45	5	45±5	pCi/l
Water	Sr-89	10	5	<5	pCi/l
Water	Sr-90	20	1.5	20±2	pCi/l
Water	H-3	1750	341	1600±160	pCi/l
Milk	Sr-89	10	5	<5	pCi/l
Milk	Sr-90	25	1.5	18±3	pCi/l
Milk	I-131	0.01	0.1	<5	pCi/l
Milk	Cs-137	40	5	43±4	pCi/l
Milk	Ba-140	0.01	0.1	<10	pCi/l
Milk	K	1600	80	2000±200	pCi/l
Water	Gross α	13	5	14±1	pCi/l
Water	Gross β	22	5	23±2	pCi/l
Air Filter	Gross α	15	5	18±2	pCi/filter
Air Filter	Gross β	41	5	50±5	pCi/filter
Air Filter	Sr-90	10	1.5	10±1	pCi/filter
Air Filter	Cs-137	20	5	23±2	pCi/filter
Water	I-131	44	5	35±4	pCi/l
Water	H-3	3400	360	3030±300	pCi/l
Water	Sr-89	5	5	<2	pCi/l
Water	Sr-90	12	1.5	12±1	pCi/l
Water	H-3	2000	345	2300±200	pCi/l
Water	Gross α	36	9	34±3	pCi/l
Water	Gross β	38	5	42±4	pCi/l
Water	H-3	1210	329	1100±100	pCi/l

EPA INTERCOMPARISON RESULTS

1980

(continued)

Sample Type	Analysis	Agency Value	Control Limits (3σ,n=1)	MWF Measured ±2σ error	Units
Water	Sr-89	24	8.6	27±3	pCi/l
Water	Sr-90	15	2.6	14±1	pCi/l
Water	H-3	3200	625	3400±300	pCi/l
Water	Cr-51	86	8.6	<100	pCi/l
Water	Co-60	16	8.6	19±5	pCi/l
Water	Zn-65	25	8.6	40±10	pCi/l
Water	Ru-106	46	8.6	<50	pCi/l
Water	Cs-134	20	8.6	24±5	pCi/l
Water	Cs-137	12	8.6	15±3	pCi/l
Water	Gross α	32	8.0	31±3	pCi/l
Water	Gross β	21	5.0	22±2	pCi/l
Water	Gross α	16	8.6	21±2	pCi/l
Water	Gross β	13	8.6	19±3	pCi/l
Air filter	Gross α	24	10.0	25±3	pCi/filter
Air filter	Gross β	10	8.6	17±2	pCi/filter
Air filter	Sr-90	0	0.0	<1	pCi/filter
Air filter	Cs-137	10	8.6	10±1	pCi/filter

USDOE QUALITY ASSESSMENT PROGRAM

1980

Sample Type	Nuclide	Known	Measured ±2σ error	Units
Air (80-4)	Be-7	0.272 E+03	0.260±0.044 E+03	pCi/filter
Air (80-4)	Mn-54	0.720 E+02	0.645±0.095 E+02	pCi/filter
Air (80-4)	Sr-90	0.199 E+02	0.143±0.094 E+02	pCi/filter
Air (80-4)	Zr-95	0.720 E+02	0.605±0.094 E+02	pCi/filter
Air (80-4)	Sb-125	0.258 E+04	0.180±0.026 E+04	pCi/filter
Air (80-4)	Cs-137	0.257 E+03	0.230±0.034 E+03	pCi/filter
Air (80-4)	Ce-144	0.376 E+04	0.339±0.048 E+04	pCi/filter
Air (80-10)	Be-7	0.230 E+04	0.270±0.038 E+04	pCi/filter
Air (80-10)	Co-60	0.200 E+03	0.225±0.032 E+03	pCi/filter
Air (80-10)	Sr-90	0.107 E+02	0.105±0.016 E+02	pCi/filter
Air (80-10)	Cs-134	0.247 E+04	0.215±0.031 E+04	pCi/filter
Air (80-10)	Ce-141	0.404 E+03	0.475±0.068 E+03	pCi/filter
Air (80-10)	Ce-144	0.346 E+04	0.280±0.040 E+04	pCi/filter
Water (80-4)	H-3	0.103 E+02	0.097±0.017 E+02	pCi/ml
Water (80-4)	Na-22	0.107 E+01	0.095±0.014 E+01	pCi/ml
Water (80-4)	Cr-51	0.137 E+01	0.170±0.029 E+01	pCi/ml
Water (80-4)	Co-57	0.337 E 00	0.600±0.140 E 00	pCi/ml
Water (80-4)	Co-60	0.922 E 00	0.900±0.127 E 00	pCi/ml
Water (80-4)	Sr-89	0.240 E-01	0.267±0.172 E-01	pCi/ml
Water (80-4)	Cs-137	0.978 E 00	0.850±0.127 E 00	pCi/ml
Water (80-4)	U	0.283 E-01	0.200±0.173 E-01	µg/ml
Water (80-10)	H-3	0.149 E+02	0.133±0.017 E+02	pCi/ml
Water (80-10)	Co-60	0.197 E+01	0.207±0.036 E+01	pCi/ml
Water (80-10)	Sr-89	0.218 E 00	0.803±0.263 E-01	pCi/ml
Water (80-10)	Sr-90	0.216 E-01	0.230±0.069 E-01	pCi/ml
Water (80-10)	Cs-134	0.244 E+01	0.283±0.052 E+01	pCi/ml
Water (80-10)	Cs-137	0.226 E+01	0.263±0.045 E+01	pCi/ml
Soil (80-4)	K-40	0.770 E+01	1.100±0.341 E+01	pCi/g
Soil (80-4)	Sr-90	0.374 E 00	0.300±0.172 E 00	pCi/g
Soil (80-4)	Cs-137	0.680 E+01	0.507±0.087 E+01	pCi/g
Soil (80-10)	K-40	0.207 E+02	0.273±0.053 E+02	pCi/g
Soil (80-10)	Co-60	0.100 E 00	0.100±0.100 E 00	pCi/g
Soil (80-10)	Sr-90	0.460 E 00	0.333±0.172 E 00	pCi/g
Soil (80-10)	Cs-137	0.110 E+02	0.110±0.017 E+02	pCi/g
Tissue (80-4)	K-40	0.143 E+02	0.207±0.036 E+02	pCi/g
Tissue (80-4)	Co-60	0.386 E+01	0.373±0.056 E+01	pCi/g
Tissue (80-4)	Sr-90	0.182 E+02	0.180±0.034 E+02	pCi/g
Tissue (80-4)	Cs-137	0.122 E+02	0.103±0.018 E+02	pCi/g
Tissue (80-10)	K-40	0.170 E+01	0.550±0.143 E+01	pCi/g
Tissue (80-10)	Co-60	0.874 E+01	0.950±0.141 E+01	pCi/g
Tissue (80-10)	Sr-90	0.387 E+02	0.250±0.042 E+02	pCi/g
Tissue (80-10)	Cs-137	0.275 E+02	0.270±0.044 E+02	pCi/g

USDOE QUALITY ASSESSMENT PROGRAM--continued

Sample Type	Nuclide	Known	Measured ±2σ error	Units
Vegetation (80-4)	K-40	0.317 E+02	0.457±0.083 E+02	pCi/g
Vegetation (80-4)	Sr-90	0.246 E+02	0.243±0.039 E+02	pCi/g
Vegetation (80-4)	Cs-137	0.171 E+02	0.147±0.025 E+02	pCi/g
Vegetation (80-10)	K-40	0.225 E+02	0.303±0.053 E+02	pCi/g
Vegetation (80-10)	Co-60	0.272 E+01	0.297±0.052 E+01	pCi/g
Vegetation (80-10)	Sr-90	0.138 E+02	0.133±0.030 E+02	pCi/g
Vegetation (80-10)	Cs-137	0.961 E+01	0.967±0.167 E+01	pCi/g