

ENVIRONMENTAL

RADIATION

DATA

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Contents

	Page
List of Tables	v
Preface	vii
Acknowledgments	ix
Data Reporting Conventions	xi
1. Air Program	1
Airborne Particulates and Precipitation	1
Plutonium and Uranium in Airborne Particulates and Precipitation	15
2. Water Program	19
Surface Water	19
Drinking Water	25
3. Milk Program	39
Pasteurized Milk	39

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List of Tables

Table	Page
1 Reporting Units and Minimum Detectable Concentrations	xiii
2 Gross Beta in Airborne Particulates: October 1996	2
3 Gross Beta in Airborne Particulates: November 1996	4
4 Gross Beta in Airborne Particulates: December 1996	6
5 Gross Beta and Specific Gamma in Precipitation: October 1996	8
6 Gross Beta and Specific Gamma in Precipitation: November 1996	9
7 Gross Beta and Specific Gamma in Precipitation: December 1996	11
8 Tritium in Precipitation: October - December 1996	13
9 Plutonium and Uranium in Airborne Particulates: January - December 1996 Composites	16
10 Tritium in Surface Water: October - December 1996	20
11 Surface Water Annual Gamma Analysis: January - December 1996	22
12 Tritium in Drinking Water: October - December 1996	26
13 Plutonium and Uranium Analyses of Selected Drinking Water Composite Samples: January - December 1996	28
14 Iodine-131 in Drinking Water: January - December 1996	29
15 Alpha, Beta, and Sr-90 Concentrations in Drinking Water: January - December 1996 Composites	32
16 Radium-226, -228 and Gamma-Emitting Radionuclides in Drinking Water: January - December 1996 Composites	35
17 Radionuclides in Pasteurized Milk: October 1996	40
18 Radionuclides in Pasteurized Milk: November 1996	42
19 Radionuclides in Pasteurized Milk: December 1996	44

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Preface

Environmental Radiation Data (ERD) is compiled and published quarterly by the Office of Radiation and Indoor Air's National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama, and contains data from the Environmental Radiation Ambient Monitoring System (ERAMS). ERD is published in both hard-copy and electronic formats. Electronic reports are available online at www.epa.gov/narel.

The United States Environmental Protection Agency established ERAMS in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. ERAMS is comprised of a nationwide network of sampling stations that provide air, precipitation, surface water, drinking water, and milk samples.

Sampling locations are selected to provide optimal population coverage while functioning to monitor fallout from nuclear devices and other forms of radioactive contamination of the environment. The radiation analyses performed on these samples include gross alpha and gross beta analyses, gamma analyses, and radionuclide-specific analyses for uranium, plutonium, strontium, iodine, radium, and tritium. This monitoring effort also provides ancillary information on natural background levels and on routine and accidental releases into the environment from stationary sources.

The radiochemical procedures used by NAREL to analyze the ERAMS samples are contained in the *Eastern Environmental Radiation Facility Radiochemistry Procedures Manual* (EPA 520/5-84-006). Station operation and sample collection are in accordance with procedures contained in the *ERAMS Manual* (EPA 520/5-84-007, 008, 009).

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Acknowledgments

All sampling for the Environmental Radiation Ambient Monitoring System (ERAMS) is performed by volunteer collectors who are frequently members of the health departments or related environmental agencies of their respective states. The National Air and Radiation Environmental Laboratory (NAREL) on behalf of the U.S. Environmental Protection Agency would like to acknowledge its indebtedness to these volunteer collectors who are so essential to the successful operation of ERAMS. The efforts of the sample collectors are especially appreciated during times of emergency operation when sampling frequencies are increased and schedules are sometimes demanding.

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Data Reporting Conventions

Every laboratory measurement involves uncertainty. When there is little or no radioactivity in a sample, one consequence of measurement uncertainty is the possibility of obtaining a measured value that is less than zero. Such a negative result occurs when random effects in the measurement process cause the measured value for the sample to be less than that of the blank or background, which is subtracted from it. From April 1991 to December 1995, negative results were reported as “not detected” or “ND,” and gamma analysis results that were less than their estimated measurement uncertainties were also reported as “ND.” In January 1996 both of these practices were discontinued. Although negative activities are physically impossible, the inclusion of negative results in the report allows better statistical analysis of the data.

Results of gamma analyses are still reported as “ND” when gamma-emitting radionuclides are not detected.

Measurement Uncertainty

Each measured value y is reported with an expanded uncertainty $U = k u_c(y)$, which is determined from the combined standard uncertainty $u_c(y)$ and the coverage factor $k = 2$. The interval from $y - U$ to $y + U$ is estimated to have a level of confidence of approximately 95%.

Significant Figures

Expanded uncertainties are reported to two significant figures. Measurement results are rounded to the corresponding number of decimal places.

Detection Capability

The minimum detectable concentrations (MDCs) for each radionuclide are shown in Table 1. The MDC is defined as the minimum concentration that gives a 95% probability of detection when the detection criteria are chosen to give only a 5% probability of false detection in a blank sample.

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Table 1**Reporting Units and Minimum Detectable Concentrations
for Radionuclide Analyses**

Radionuclide	Media	Reporting Unit	Minimum Detectable Concentration
Gross Alpha	Water	pCi/L	2
Gross Beta	Air	pCi/m ³	0.0015
	Water	pCi/L	2
	Precipitation	pCi/L	2
Tritium	Water	pCi/L	150
	Milk	pCi/L	150
* Plutonium-238,239/240	Air	aCi/m ³	0.75
	Water	pCi/L	0.1
† Uranium-234,235,238	Air	aCi/m ³	0.75
	Water	pCi/L	0.1
Radium-226	Water	pCi/L	0.02
Strontium-90	Milk	pCi/L	2
	Water	pCi/L	1
‡ Iodine-131	Milk (gamma)	pCi/L	4
	Water (gamma)	pCi/L	4
	Water	pCi/L	0.3
Cesium-137	Milk	pCi/L	5
	Water	pCi/L	5
‡ Barium-140	Milk	pCi/L	15
	Water	pCi/L	15
Potassium	Milk	g/L	0.06
	Water	g/L	0.06
Potassium-40	Water	pCi/L	50

* The MDC for air is based on an assumed total sample volume of 120,000 m³. Measurement by alpha spectrometry includes combined activities of ²³⁹Pu and ²⁴⁰Pu, since the relative contributions of these two isotopes cannot be determined.

† The MDC for air is based on an assumed total sample volume of 120,000 m³.

‡ Activity as of the day of counting.

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1. Air Program

Airborne Particulates and Precipitation

Gross beta radioactivity measurements and certain specific analyses are performed on air particulates and precipitation samples as indicator measurements in assessing the general (national) impact of all contributing sources on environmental levels of radiation.

Airborne particulates are collected continuously at field stations representing wide geographic coverage, including present and potential sources of environmental radioactivity. Sampling sites are located throughout the United States.

Filters (10-cm diameter synthetic fiber) from air samplers are changed twice weekly and field measurements are made with a G-M survey meter at 5 hours after collection to allow for decay of natural radon isotopes and their progeny. Field estimates are reported to appropriate EPA officials by telephone or mail depending on the activity levels found.

The filters are sent to NAREL for more sensitive analyses in a low background beta counter. Gamma scans are performed on all filters showing gross beta counts greater than 1 pCi/m³. The laboratory obtained values are usually lower than the field estimates due to the decay of naturally occurring radionuclides between the times of the two measurements.

Precipitation samples are collected at most field stations collecting air filters. These samples are also sent to NAREL where they are composited monthly for gamma scans, tritium, and gross beta activity measurements. A composite of the March, April, and May precipitation samples is analyzed for plutonium-238, combined plutonium-239 and 240, and uranium-234, 235, and 238.

A compilation of individual measurements is available from the National Air and Radiation Environmental Laboratory, 540 South Morris Avenue, Montgomery, AL 36115-2601.

Table 2
Gross Beta in Airborne Particulates
October 1996

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
AL: Montgomery	7	0.1	0.0	0.0	0.014	0.008	0.012
AR: Little Rock	9	0.7	0.1	0.2	0.023	0.006	0.014
AZ: Phoenix	5	1.0	0.3	0.6	0.019	0.012	0.015
CA: Berkeley	9	1.4	0.0	0.2	0.013	0.004	0.007
CA: Los Angeles	9	0.3	0.0	0.1	0.026	0.009	0.017
CO: Denver	8	1.3	0.3	0.7	0.016	0.007	0.011
CT: Hartford	9	0.2	0.0	0.1	0.013	0.004	0.008
DE: Wilmington	8	0.6	0.1	0.2	0.022	0.006	0.013
FL: Jacksonville	9	0.1	0.0	0.1	0.013	0.003	0.009
FL: Miami	7	0.0	0.0	0.0	0.018	0.001	0.007
HI: Honolulu	9	0.5	0.1	0.2	0.004	0.002	0.003
IA: Iowa City	9	0.8	0.1	0.5	0.016	0.003	0.010
ID: Boise	9	1.4	0.2	0.6	0.017	0.004	0.009
ID: Idaho Falls	9				0.017	0.006	0.011
IN: Indianapolis	9	0.5	0.1	0.3	0.024	0.010	0.015
KS: Topeka	9	1.2	0.2	0.6	0.014	0.008	0.010
ME: Augusta	9	0.2	0.0	0.1	0.011	0.004	0.007
MI: Lansing	9	0.4	0.1	0.1	0.017	0.007	0.012
MN: Welch	9	0.4	0.1	0.3	0.016	0.006	0.011
MS: Jackson	9	0.7	0.1	0.3	0.025	0.007	0.013
NC: Charlotte	7	0.1	0.0	0.1	0.028	0.007	0.015
NC: Wilmington	4				0.017	0.006	0.012
ND: Bismarck	6	1.1	0.1	0.5	0.013	0.005	0.010
NH: Concord	9	0.3	0.0	0.1	0.011	0.002	0.007
NJ: Trenton	9	0.4	0.1	0.2	0.017	0.005	0.011
NM: Santa Fe	4	0.7	0.0	0.2	0.016	0.008	0.012
NV: Las Vegas	8	0.3	0.1	0.1	0.020	0.007	0.013
NY: Albany	5	0.1	0.0	0.1	0.015	0.007	0.010
NY: Yaphank	9				0.023	0.004	0.010
OH: Columbus	5	0.2	0.0	0.1	0.019	0.010	0.013
OH: Painesville	7	0.3	0.0	0.1	0.020	0.003	0.011
OH: Ross	8				0.065	0.010	0.020
PA: Harrisburg	9	0.4	0.1	0.2	0.025	0.007	0.013
PA: Pittsburgh	9	0.1	0.1	0.1	0.022	0.004	0.012
SC: Barnwell	2	0.0	0.0	0.0	0.011	0.010	0.011
SC: Columbia	9	0.6	0.1	0.3	0.025	0.006	0.015
SD: Pierre	2	1.2	0.2	0.7	0.031	0.014	0.023
TN: Knoxville	6	1.1	0.0	0.3	0.032	0.013	0.020

Table 2 (continued)
Gross Beta in Airborne Particulates
October 1996

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
TN: Nashville	8	0.4	0.1	0.2	0.019	0.010	0.013
TN: Oak Ridge/Bethel	9	0.4	0.0	0.2	0.025	0.008	0.014
TN: Oak Ridge/K25	9	0.4	0.0	0.2	0.025	0.009	0.014
TN: Oak Ridge/Melton	9	0.5	0.0	0.2	0.026	0.008	0.014
TN: Oak Ridge/Y12 E	9	0.4	0.0	0.1	0.021	0.008	0.013
TN: Oak Ridge/Y12 W	9	0.1	0.0	0.1	0.023	0.008	0.012
TX: Austin	9	0.3	0.1	0.2	0.018	0.007	0.011
TX: El Paso	9	1.8	0.4	0.9	0.032	0.012	0.018
UT: Salt Lake City	7	0.7	0.0	0.2	0.023	0.006	0.015
VA: Lynchburg	9	1.0	0.1	0.5	0.025	0.004	0.012
WA: Olympia	6	0.1	0.0	0.1	0.022	0.005	0.010
WA: Spokane	9	0.6	0.1	0.2	0.016	0.003	0.009
WI: Madison	8	0.5	0.2	0.3	0.014	0.006	0.011

Table 3
Gross Beta in Airborne Particulates
November 1996

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
AL: Montgomery	6	0.0	0.0	0.0	0.014	0.010	0.012
AR: Little Rock	6	0.1	0.1	0.1	0.019	0.010	0.015
AZ: Phoenix	4	0.4	0.1	0.2	0.018	0.004	0.013
CA: Berkeley	9	0.4	0.0	0.1	0.027	0.003	0.009
CA: Los Angeles	8	0.2	0.0	0.1	0.028	0.005	0.014
CO: Denver	7	1.0	0.2	0.5	0.030	0.007	0.017
CT: Hartford	8	0.1	0.0	0.0	0.011	0.002	0.007
DE: Wilmington	9	0.2	0.1	0.1	0.015	0.006	0.011
FL: Jacksonville	7	0.1	0.0	0.0	0.011	0.006	0.008
FL: Miami	7	0.1	0.0	0.0	0.008	0.004	0.006
HI: Honolulu	8	0.2	0.1	0.1	0.008	0.001	0.003
IA: Iowa City	7	0.7	0.2	0.3	0.019	0.010	0.014
ID: Boise	9	1.6	0.1	0.6	0.022	0.004	0.012
ID: Idaho Falls	7				0.022	0.004	0.012
IN: Indianapolis	7	0.3	0.1	0.2	0.021	0.012	0.015
KS: Topeka	7	1.1	0.1	0.4	0.033	0.010	0.016
ME: Augusta	6	0.1	0.0	0.1	0.012	0.006	0.008
MI: Lansing	8	0.2	0.0	0.1	0.018	0.008	0.011
MN: Welch	5	0.3	0.1	0.2	0.017	0.007	0.012
MS: Jackson	8	0.4	0.1	0.1	0.023	0.008	0.012
NC: Charlotte	7	0.1	0.0	0.1	0.019	0.010	0.013
NC: Wilmington	4				0.012	0.008	0.011
ND: Bismarck	5	0.2	0.0	0.2	0.019	0.010	0.014
NH: Concord	8	0.2	0.0	0.1	0.012	0.005	0.009
NJ: Trenton	7	0.5	0.1	0.3	0.015	0.005	0.009
NM: Santa Fe	3	0.4	0.0	0.2	0.016	0.008	0.011
NV: Las Vegas	7	0.5	0.1	0.2	0.025	0.005	0.013
NY: Albany	4	0.1	0.0	0.1	0.014	0.006	0.011
NY: Yaphank	7				0.012	0.006	0.008
OH: Columbus	5	0.1	0.1	0.1	0.021	0.010	0.014
OH: Painesville	8	0.1	0.0	0.1	0.014	0.005	0.010
OH: Ross	8				0.019	0.009	0.014
PA: Harrisburg	8	0.6	0.0	0.2	0.021	0.006	0.012
PA: Pittsburgh	6	0.0	0.0	0.0	0.016	0.008	0.012
SC: Barnwell	2	0.0	0.0	0.0	0.010	0.008	0.009
SC: Columbia	7	0.3	0.0	0.1	0.013	0.008	0.011
SD: Pierre	7	0.5	0.0	0.2	0.020	0.007	0.016
TN: Knoxville	7	0.2	0.0	0.1	0.024	0.011	0.018

Table 3 (continued)
Gross Beta in Airborne Particulates
November 1996

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
TN: Nashville	8	0.9	0.1	0.2	0.020	0.009	0.013
TN: Oak Ridge/Bethel	8	0.4	0.0	0.1	0.018	0.009	0.012
TN: Oak Ridge/K25	8	0.4	0.0	0.2	0.015	0.009	0.012
TN: Oak Ridge/Melton	8	0.4	0.0	0.1	0.017	0.008	0.012
TN: Oak Ridge/Y12 E	8	0.6	0.0	0.2	0.016	0.008	0.012
TN: Oak Ridge/Y12 W	8	0.2	0.0	0.1	0.017	0.009	0.012
TX: Austin	7	0.2	0.1	0.1	0.020	0.009	0.014
TX: El Paso	7	1.0	0.5	0.8	0.036	0.014	0.022
UT: Salt Lake City	8	0.2	0.0	0.1	0.034	0.006	0.015
VA: Lynchburg	6	0.5	0.1	0.3	0.012	0.007	0.010
WA: Olympia	7	0.2	0.0	0.1	0.011	0.004	0.008
WA: Spokane	7	0.3	0.0	0.1	0.022	0.005	0.013
WI: Madison	9	0.7	0.0	0.2	0.019	0.008	0.013

Table 4
Gross Beta in Airborne Particulates
December 1996

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
AL: Montgomery	7	0.0	0.0	0.0	0.015	0.007	0.012
AR: Little Rock	9	0.2	0.0	0.1	0.027	0.008	0.016
CA: Berkeley	9	0.3	0.0	0.1	0.014	0.002	0.005
CA: Los Angeles	9	0.2	0.0	0.1	0.017	0.002	0.009
CO: Denver	9	0.9	0.1	0.4	0.014	0.004	0.009
CT: Hartford	9	0.0	0.0	0.0	0.014	0.003	0.009
DE: Wilmington	9	0.1	0.0	0.1	0.016	0.003	0.012
FL: Jacksonville	7	0.1	0.0	0.1	0.013	0.006	0.009
FL: Miami	8	0.0	0.0	0.0	0.008	0.002	0.006
HI: Honolulu	9	0.2	0.1	0.1	0.004	0.002	0.003
IA: Iowa City	9	0.5	0.0	0.2	0.028	0.013	0.019
ID: Boise	9	0.2	0.0	0.1	0.014	0.002	0.005
ID: Idaho Falls	8				0.031	0.004	0.011
IN: Indianapolis	8	0.2	0.0	0.1	0.030	0.012	0.018
KS: Topeka	9	1.2	0.1	0.5	0.037	0.006	0.019
ME: Augusta	8	0.1	0.0	0.0	0.020	0.003	0.012
MI: Lansing	9	0.1	0.0	0.1	0.024	0.010	0.016
MN: Welch	9	0.1	0.0	0.0	0.031	0.017	0.023
MS: Jackson	8	0.2	0.0	0.1	0.015	0.004	0.011
NC: Charlotte	6	0.1	0.0	0.1	0.017	0.007	0.012
NC: Wilmington	4				0.021	0.007	0.011
ND: Bismarck	6	0.5	0.0	0.1	0.029	0.015	0.022
NH: Concord	9	0.1	0.0	0.0	0.018	0.002	0.011
NJ: Trenton	9	0.3	0.0	0.1	0.019	0.005	0.012
NM: Santa Fe	1				0.012	0.012	0.012
NV: Las Vegas	9	0.4	0.1	0.2	0.027	0.005	0.012
NY: Albany	3	0.1	0.0	0.1	0.013	0.007	0.011
NY: Yaphank	9	0.0	0.0	0.0	0.019	0.004	0.011
OH: Columbus	4	0.1	0.1	0.1	0.018	0.016	0.017
OH: Painesville	5	0.1	0.0	0.1	0.016	0.010	0.012
OH: Ross	9				0.021	0.008	0.016
PA: Harrisburg	9	0.2	0.0	0.1	0.022	0.006	0.013
SC: Barnwell	2	0.0	0.0	0.0	0.012	0.009	0.011
SC: Columbia	8	0.2	0.0	0.1	0.024	0.008	0.013
SD: Pierre	8	0.1	0.0	0.0	0.037	0.009	0.020
TN: Knoxville	5	0.3	0.0	0.1	0.028	0.016	0.022
TN: Nashville	8	0.1	0.0	0.1	0.016	0.008	0.012
TN: Oak Ridge/Bethel	9	0.4	0.0	0.1	0.016	0.009	0.012

Table 4 (continued)
Gross Beta in Airborne Particulates
December 1996

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
TN: Oak Ridge/K25	9	0.5	0.0	0.1	0.016	0.011	0.013
TN: Oak Ridge/Melton	9	0.4	0.0	0.1	0.016	0.009	0.013
TN: Oak Ridge/Y12 E	9	0.5	0.0	0.1	0.016	0.010	0.013
TN: Oak Ridge/Y12 W	8	0.1	0.0	0.0	0.014	0.008	0.011
TX: Austin	8	0.2	0.0	0.1	0.018	0.007	0.011
TX: El Paso	8	1.9	0.5	1.1	0.023	0.011	0.016
UT: Salt Lake City	7	0.1	0.0	0.0	0.014	0.002	0.007
VA: Lynchburg	7	0.5	0.1	0.3	0.017	0.006	0.011
WA: Olympia	4	0.0	0.0	0.0	0.005	0.002	0.003
WA: Spokane	9	0.1	0.0	0.0	0.027	0.001	0.011
WI: Madison	9	0.4	0.0	0.1	0.025	0.015	0.019

Table 5
Gross Beta and Specific Gamma in Precipitation
October 1996

Location	Gross Beta Activity		Specific Gamma Activity	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	4.48	0.49	Be7	72 43
			K40	14 26
AR: Little Rock	0.93	0.27	K40	29 35
AZ: Phoenix	4.18	0.48		ND
CA: Berkeley	1.40	0.32		ND
CO: Denver	2.62	0.38	Be7	89 48
CT: Hartford	0.71	0.27		ND
DE: Wilmington	0.99	0.29		ND
FL: Jacksonville	0.15	0.20		ND
FL: Miami	0.44	0.24		ND
HI: Honolulu	1.36	0.31		ND
IA: Iowa City	1.23	0.30		ND
ID: Boise	3.20	0.42		ND
ID: Idaho Falls	11.90	0.82		ND
ME: Augusta	1.33	0.30	Be7	52 45
MI: Lansing	1.75	0.33		ND
MN: Minneapolis	1.59	0.31		ND
MN: Welch	1.54	0.33		ND
NC: Charlotte	0.34	0.22		ND
NC: Wilmington	2.16	0.44		ND
ND: Bismarck	2.26	0.38		ND
NE: Lincoln	1.21	0.29		ND
NH: Concord	1.14	0.29		ND
NJ: Trenton	0.76	0.27		ND
NY: Albany	1.18	0.29		ND
NY: Yaphank	7.60	0.61	K40	29 34
OH: Painesville	1.57	0.32	K40	22 36
OR: Portland	0.80	0.28		ND
PA: Harrisburg	0.97	0.27		ND
SC: Barnwell	1.32	0.30	K40	16 28
SC: Columbia	0.68	0.25	Pb212	3.8 4.6
TN: Knoxville	0.64	0.27		ND
TN: Nashville	0.63	0.24		ND
UT: Salt Lake City	0.77	0.27		ND
VA: Lynchburg	2.88	0.39		ND
WA: Olympia	0.55	0.25		ND
WI: Madison	0.87	0.28	Be7	59 48

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
November 1996

Location	Gross Beta Activity		Specific Gamma Activity	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	2.91	0.40		ND
AR: Little Rock	1.03	0.28		ND
CA: Berkeley	0.53	0.25	Pb212	7.4 5.6
			Tl208	5.8 2.8
CO: Denver	3.66	0.44	Pb214	5.8 6.1
CT: Hartford	0.55	0.25		ND
DE: Wilmington	0.40	0.23		ND
FL: Jacksonville	1.52	0.33		ND
FL: Miami	0.68	0.28		ND
HI: Honolulu	0.50	0.24	Pb212	10.4 6.5
			Tl208	4.8 4.2
IA: Iowa City	1.33	0.32		ND
ID: Boise	1.16	0.30		ND
ME: Augusta	1.35	0.31	Be7	77 49
MI: Lansing	2.27	0.37		ND
MN: Minneapolis	1.88	0.34	Pb212	5.2 7.9
			Tl208	3.2 5.4
MS: Jackson	0.37	0.23		ND
NC: Charlotte	1.09	0.30	Pb212	8.6 5.3
NC: Wilmington	0.56	0.25		ND
ND: Bismarck	0.95	0.28	Bi214	8.6 5.9
			Pb212	5.0 5.1
			Tl208	4.7 4.0
NH: Concord	4.42	0.47		ND
NJ: Trenton	1.16	0.29		ND
NV: Las Vegas	3.41	0.44		ND
NY: Albany	1.30	0.31	Bi214	6.2 7.1
NY: Yaphank	2.29	0.36		ND
OH: Painesville	1.69	0.33		ND
OR: Portland	1.29	0.30		ND
PA: Harrisburg	1.67	0.33	K40	25 37
			Pb212	4.7 5.6
			Pb214	12.4 5.6
SC: Barnwell	3.61	0.44		ND
SC: Columbia	1.47	0.30	Pb212	3.7 6.5
TN: Knoxville	1.63	0.32		ND
TN: Nashville	0.81	0.26		ND

Note: ND = Not Detected

Table 6 (continued)
Gross Beta and Specific Gamma in Precipitation
November 1996

Location	Gross Beta Activity		Specific Gamma Activity	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
UT: Salt Lake City	0.78	0.27	Pb212	4.5 4.8
VA: Lynchburg	3.68	0.44	K40	30 38
WA: Olympia	0.59	0.25		ND
WI: Madison	1.12	0.29	Pb212	5.0 5.2

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
December 1996

Location	Gross Beta Activity		Specific Gamma Activity	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.98	0.29		ND
AR: Little Rock	1.20	0.29	Tl208	2.1 3.8
CA: Berkeley	0.54	0.25	Tl208	2.2 3.9
CT: Hartford	1.83	0.34	Be7	170 120
			Bi214	14 10
FL: Jacksonville	0.95	0.28	Pb212	5.4 5.1
			Tl208	3.3 3.9
FL: Miami	2.54	0.42		ND
HI: Honolulu	1.02	0.29	Bi214	10.2 6.0
IA: Iowa City	3.52	0.44	Tl208	4.9 3.9
ID: Boise	0.52	0.25		ND
ID: Idaho Falls	1.04	0.28		ND
MN: Minneapolis	3.07	0.42	K40	21 28
MN: Welch	4.59	0.54	Tl208	2.4 4.1
MS: Jackson	0.23	0.23	Bi214	27.2 7.2
			Pb214	19.8 7.2
NC: Charlotte	1.65	0.33		ND
NC: Wilmington	0.56	0.26		ND
ND: Bismarck	2.78	0.40	Pb212	6.2 6.3
NE: Lincoln	0.88	0.28		ND
NJ: Trenton	3.09	0.41	Pb214	7.1 5.9
NY: Albany	1.76	0.32	Pb212	3.1 5.4
NY: Yaphank	1.11	0.30		ND
OH: Painesville	7.12	0.61		ND
OR: Portland	0.30	0.22		ND
PA: Harrisburg	2.38	0.37	Bi214	6.2 7.7
SC: Barnwell	0.83	0.30	Bi214	6.8 7.4
			Pb212	5.7 6.8
			Tl208	3.3 4.1
SC: Columbia	1.22	0.30	Pb212	11.9 6.4
TN: Knoxville	0.88	0.37		ND
TN: Nashville	0.87	0.27		ND
TX: Austin	0.72	0.26	Pb212	3.8 5.0
UT: Salt Lake City	1.11	0.28	Pb212	5.7 6.7
			Tl208	4.5 4.4
VA: Lynchburg	2.94	0.40		ND
WA: Olympia	0.58	0.25	Bi214	5.1 7.5

Note: ND = Not Detected

Table 7 (continued)
Gross Beta and Specific Gamma in Precipitation
December 1996

Location	Gross Beta Activity		Specific Gamma Activity	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
WI: Madison	1.91	0.40	K40	32 58
			Tl208	3.6 3.7

Table 8
Tritium in Precipitation
October - December 1996

Location	October 1996		November 1996		December 1996	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery	-16	70	301	91	33	71
AR: Little Rock	-60	70	-70	77	-48	72
AZ: Phoenix	-23	72	NS		NS	
CA: Berkeley	25	74	-59	75	-66	71
CO: Denver	-18	72	47	81	NS	
CT: Hartford	7	70	16	76	3	70
DE: Wilmington	0	70	65	78	NS	
FL: Jacksonville	-22	69	-7	75	-26	69
FL: Miami	3	70	-15	79	49	73
HI: Honolulu	-38	72	-93	73	-45	72
IA: Iowa City	-10	73	-7	79	31	75
ID: Boise	-4	73	-25	76	-47	72
ID: Idaho Falls	-18	73	NS		21	75
ME: Augusta	-28	69	20	76	NS	
MI: Lansing	17	70	7	79	NS	
MN: Minneapolis	-52	71	-43	78	-29	73
MN: Welch	6	73	NS		6	74
MS: Jackson	NS		36	80	11	70
NC: Charlotte	32	71	61	79	21	71
NC: Wilmington	1	70	82	80	11	70
ND: Bismarck	-23	72	0	80	2	74
NE: Lincoln	-50	71	NS		-29	73
NH: Concord	-1	69	20	76	NS	
NJ: Trenton	-26	69	36	77	30	72
NV: Las Vegas	NS		-18	76	NS	
NY: Albany	3	70	84	79	33	71
NY: Yaphank	-7	69	28	77	27	72
OH: Painesville	65	76	18	81	-26	73
OR: Portland	-25	72	-56	74	-42	72
PA: Harrisburg	16	70	60	78	12	71
SC: Barnwell	57	72	18	80	45	72
SC: Columbia	12	71	98	80	18	71
TN: Knoxville	59	73	25	81	23	71
TN: Nashville	29	71	-18	78	21	71
TX: Austin	NS		NS		-14	74
UT: Salt Lake City	-10	73	-69	74	-24	73
VA: Lynchburg	3	70	5	76	14	70
WA: Olympia	-35	72	-44	75	-17	73

Note: NS = No Sample

Table 8 (continued)
Tritium in Precipitation
October - December 1996

Location	October 1996 pCi/L $\pm 2u$	November 1996 pCi/L $\pm 2u$	December 1996 pCi/L $\pm 2u$
WI: Madison	-18 73	-36 78	51 72

Note: NS = No Sample

Plutonium and Uranium in Airborne Particulates and Precipitation

Environmental radiation levels of plutonium and uranium are determined by the analysis of annually composited samples (air filters) collected from the continuously operating airborne particulate samplers.

Concentrations of plutonium-238, combined plutonium-239 and 240, and uranium-234, 235, and 238 are determined by alpha spectrometry following chemical separation. The volume of air represented by the annual composite ranges from 120,000 to 500,000 cubic meters.

Plutonium and uranium results are published when they become available.

Table 9
Plutonium and Uranium in Airborne Particulates
January - December 1996 Composites

Location	²³⁸ Pu		²³⁹⁻²⁴⁰ Pu		²³⁴ U		²³⁵ U		²³⁸ U	
	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u
AK: Fairbanks	0.14	0.38	0.02	0.13	9.8	1.4	0.71	0.39	9.9	1.4
AL: Montgomery	0.21	0.40	0.11	0.28	11.0	1.9	0.41	0.37	11.1	1.9
AR: Little Rock	0.06	0.73	-0.10	0.33	25.5	3.6	1.60	0.94	23.6	3.5
AZ: Phoenix	0.00	0.78	0.78	0.68	53.7	7.3	3.8	1.9	42.1	6.3
CA: Berkeley	0.00	0.47	0.31	0.34	11.3	2.2	1.68	0.95	10.9	2.2
CA: Los Angeles	0.06	0.38	-0.028	0.056	22.5	3.0	1.19	0.72	18.5	2.7
CO: Denver	0.60	0.72	-0.15	0.30	31.8	4.8	1.4	1.1	28.7	4.5
CT: Hartford	0.03	0.33	0.08	0.14	8.4	1.6	0.66	0.49	8.7	1.6
DE: Wilmington	0.18	0.61	0.00	0.21	14.3	2.0	1.94	0.75	14.5	2.0
FL: Jacksonville	0.24	0.28	0.35	0.27	13.7	1.8	0.47	0.33	13.5	1.7
HI: Honolulu	0.24	0.27	-0.026	0.036	3.94	0.73	0.26	0.20	3.23	0.66
IA: Iowa City	0.40	0.77	-0.16	0.24	10.9	3.4	1.2	1.1	13.6	3.0
ID: Boise	0.47	0.83	0.07	0.34	25.6	3.9	0.85	0.77	26.7	3.9
ID: Idaho Falls	0.17	0.37	0.24	0.30	23.6	3.2	2.05	0.92	21.6	3.0
IL: Chicago	0.42	0.44	-0.024	0.049	12.9	3.2	-0.19	0.60	5.3	1.9
IN: Indianapolis	0.65	0.54	0.04	0.13	21.1	4.6	0.6	1.1	23.9	4.2
KS: Topeka	0.08	0.50	0.05	0.24	14.5	3.6	1.4	1.1	18.4	3.2
ME: Augusta	0.09	0.48	-0.09	0.30	17.4	2.7	1.54	0.80	15.3	2.5
MI: Lansing	0.55	0.45	0.12	0.19	9.1	2.8	0.49	0.76	8.9	2.0
MN: Minneapolis	0.22	0.53	0.00	0.25	11.1	4.4	0.9	1.6	12.4	3.6
MS: Jackson	0.46	0.93	0.04	0.26	13.5	2.6	0.84	0.72	14.8	2.7
NC: Charlotte	0.22	0.61	0.05	0.17	22.5	3.1	1.03	0.65	21.9	3.0
NC: Wilmington	0.63	0.46	0.02	0.11	11.7	1.5	1.01	0.45	10.4	1.4
ND: Bismarck	0.10	0.58	-0.17	0.16	15.1	4.0	0.00	0.86	15.7	3.2
NH: Concord	-0.15	0.33	0.09	0.16	9.3	1.2	0.77	0.36	10.1	1.3
NJ: Trenton	0.03	0.21	0.14	0.19	6.8	1.0	0.50	0.30	6.16	0.98
NM: Santa Fe	0.36	0.38	0.16	0.23	15.3	2.8	0.75	0.70	17.9	2.6
NV: Las Vegas	1.1	1.5	1.6	1.2	88.5	9.8	2.3	1.5	69.8	8.4
NY: Albany	0.01	0.48	0.43	0.47	17.0	2.4	0.90	0.54	14.5	2.2
NY: New York	0.14	0.35	0.14	0.26	9.3	1.5	1.12	0.56	10.2	1.6
NY: Niagara Falls	0.9	1.5	0.65	0.80	70.7	7.1	6.4	1.9	68.8	6.9
NY: Yaphank	0.20	0.25	0.028	0.089	4.97	0.87	1.02	0.41	4.67	0.84
OH: Columbus	0.23	0.27	0.02	0.12	14.3	3.4	0.40	0.76	13.0	2.8
OH: Painesville	0.06	0.21	0.020	0.094	9.4	3.2	0.53	0.60	9.9	1.8
OH: Ross	0.30	0.54	0.05	0.17	39.8	6.8	4.1	2.0	41.9	6.0
OH: Toledo	0.86	0.87	0.09	0.27	11.3	6.2	3.1	2.4	16.4	4.8
OR: Portland	0.36	0.47	-0.02	0.14	6.7	1.3	1.07	0.57	5.7	1.2
PA: Harrisburg	0.34	0.58	0.08	0.35	9.7	1.5	0.61	0.39	8.5	1.4
PA: Pittsburgh	-0.15	0.25	0.06	0.12	20.2	2.4	1.70	0.69	18.6	2.3
SC: Barnwell	0.40	0.42	0.18	0.18	12.9	1.6	1.21	0.47	10.6	1.4

Table 9 (continued)
Plutonium and Uranium in Airborne Particulates
January - December 1996 Composites

Location	²³⁸ Pu		²³⁹⁻²⁴⁰ Pu		²³⁴ U		²³⁵ U		²³⁸ U	
	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u
SC: Columbia	0.54	0.42	0.16	0.18	26.4	2.7	1.46	0.59	23.8	2.5
SD: Pierre	0.87	0.98	0.29	0.38	8.5	3.4	-0.07	0.72	13.8	3.2
TN: Knoxville	0.38	0.50	0.26	0.37	15.1	2.5	1.11	0.69	14.2	2.4
TN: Nashville	0.18	0.31	0.04	0.12	16.4	2.2	0.98	0.53	14.5	2.0
TN: Oak Ridge/Bethel	-0.05	0.24	-0.03	0.12	15.7	2.3	1.04	0.61	14.4	2.2
TN: Oak Ridge/Melton	0.07	0.17	-0.011	0.076	5.2	2.6	0.65	0.44	5.3	1.1
TN: Oak Ridge/Y12 E	0.06	0.38	0.31	0.27	43.0	5.0	3.4	1.2	15.3	2.6
TN: Oak Ridge/Y12 W	0.40	0.35	0.06	0.13	63.8	6.0	4.2	1.3	23.6	3.0
TX: Austin	0.72	0.93	0.09	0.28	7.4	3.0	0.08	0.74	9.6	2.4
TX: El Paso	-1.4	2.1	1.1	1.3	76	10	6.6	3.1	74	10
UT: Salt Lake City	0.13	0.72	0.57	0.73	36.7	5.0	2.8	1.4	31.7	4.5
VA: Lynchburg	0.01	0.13	0.09	0.12	60.8	4.6	2.68	0.67	8.4	1.2
VA: Virginia Beach	0.08	0.20	0.05	0.11	12.8	1.4	0.99	0.38	12.9	1.4
WA: Olympia	0.05	0.31	0.05	0.12	3.68	0.72	0.30	0.22	3.20	0.66
WA: Spokane	-0.17	0.25	0.09	0.17	18.0	2.7	1.17	0.71	16.8	2.6
WI: Madison	0.33	0.45	0.00	0.14	14.6	4.2	1.1	1.2	14.8	3.4

2. Water Program

The ERAMS water program provides data on radionuclide concentrations in the nation's rivers, streams, and drinking water supplies.

Surface Water

Quarterly grab samples are taken downstream from nuclear facilities at 58 stations. Surface water samples are analyzed for tritium quarterly and gamma-emitting radionuclides annually. Tritium is a primary potential radioactive pollutant from nuclear power plants and weapons production activities.

Table 10
Tritium in Surface Water
October - December 1996

Location	Source	Date Collected	³ H pCi/L ± 2u	
AL: Decatur	Tennessee River	10/22/96	-4	73
AL: Gordon	Chattahoochee River	10/10/96	0	80
AL: Scottsboro	Tennessee River	10/17/96	12	74
AR: Little Rock	Arkansas River	10/02/96	130	78
CA: Clay Station	Folsom S. Canal	10/22/96	19	69
CA: Diablo Canyon	Pacific Ocean	10/07/96	26	70
CA: San Onofre	Pacific Ocean	10/10/96	-28	69
CO: Platteville	South Platte River	10/03/96	52	74
CT: E. Haddam	Connecticut River	12/10/96	101	80
CT: Waterford	Long Island Sound	12/10/96	8	76
FL: Crystal River	Gulf Of Mexico	10/14/96	12	69
FL: Ft. Pierce	Atlantic Ocean	10/15/96	-32	72
FL: Homestead	Biscayne Bay	10/22/96	3	73
IA: Cedar Rapids	Cedar River	11/19/96	-49	71
ID: Buhl	Snake River	10/15/96	35	70
IL: Moline	Mississippi River	10/09/96	23	73
IL: Morris	Illinois River	12/29/96	28	75
IL: Zion	Lake Michigan	12/30/96	725	94
KS: Le Roy	Neosho River	12/31/96	-70	73
LA: New Orleans	Mississippi River	10/31/96	9	74
MA: Plymouth	Cape Cod Bay	10/03/96	21	72
MD: Conowingo	Susquehanna River	10/08/96	85	83
MD: Lusby	Chesapeake Bay	10/22/96	-35	72
ME: Wiscasset	Montseway Bay	10/10/96	72	77
MI: Bridgman	Lake Michigan	10/20/96	172	75
MI: Charlevoix	Lake Michigan	10/09/96	57	71
MI: Monroe	Lake Erie	10/07/96	0	78
MI: S. Haven	Lake Michigan	10/20/96	74	71
MN: Monticello	Mississippi River	10/28/96	-6	73
MN: Red Wing	Mississippi River	10/22/96	-10	72
MS: Port Gibson	Mississippi River	10/08/96	20	72
NC: Charlotte	Catawba River	10/11/96	304	85
NC: Southport	Atlantic Ocean	10/15/96	32	70
NJ: Bayside	Delaware River	10/24/96	12	73
NJ: Oyster Creek	Oyster Creek	10/22/96	-50	71
NY: Chelsea	Hudson River	10/07/96	68	81
NY: Croton-On-Hudson	Hudson River	10/11/96	202	77
NY: Oswego	Lake Ontario	10/28/96	116	78
OH: Toledo	Lake Erie	10/04/96	8	71
OR: Bradwood	Columbia River	10/21/96	85	73

Table 10 (continued)
Tritium in Surface Water
October - December 1996

Location	Source	Date Collected	³ H pCi/L ± 2u	
PA: Danville	Susquehanna River	10/09/96	-7	72
PA: Philadelphia	Schuylkill River - Belmont	10/03/96	7	72
PA: Philadelphia	Delaware River - Baxter	10/03/96	1	71
PA: Philadelphia	Schuylkill River - Queen Lane	10/03/96	-28	70
SC: Columbia	Broad River	10/09/96	0	80
SC: Hartsville	Lake Robinson	10/02/96	5270	190
TN: Daisy	Tennessee River	10/03/96	113	76
TN: Kingston	Clinch River	10/08/96	38	80
TN: Oak Ridge	Clinch River	11/19/96	229	86
TX: Matagorda	Colorado River	10/04/96	-14	70
VA: Doswell	North Anna River	10/02/96	3200	150
VA: Newport News	James River	10/15/96	-44	75
VT: Vernon	Connecticut River	10/07/96	49	82
WA: Northport	Columbia River	10/22/96	-59	71
WA: Richland	Columbia River	10/10/96	-1	72
WI: Two Creeks	Lake Michigan	10/15/96	105	72
WI: Victory	Mississippi River	10/07/96	-4	72
WV: Wheeling	Ohio River	10/01/96	-27	76

Table 11
Surface Water Annual Gamma Analysis
January - December 1996

Location	Source	Date Collected	Specific Gamma Activity	
			Nuclide	pCi/L $\pm 2u$
AL: Decatur	Tennessee River	04/24/96		ND
AL: Gordon	Chattahoochee River	04/03/96	K40	24 35
AL: Scottsboro	Tennessee River	04/23/96		ND
AR: Little Rock	Arkansas River	04/02/96		ND
CA: Clay Station	Folsom S. Canal	04/23/96	Bi214	8.8 7.2
CA: Diablo Canyon	Pacific Ocean	04/02/96	K40	313 56
		07/02/96	K40	257 68
CA: Eureka	Humboldt Bay	04/11/96	Bi212	158 31
			K40	324 47
			Pb212	129.0 6.9
			Ra224	156 47
			Ra228	88.9 8.6
			Tl208	44.1 4.1
CA: San Onofre	Pacific Ocean	06/27/96	K40	307 48
			Tl208	2.0 3.5
CO: Platteville	South Platte River	04/03/96		ND
CT: E. Haddam	Connecticut River	05/20/96	K40	27 36
			Pb214	7.5 4.9
			Tl208	2.6 3.1
CT: Waterford	Long Island Sound	05/16/96	K40	236 40
			Tl208	1.7 3.0
FL: Crystal River	Gulf Of Mexico	04/02/96	Pb212	6.9 8.0
FL: Ft. Pierce	Atlantic Ocean	04/09/96	K40	28 29
FL: Homestead	Biscayne Bay	04/19/96	K40	372 51
GA: Baxley	Altamaha River	06/25/96		ND
IA: Cedar Rapids	Cedar River	04/10/96		ND
ID: Buhl	Snake River	04/09/96	Bi214	11.5 7.0
			Pb212	5.3 7.8
			Pb214	10.0 7.2
IL: Moline	Mississippi River	04/03/96		ND
IL: Morris	Illinois River	04/01/96	Tl208	3.0 3.9
IL: Zion	Lake Michigan	05/15/96	K40	33 63
			Pb212	6.2 2.5
KS: Le Roy	Neosho River	04/02/96		ND
		06/25/96	Tl208	2.2 3.1
LA: New Orleans	Mississippi River	04/30/96	Tl208	3.9 4.9
MA: Plymouth	Cape Cod Bay	04/29/96		ND

Note: ND = Not Detected

Table 11 (continued)
Surface Water Annual Gamma Analysis
January - December 1996

Location	Source	Date Collected	Specific Gamma Activity		
			Nuclide	pCi/L \pm 2u	
MD: Conowingo	Susquehanna River	04/11/96	Pb212	6.3 8.8	
			Ra224	52 51	
MD: Lusby	Chesapeake Bay	04/08/96	K40	81 43	
ME: Wiscasset	Montseway Bay	04/10/96	K40	208 44	
			Pb214	9.6 6.5	
MI: Bridgman	Lake Michigan	04/09/96	Bi214	5.6 6.6	
			Pb212	2.9 5.2	
				NR	
MI: Charlevoix	Lake Michigan	04/04/96		NR	
MI: Monroe	Lake Erie	04/08/96		ND	
MI: S. Haven	Lake Michigan	04/09/96		ND	
MN: Monticello	Mississippi River	04/15/96	Pb212	3.8 5.8	
MN: Red Wing	Mississippi River	04/08/96	K40	26 38	
MS: Port Gibson	Mississippi River	04/02/96	Pb212	6.0 8.1	
NC: Charlotte	Catawba River	04/15/96		ND	
NC: Southport	Atlantic Ocean	04/11/96	K40	192 77	
NE: Rulo	Missouri River	04/17/96		ND	
NJ: Bayside	Delaware River	04/16/96	K40	100 43	
			Pb212	5.1 5.2	
			K40	201 76	
NJ: Oyster Creek	Oyster Creek	04/18/96	K40	ND	
NY: Chelsea	Hudson River	04/22/96		ND	
NY: Croton-On-Hudson	Hudson River	04/08/96	K40	43 33	
			Pb212	2.4 4.6	
NY: Oswego	Lake Ontario	06/20/96		ND	
OH: Toledo	Lake Erie	04/16/96	K40	33 50	
			Pb212	3.0 3.5	
			Tl208	4.2 2.6	
OR: Bradwood	Columbia River	05/15/96		ND	
PA: Danville	Susquehanna River	04/10/96	K40	19 36	
PA: Philadelphia	Delaware River - Baxter	04/04/96		ND	
			Schuylkill River - Belmont	04/04/96	ND
			Schuylkill River - Queen Lane	04/04/96	Bi214
SC: Allendale	Savannah River	04/01/96	Bi214	7.2 4.6	
SC: Columbia	Broad River	04/17/96	Bi214	8.3 7.8	
SC: Hartsville	Lake Robinson	04/15/96	Pb212	3.1 5.4	
TN: Daisy	Tennessee River	04/16/96		ND	
TN: Kingston	Clinch River	04/16/96	Pb212	9.8 8.1	
TN: Oak Ridge	Clinch River	04/25/96		ND	
TX: El Paso	Rio Grande	05/03/96	Bi214	10.3 6.3	

Note: ND = Not Detected
NR = Not Reported

Table 11 (continued)
Surface Water Annual Gamma Analysis
January - December 1996

Location	Source	Date Collected	Specific Gamma Activity	
			Nuclide	pCi/L \pm 2 <i>u</i>
TX: El Paso	Rio Grande	05/03/96	Pb212	3.3 5.0
TX: Matagorda	Colorado River	04/11/96	K40	135 34
VA: Doswell	North Anna River	04/03/96		ND
VA: Newport News	James River	04/11/96	K40	81 40
			Tl208	3.1 4.1
VT: Vernon	Connecticut River	04/03/96	Tl208	1.9 2.6
WA: Northport	Columbia River	04/03/96	Pb212	5.2 6.9
WA: Richland	Columbia River	04/10/96		ND
WI: Two Creeks	Lake Michigan	04/09/96	Pb212	5.2 7.0
WI: Victory	Mississippi River	04/02/96		ND
WV: Wheeling	Ohio River	04/01/96		ND

Note: ND = Not Detected

Drinking Water

This program monitors ambient radiation levels in drinking water at 78 sites. These data serve to assess trends and anomalies in concentrations, and to compare with standards set forth in the EPA “National Interim Primary Drinking Water Regulations.” These regulations provide for approval of supplies when the combined radium-226 and radium-228 levels do not exceed 5 pCi/L, when the gross alpha (excluding radon and uranium) levels do not exceed 15 pCi/L, when tritium levels do not exceed 20,000 pCi/L, when the strontium-90 levels do not exceed 8 pCi/L, and when the gross beta levels do not exceed 50 pCi/L.

Grab samples are taken at the 78 sites which are either major population centers or selected nuclear facility environs.

The analyses include (a) tritium on a quarterly basis; (b) gross alpha, gross beta, strontium-90, and gamma on annual composites; (c) radium-226 if the gross alpha exceeds 2 pCi/L and radium-228 if the radium-226 falls between 3 and 5 pCi/L; (d) iodine-131 on one quarterly sample per year for each station; and (e) an annual composite for plutonium-238, combined plutonium-239 and 240, and uranium-234, 235, and 238 for stations that demonstrate gross alpha levels greater than 2 pCi/L.

Table 12
Tritium in Drinking Water
October - December 1996

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	10/07/96	66	82
AL: Dothan	10/10/96	0	80
AL: Montgomery - 408	11/27/96	3	73
AL: Muscle Shoals	10/23/96	77	76
AL: Scottsboro	10/17/96	67	76
AR: Little Rock	10/01/96	-22	73
CA: Berkeley	10/04/96	168	85
CA: Los Angeles	10/01/96	-54	71
CO: Denver	10/03/96	26	74
CO: Platteville	10/03/96	67	81
DE: Dover	10/11/96	0	68
FL: Miami	10/18/96	-12	68
GA: Savannah	10/24/96	-83	70
HI: Honolulu	10/01/96	-37	72
IA: Cedar Rapids	11/19/96	20	74
ID: Boise	10/01/96	-23	70
ID: Idaho Falls	10/22/96	84	71
KS: Topeka	10/01/96	18	71
LA: New Orleans	10/02/96	25	72
MA: Lawrence	12/06/96	-16	72
MD: Baltimore	10/01/96	-53	71
MD: Conowingo	10/08/96	47	80
ME: Augusta	10/02/96	-7	73
MI: Detroit	10/04/96	52	81
MI: Grand Rapids	10/24/96	65	75
MN: Minneapolis	11/12/96	10	73
MN: Red Wing	10/22/96	-10	68
MO: Jefferson City	10/01/96	-19	73
MS: Jackson	10/08/96	28	80
MS: Port Gibson	10/08/96	-20	71
MT: Helena	12/20/96	-24	78
NC: Charlotte	10/11/96	257	83
NC: Wilmington	10/15/96	32	75
ND: Bismarck	10/01/96	-7	74
NE: Lincoln	11/02/96	-16	72
NH: Concord	10/01/96	11	71
NJ: Trenton	10/21/96	44	70
NJ: Waretown	10/22/96	30	74
NM: Santa Fe	10/15/96	-59	71
NV: Las Vegas	10/01/96	-9	75

Table 12 (continued)
Tritium in Drinking Water
October - December 1996

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NY: Niagara Falls	10/04/96	168	80
OH: Cincinnati	11/25/96	55	72
OH: Columbus	10/17/96	17	69
OH: E. Liverpool	12/11/96	4	73
OH: Toledo	10/03/96	136	77
OK: Oklahoma City	10/02/96	-43	72
OR: Portland	10/03/96	42	80
PA: Columbia	10/09/96	21	79
PA: Harrisburg	10/16/96	12	69
PA: Philadelphia - Baxter	10/03/96	17	73
PA: Philadelphia - Belmont	10/03/96	59	74
PA: Philadelphia - Queens Lab	10/03/96	45	73
PA: Pittsburgh	12/11/96	0	72
PC: Corozal	10/10/96	-11	71
RI: Providence	10/07/96	3	79
SC: Barnwell	10/10/96	-1	72
SC: Columbia	10/01/96	528	92
SC: Jenkinsville	10/09/96	138	84
SC: Seneca	10/23/96	29	69
SC: Seneca	12/31/96	32	80
TN: Chattanooga	10/01/96	61	75
TN: Knoxville	10/03/96	15	72
TN: Oak Ridge - Anderson Co. #768	12/12/96	89	79
TN: Oak Ridge - Anderson Co. #772	12/12/96	97	79
TN: Oak Ridge - Knox Co. #371	12/12/96	51	78
TN: Oak Ridge - Roane Co. #360	12/13/96	76	78
TN: Oak Ridge - Roane Co. #4442	12/13/96	199	83
TX: Austin	10/18/96	-7	68
VA: Doswell	11/15/96	13	76
WA: Richland	10/10/96	3	72
WI: Genoa City	10/07/96	2	78
WI: Madison	10/04/96	13	72

Table 13
Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples
January - December 1996

Location	²³⁸ Pu		²³⁹⁻²⁴⁰ Pu		²³⁴ U		²³⁵ U		²³⁸ U	
	pCi/L ± 2 <i>u</i>		pCi/L ± 2 <i>u</i>		pCi/L ± 2 <i>u</i>		pCi/L ± 2 <i>u</i>		pCi/L ± 2 <i>u</i>	
CA: Los Angeles	-0.0005	0.0075	0.0005	0.0032	2.30	0.24	0.202	0.066	1.96	0.22
IL: W. Chicago	0.014	0.023	0.0049	0.0086	1.38	0.23	-0.007	0.024	0.198	0.083
MT: Helena	0.006	0.012	-0.0005	0.0010	0.97	0.14	0.071	0.038	0.57	0.10
NE: Lincoln	-0.0026	0.0092	0.0021	0.0047	4.22	0.49	0.53	0.15	2.92	0.38
NV: Las Vegas	0.0025	0.0082	0.0025	0.0044	2.62	0.24	0.095	0.040	1.44	0.16

Table 14
Iodine-131 in Drinking Water
January - December 1996

Location	Date Collected	¹³¹ I pCi/L ± 2 <i>u</i>	
AK: Fairbanks	01/22/96	0.04	0.28
AL: Dothan	07/08/96	-0.015	0.097
AL: Muscle Shoals	01/18/96	0.12	0.14
AL: Muscle Shoals	04/24/96	-0.04	0.28
AL: Scottsboro	04/23/96	0.09	0.30
AR: Little Rock	01/25/96	-0.08	0.38
CA: Berkeley	07/03/96	0.02	0.12
CA: Los Angeles	01/23/96	0.18	0.29
CO: Denver	01/25/96	0.33	0.42
CO: Platteville	01/24/96	0.17	0.34
CT: Hartford	01/24/96	-0.08	0.39
DC: Washington	01/26/96	-0.8	1.7
DE: Dover	01/23/96	0.12	0.29
FL: Miami	01/23/96	-0.22	0.31
FL: Tampa	01/23/96	0.17	0.28
GA: Savannah	03/19/96	0.06	0.10
HI: Honolulu	10/01/96	-0.06	0.13
IA: Cedar Rapids	01/23/96	0.07	0.33
ID: Boise	01/22/96	-0.30	0.56
ID: Idaho Falls	04/23/96	-0.09	0.31
IL: Morris	01/22/96	-0.014	0.085
IL: Morris	07/05/96	0.06	0.10
IL: W. Chicago	04/29/96	0.05	0.11
KS: Topeka	01/22/96	0.21	0.21
LA: New Orleans	01/24/96	0.32	0.28
MA: Lawrence	12/06/96	0.07	0.47
MD: Baltimore	01/22/96	0.18	0.10
MD: Conowingo	04/11/96	0.12	0.14
ME: Augusta	01/29/96	0.18	0.10
MI: Detroit	01/22/96	0.117	0.085
MI: Grand Rapids	04/18/96	-0.06	0.12
MN: Minneapolis	04/29/96	0.13	0.11
MN: Red Wing	04/22/96	0.10	0.14
MO: Jefferson City	01/24/96	0.24	0.28
MS: Jackson	01/24/96	0.11	0.30
MS: Port Gibson	01/23/96	0.26	0.30
MT: Helena	03/20/96	0.09	0.15
NC: Charlotte	04/15/96	0.30	0.30
NC: Wilmington	10/15/96	-0.03	0.12
ND: Bismarck	10/01/96	-0.02	0.11
NE: Lincoln	01/23/96	0.06	0.33

Table 14 (continued)
Iodine-131 in Drinking Water
January - December 1996

Location	Date Collected	¹³¹ I pCi/L ± 2u	
NH: Concord	01/22/96	0.18	0.26
NJ: Trenton	01/22/96	0.24	0.10
NJ: Waretown	01/25/96	-0.21	0.37
NM: Santa Fe	07/19/96	0.19	0.24
NV: Las Vegas	01/23/96	0.16	0.33
NY: Albany	01/22/96	-0.02	0.33
NY: Niagara Falls	01/23/96	-0.07	0.32
NY: Niagara Falls	07/03/96	0.58	0.36
NY: Syracuse	05/30/96	-0.07	0.12
OH: Cincinnati	05/29/96	0.01	0.13
OH: Columbus	10/17/96	0.090	0.089
OH: E. Liverpool	05/10/96	0.81	0.14
OH: E. Liverpool	05/30/96	0.11	0.10
OH: Painesville	08/13/96	-0.03	0.14
OH: Toledo	04/09/96	-0.23	0.32
OK: Oklahoma City	01/24/96	0.02	0.30
OR: Portland	01/24/96	0.40	0.36
PA: Columbia	07/18/96	0.13	0.25
PA: Philadelphia - Baxter Lab	07/11/96	0.13	0.11
PA: Philadelphia - Queen Lane	07/11/96	0.54	0.14
PA: Philadelphia - Belmont	07/11/96	0.50	0.13
PA: Pittsburgh	04/12/96	0.19	0.28
PC: Corozal	10/10/96	0.03	0.16
RI: Providence	01/23/96	0.02	0.33
SC: Barnwell	04/10/96	0.09	0.28
SC: Columbia	01/22/96	0.029	0.098
SC: Jenkinsville	01/26/96	-0.11	0.31
SC: Seneca	01/22/96	0.16	0.29
SC: Seneca	12/31/96	0.01	0.28
TN: Chattanooga	01/22/96	0.12	0.14
TN: Knoxville	04/08/96	-0.01	0.11
TN: Oak Ridge - Anderson Co. #772	03/27/96	0.14	0.14
TN: Oak Ridge - Anderson Co. #768	03/27/96	0.00	0.13
TN: Oak Ridge - Knox Co. #371	03/27/96	0.08	0.13
TN: Oak Ridge - Roane Co. #4442	03/28/96	0.08	0.11
TN: Oak Ridge - Roane Co. #360	03/28/96	-0.03	0.10
TX: Austin	04/24/96	0.12	0.28
VA: Doswell	06/27/96	0.13	0.10
VA: Lynchburg	01/25/96	0.06	0.35
WA: Richland	01/25/96	0.22	0.60
WA: Seattle	01/22/96	0.15	0.11

Table 14 (continued)
Iodine-131 in Drinking Water
January - December 1996

Location	Date Collected	¹³¹ I pCi/L ± 2 <i>u</i>	
WI: Genoa City	10/07/96	-0.10	0.25
WI: Madison	01/24/96	-0.04	0.34
WI: Madison	07/03/96	0.11	0.12

Table 15
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 1996 Composites

Location	Total Solids	Gross Beta		Gross Alpha		⁹⁰ Sr	
	(mg/L)	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AK: Fairbanks	130.0	3.48	0.67	0.50	0.57	0.17	0.38
AL: Dothan	65.5	2.10	0.69	0.07	0.32	0.18	0.18
AL: Montgomery	53.4	1.14	0.50	0.14	0.25	0.07	0.21
AL: Muscle Shoals	200.0	1.06	0.53	0.43	0.73	0.28	0.20
AL: Scottsboro	89.6	1.43	0.54	0.11	0.44	0.16	0.20
AR: Little Rock	29.6	0.70	0.46	0.10	0.27	0.06	0.18
CA: Berkeley	81.0	1.17	0.52	0.06	0.26	0.26	0.20
CA: Los Angeles	741.0	6.9	2.8	7.1	4.8	0.03	0.19
CO: Denver	94.6	1.84	0.55	0.33	0.40	0.27	0.21
CO: Platteville	107.0	2.11	0.61	0.68	0.57	0.19	0.22
CT: Hartford	35.6	0.85	0.47	0.08	0.22	0.01	0.20
DC: Washington	120.0	2.7	2.3	0.9	1.5	-0.51	0.67
DE: Dover	171.0	2.83	0.91	0.04	0.49	-0.02	0.17
FL: Miami	164.0	3.43	0.84	2.0	1.2	0.01	0.19
FL: Tampa	233.0	4.3	1.0	1.9	1.3	0.19	0.21
GA: Baxley	155.0	2.22	0.63	2.7	1.2	-0.05	0.16
GA: Savannah	130.0	2.11	0.59	0.32	0.49	-0.14	0.17
HI: Honolulu	184.0	1.61	0.66	0.83	0.88	-0.05	0.16
IA: Cedar Rapids	126.0	3.04	0.65	0.70	0.66	0.12	0.20
ID: Boise	74.2	1.27	0.59	0.41	0.40	0.18	0.17
ID: Idaho Falls	220.0	3.7	1.1	0.49	0.99	-0.06	0.18
IL: Morris	463.0	11.7	2.4	17.0	5.1	0.03	0.32
IL: W. Chicago	285.0	21.0	2.1	31.2	5.1	-0.03	0.14
KS: Topeka	243.0	3.2	1.1	1.2	1.1	0.17	0.22
LA: New Orleans	176.0	2.96	0.76	0.95	0.86	0.28	0.18
MA: Lawrence	79.2	1.26	0.58	0.30	0.40	0.00	0.20
MD: Baltimore	102.0	2.27	0.71	-0.20	0.27	0.06	0.15
MD: Conowingo	164.0	2.09	0.71	0.81	0.81	0.03	0.18
ME: Augusta	92.8	1.71	0.55	0.15	0.40	0.15	0.24
MI: Detroit	78.2	1.96	0.55	0.33	0.37	0.45	0.23
MI: Grand Rapids	113.0	2.90	0.72	0.59	0.57	0.25	0.21
MN: Minneapolis	78.8	2.48	0.70	0.23	0.37	0.14	0.19
MN: Red Wing	314.0	14.0	1.7	22.0	4.5	-0.09	0.16
MO: Jefferson City	281.0	6.8	1.1	1.6	1.4	0.03	0.17
MS: Jackson	77.6	1.74	0.58	-0.10	0.32	0.17	0.20
MS: Port Gibson	283.0	7.1	1.4	2.7	1.9	0.03	0.17
MT: Helena	107.0	2.31	0.63	2.7	1.0	0.30	0.23

Table 15 (continued)
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 1996 Composites

Location	Total Solids	Gross Beta		Gross Alpha		⁹⁰ Sr	
	(mg/L)	pCi/L ± 2u		pCi/L ± 2u		pCi/L ± 2u	
NC: Charlotte	42.0	1.82	0.57	-0.03	0.25	0.18	0.18
NC: Wilmington	114.0	3.22	0.66	0.50	0.57	0.10	0.21
ND: Bismarck	283.0	4.0	1.0	1.7	1.5	0.06	0.22
NE: Lincoln	326.0	11.7	1.7	10.9	3.4	0.02	0.19
NH: Concord	106.0	0.67	0.57	0.00	0.43	0.12	0.22
NJ: Trenton	88.8	1.47	0.63	0.13	0.34	-0.03	0.21
NJ: Waretown	63.0	2.15	0.58	0.65	0.49	0.05	0.21
NM: Santa Fe	250.0	13.7	1.9	23.8	4.3	0.12	0.15
NV: Las Vegas	604.0	7.0	2.0	3.1	3.1	0.21	0.22
NY: Albany	70.0	1.21	0.58	0.00	0.25	0.04	0.20
NY: Niagara Falls	102.0	1.72	0.66	0.00	0.42	0.21	0.21
NY: Syracuse	92.5	2.11	0.66	0.64	0.53	0.32	0.20
OH: Cincinnati	144.0	2.24	0.71	0.37	0.65	0.13	0.17
OH: Columbus	333.0	4.2	1.1	0.4	1.0	-0.02	0.16
OH: E. Liverpool	157.0	2.69	0.91	0.69	0.75	0.16	0.19
OH: Painesville	162.0	3.13	0.77	0.21	0.58	0.50	0.19
OH: Toledo	117.0	2.05	0.62	0.52	0.64	0.14	0.17
OK: Oklahoma City	64.0	2.32	0.59	-0.02	0.29	0.27	0.18
OR: Portland	24.4	0.34	0.44	0.42	0.43	0.14	0.18
PA: Columbia	125.0	1.42	0.52	-0.21	0.21	-0.15	0.24
PA: Harrisburg	37.8	0.27	0.44	0.32	0.32	0.03	0.21
PA: Philadelphia - Belmont	172.0	3.02	0.77	0.40	0.67	0.07	0.22
PA: Philadelphia - Queen	189.0	2.87	0.77	-0.28	0.34	0.25	0.22
PA: Philadelphia - Baxter	105.0	2.14	0.69	0.13	0.33	0.11	0.21
PA: Pittsburgh	178.0	2.29	0.70	0.34	0.63	0.15	0.21
PC: Corozal	78.4	0.60	0.47	0.07	0.33	0.01	0.19
RI: Providence	57.6	1.19	0.51	0.25	0.33	0.17	0.19
SC: Barnwell	52.2	0.87	0.48	1.01	0.54	-0.02	0.19
SC: Columbia	73.8	2.22	0.58	0.08	0.31	0.02	0.21
SC: Jenkinsville	185.0	4.69	0.89	4.3	1.7	0.10	0.20
SC: Seneca	35.0	0.97	0.47	0.07	0.21	-0.02	0.19
TN: Chattanooga	70.4	1.54	0.55	0.33	0.42	0.13	0.19
TN: Knoxville	108.0	2.08	0.58	1.07	0.68	0.29	0.22
TN: Oak Ridge-Anderson Co #768	112.0	1.81	0.62	0.47	0.57	0.08	0.19
TN: Oak Ridge-Anderson Co #772	108.0	1.34	0.64	0.67	0.58	-0.08	0.21
TN: Oak Ridge-Roane Co #4442	106.0	2.41	0.71	0.43	0.56	0.20	0.23
TN: Oak Ridge-Roane Co #360	70.5	1.58	0.62	-0.10	0.27	0.16	0.19

Table 15 (continued)
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 1996 Composites

Location	Total Solids	Gross Beta		Gross Alpha		⁹⁰ Sr	
	(mg/L)	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
TN: Oak Ridge-Knox Co #371	104.0	1.73	0.64	0.07	0.41	0.0	1.3
TX: Austin	177.0	3.70	0.89	0.45	0.71	0.05	0.19
VA: Doswell	202.0	5.21	0.95	0.10	0.75	-0.04	0.21
VA: Lynchburg	45.2	0.20	0.42	-0.10	0.25	0.09	0.18
VA: Virginia Beach	99.8	1.64	0.55	0.17	0.39	0.08	0.44
WA: Richland	60.7	0.67	0.56	-0.01	0.27	-0.05	0.18
WA: Seattle	27.4	0.57	0.44	0.41	0.33	0.10	0.17
WI: Genoa City	142.0	2.14	0.63	3.1	1.3	-0.01	0.16
WI: Madison	264.0	3.5	1.3	3.5	2.0	-0.03	0.15

Table 16
Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 1996 Composites

Location	²²⁶ Ra		²²⁸ Ra	Specific Gamma Activity	
	pCi/L ± 2 <i>u</i>		pCi/L ± 2 <i>u</i>	Nuclide	pCi/L ± 2 <i>u</i>
AK: Fairbanks	NA		NA	K40	10 13
AL: Dothan	NA		NA	K40	37 44
AL: Montgomery	NA		NA	K40	25 29
AL: Muscle Shoals	NA		NA		ND
AL: Scottsboro	NA		NA		ND
AR: Little Rock	NA		NA	Pb212	2.8 2.6
CA: Berkeley	NA		NA		ND
CA: Los Angeles	0.093	0.011	NA		ND
CO: Denver	NA		NA		ND
CO: Platteville	NA		NA	Bi214	7.6 3.1
CT: Hartford	NA		NA	Bi214	5.0 3.1
				Pb212	3.8 3.5
DC: Washington	NA		NA	Bi214	7.9 4.9
				K40	28 29
DE: Dover	NA		NA		ND
FL: Miami	NA		NA		ND
FL: Tampa	NA		NA	Bi214	7.3 7.5
GA: Baxley	NA		NA		ND
GA: Savannah	NA		NA	K40	31 53
HI: Honolulu	NA		NA		ND
IA: Cedar Rapids	NA		NA		ND
ID: Boise	NA		NA	Pb212	3.3 4.0
ID: Idaho Falls	NA		NA	K40	44 73
IL: Morris	1.061	0.043	NA		ND
IL: W. Chicago	8.50	0.26	NA	Bi214	6.1 5.0
				Pb212	4.0 4.4
				Pb214	6.8 4.7
				Tl208	2.3 4.1
KS: Topeka	NA		NA		ND
LA: New Orleans	NA		NA		ND
MA: Lawrence	NA		NA		ND
MD: Baltimore	NA		NA		ND
MD: Conowingo	NA		NA		ND
ME: Augusta	NA		NA	Pb212	2.9 3.4
MI: Detroit	NA		NA		ND
MI: Grand Rapids	NA		NA		ND
MN: Minneapolis	NA		NA		ND

Note: ND = Not Detected
NA = No Analysis

Table 16 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 1996 Composites

Location	²²⁶ Ra		²²⁸ Ra	Specific Gamma Activity		
	pCi/L ± 2 <i>u</i>			Nuclide	pCi/L ± 2 <i>u</i>	
MN: Red Wing	4.19	0.12	NA	Bi212	33	31
				Pb212	5.8	5.1
				Tl208	3.4	4.8
MO: Jefferson City	NA		NA	Pb212	3.7	5.2
MS: Jackson	NA		NA	Pb212	2.6	4.2
MS: Port Gibson	0.377	0.022	NA		ND	
MT: Helena	0.108	0.011	NA		ND	
NC: Charlotte	NA		NA		ND	
NC: Wilmington	NA		NA		ND	
ND: Bismarck	NA		NA	Pb212	3.5	4.0
				Ra224	60	68
NE: Lincoln	0.258	0.017	NA	K40	31	54
				Tl208	5.3	4.7
NH: Concord	NA		NA		ND	
NJ: Trenton	NA		NA	Tl208	1.7	2.2
NJ: Waretown	NA		NA		ND	
NM: Santa Fe	0.149	0.014	NA		ND	
NV: Las Vegas	0.156	0.014	NA		ND	
NY: Albany	NA		NA	Pb212	3.6	2.6
NY: Niagara Falls	NA		NA		ND	
NY: Syracuse	NA		NA		ND	
OH: Cincinnati	NA		NA	Bi214	3.4	2.6
OH: Columbus	NA		NA		ND	
OH: E. Liverpool	NA		NA		ND	
OH: Painesville	NA		NA		ND	
OH: Toledo	NA		NA		ND	
OK: Oklahoma City	NA		NA		ND	
OR: Portland	NA		NA		ND	
PA: Columbia	NA		NA		ND	
PA: Harrisburg	NA		NA	Bi214	4.0	2.8
				Tl208	2.1	2.4
PA: Philadelphia - Belmont	NA		NA	Pb212	2.8	3.5
PA: Philadelphia - Queen	NA		NA		ND	
PA: Philadelphia - Baxter	NA		NA		ND	
PA: Pittsburgh	NA		NA	Bi214	3.8	2.9
PC: Corozal	NA		NA		ND	
RI: Providence	NA		NA	K40	11	14

Note: ND = Not Detected
NA = No Analysis

Table 16 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 1996 Composites

Location	²²⁶ Ra		²²⁸ Ra		Specific Gamma Activity	
	pCi/L ± 2 <i>u</i>		pCi/L ± 2 <i>u</i>		Nuclide	pCi/L ± 2 <i>u</i>
SC: Barnwell	NA		NA		Pb212	4.7 6.3
SC: Columbia	NA		NA		K40	24 36
SC: Jenkinsville	NA		NA			ND
SC: Seneca	NA		NA			ND
TN: Chattanooga	NA		NA		Bi212	31 35
TN: Knoxville	NA		NA			ND
TN: Oak Ridge-Anderson Co #768	NA		NA			ND
TN: Oak Ridge-Anderson Co #772	NA		NA		K40	56 40
					Pb212	7.9 5.1
					Pb212	4.3 4.1
TN: Oak Ridge-Roane Co #4442	NA		NA			ND
TN: Oak Ridge-Roane Co #360	NA		NA			ND
TN: Oak Ridge-Knox Co #371	NA		NA			ND
TX: Austin	NA		NA			ND
VA: Doswell	NA		NA			ND
VA: Lynchburg	NA		NA			ND
VA: Virginia Beach	NA		NA			ND
WA: Richland	NA		NA			ND
WA: Seattle	NA		NA			ND
WI: Genoa City	NA		NA			ND
WI: Madison	0.468	0.025	NA			ND

Note: ND = Not Detected
NA = No Analysis

3. Milk Program

Pasteurized Milk

Milk is a reliable indicator of the general population's intake of radionuclides since it is consumed fresh by a large segment of the population and can contain several of the biologically significant radionuclides that result from environmental releases from nuclear activities. A primary function of this program is to obtain reliable monitoring data relative to current radionuclide concentrations and determine any long-term trends.

Monthly samples are collected at approximately 55 sampling sites. The samples are composited, according to production, from the major milk suppliers representing more than 80 percent of the milk consumed in a given population center.

The samples are analyzed for gamma-emitting nuclides, including iodine-131, barium-140, cesium-137, and potassium-40. Total potassium concentrations in g/L are determined from potassium-40 activities assuming natural isotopic abundances. All samples collected in July are analyzed for strontium-90.

Iodine-131, barium-140, cesium-137, and potassium-40 are determined by gamma spectral analysis. Strontium-90 is determined by beta counting a total strontium precipitate that has been chemically separated by ion exchange.

Table 17
Radionuclides in Pasteurized Milk
October 1996

Location	Date Collected	K g/L $\pm 2u$		¹³⁷ Cs pCi/L $\pm 2u$		¹⁴⁰ Ba pCi/L $\pm 2u$	¹³¹ I pCi/L $\pm 2u$
AL: Montgomery	10/02/96	1.632	0.082	ND		ND	ND
AZ: Phoenix	10/23/96	1.644	0.079	ND		ND	ND
CA: Los Angeles	10/07/96	1.704	0.081	ND		ND	ND
CA: Sacramento	10/15/96	1.656	0.082	ND		ND	ND
CA: San Francisco	10/03/96	1.549	0.090	ND		ND	ND
CO: Denver	10/16/96	1.67	0.13	ND		ND	ND
CT: Hartford	10/07/96	1.561	0.089	ND		ND	ND
DE: Wilmington	10/15/96	1.680	0.067	ND		ND	ND
FL: Tampa	10/15/96	1.621	0.066	3.7	2.1	ND	ND
GA: Atlanta	10/15/96	1.50	0.10	ND		ND	ND
HI: Honolulu	10/28/96	1.668	0.068	ND		ND	ND
IA: Des Moines	10/07/96	1.621	0.066	ND		ND	ND
IL: Chicago	10/03/96	1.609	0.068	ND		ND	ND
IN: Indianapolis	10/07/96	1.656	0.080	ND		ND	ND
KS: Wichita	10/28/96	1.54	0.10	ND		ND	ND
KY: Louisville	10/07/96	1.573	0.080	ND		ND	ND
MA: Boston	10/11/96	1.632	0.080	ND		ND	ND
MD: Baltimore	10/03/96	1.644	0.092	ND		ND	ND
ME: Portland	10/09/96	1.597	0.089	ND		ND	ND
MI: Detroit	10/01/96	1.585	0.088	ND		ND	ND
MI: Grand Rapids	10/07/96	1.704	0.068	ND		ND	ND
MN: St. Paul	10/02/96	1.597	0.080	ND		ND	ND
MO: Kansas City	10/15/96	1.597	0.067	ND		ND	ND
MS: Jackson	10/01/96	1.597	0.067	ND		ND	ND
NC: Charlotte	10/15/96	1.644	0.080	ND		ND	ND
NJ: Trenton	10/09/96	1.609	0.066	ND		ND	ND
NM: Albuquerque	10/22/96	1.57	0.10	ND		ND	ND
NV: Las Vegas	10/28/96	1.632	0.066	ND		ND	ND
NY: Buffalo	10/07/96	1.609	0.079	ND		ND	ND
NY: Syracuse	10/07/96	1.656	0.067	ND		ND	ND
OH: Cincinnati	10/07/96	1.644	0.080	ND		ND	ND
OH: Cleveland	10/17/96	1.585	0.089	ND		ND	ND
OR: Portland	10/01/96	1.752	0.085	ND		ND	ND
PA: Philadelphia	10/07/96	1.644	0.078	ND		ND	ND
PA: Pittsburgh	10/07/96	1.609	0.079	ND		ND	ND
PC: Cristobal	10/10/96	1.573	0.067	4.7	1.9	ND	ND
PR: San Juan	10/10/96	1.549	0.087	ND		ND	ND
SC: Charleston	10/25/96	1.585	0.089	ND		ND	ND
SD: Rapid City	10/03/96	1.621	0.081	ND		ND	ND

Note: ND = Not Detected

Table 17 (continued)
Radionuclides in Pasteurized Milk
October 1996

Location	Date Collected	K g/L $\pm 2u$		¹³⁷ Cs pCi/L $\pm 2u$	¹⁴⁰ Ba pCi/L $\pm 2u$	¹³¹ I pCi/L $\pm 2u$
TN: Knoxville	10/10/96	1.621	0.090	ND	ND	ND
TN: Memphis	10/22/96	1.680	0.080	ND	ND	ND
VA: Norfolk	10/01/96	1.692	0.079	ND	ND	ND
VA: Norfolk	10/29/96	1.585	0.088	ND	ND	ND
VT: Burlington	10/02/96	1.597	0.067	ND	ND	ND
VT: Burlington	10/18/96	1.537	0.087	ND	ND	ND
WA: Seattle	10/07/96	1.656	0.089	ND	ND	ND
WA: Spokane	10/07/96	1.728	0.068	ND	ND	ND
WV: Charleston	10/07/96	1.561	0.088	ND	ND	ND

Note: ND = Not Detected

Table 18
Radionuclides in Pasteurized Milk
November 1996

Location	Date Collected	K g/L $\pm 2u$		^{137}Cs pCi/L $\pm 2u$	^{140}Ba pCi/L $\pm 2u$	^{131}I pCi/L $\pm 2u$
AL: Montgomery	11/05/96	1.549	0.082	ND	ND	ND
AR: Little Rock	11/06/96	1.609	0.081	ND	ND	ND
CA: Los Angeles	11/05/96	1.692	0.082	ND	ND	ND
CA: Sacramento	11/13/96	1.656	0.089	ND	ND	ND
CA: San Francisco	11/05/96	1.656	0.089	ND	ND	ND
CO: Denver	11/18/96	1.537	0.088	ND	ND	ND
CT: Hartford	11/04/96	1.573	0.078	ND	ND	ND
DE: Wilmington	11/26/96	1.644	0.082	ND	ND	ND
FL: Tampa	11/06/96	1.680	0.082	ND	ND	ND
GA: Atlanta	11/13/96	1.525	0.082	ND	ND	ND
HI: Honolulu	11/15/96	1.632	0.081	ND	ND	ND
IA: Des Moines	11/04/96	1.61	0.15	ND	ND	ND
IN: Indianapolis	11/08/96	1.513	0.089	ND	ND	ND
KS: Wichita	11/20/96	1.692	0.069	ND	ND	ND
KY: Louisville	11/06/96	1.561	0.075	ND	ND	ND
MA: Boston	11/04/96	1.525	0.083	ND	ND	ND
MD: Baltimore	11/08/96	1.692	0.069	ND	ND	ND
MI: Detroit	11/05/96	1.62	0.14	ND	ND	ND
MI: Grand Rapids	11/04/96	1.66	0.12	ND	ND	ND
MN: St. Paul	11/01/96	1.644	0.090	ND	ND	ND
MO: Kansas City	11/19/96	1.549	0.077	ND	ND	ND
MS: Jackson	11/04/96	1.66	0.10	ND	ND	ND
NC: Charlotte	11/06/96	1.585	0.082	ND	ND	ND
ND: Minot	11/18/96	1.644	0.090	ND	ND	ND
NJ: Trenton	11/07/96	1.632	0.089	ND	ND	ND
NM: Albuquerque	11/21/96	1.597	0.089	ND	ND	ND
NV: Las Vegas	11/05/96	1.53	0.12	ND	ND	ND
NY: Buffalo	11/07/96	1.62	0.10	ND	ND	ND
NY: Syracuse	11/06/96	1.692	0.090	ND	ND	ND
OH: Cincinnati	11/19/96	1.632	0.081	ND	ND	ND
OH: Cleveland	11/05/96	1.609	0.089	ND	ND	ND
OR: Portland	11/04/96	1.585	0.076	ND	ND	ND
PA: Philadelphia	11/06/96	1.656	0.082	ND	ND	ND
PA: Pittsburgh	11/12/96	1.66	0.15	ND	ND	ND
PC: Cristobal	11/21/96	1.525	0.079	5.2	2.7	ND
PR: San Juan	11/07/96	1.644	0.081	ND	ND	ND
SC: Charleston	11/13/96	1.644	0.068	ND	ND	ND
SD: Rapid City	11/13/96	1.716	0.069	ND	ND	ND
TN: Chattanooga	11/04/96	1.692	0.068	ND	ND	ND

Note: ND = Not Detected

Table 18 (continued)
Radionuclides in Pasteurized Milk
November 1996

Location	Date Collected	K g/L $\pm 2u$	¹³⁷ Cs pCi/L $\pm 2u$	¹⁴⁰ Ba pCi/L $\pm 2u$	¹³¹ I pCi/L $\pm 2u$
TN: Knoxville	11/04/96	1.621 0.089	ND	ND	ND
TN: Memphis	11/21/96	1.632 0.081	ND	ND	ND
TX: Austin	11/13/96	1.656 0.090	ND	ND	ND
TX: Ft. Worth	11/12/96	1.632 0.083	ND	ND	ND
VA: Norfolk	11/21/96	1.656 0.083	ND	ND	ND
VT: Burlington	11/15/96	1.656 0.067	ND	ND	ND
WA: Seattle	11/05/96	1.60 0.10	ND	ND	ND

Note: ND = Not Detected

Table 19
Radionuclides in Pasteurized Milk
December 1996

Location	Date Collected	K g/L $\pm 2u$		¹³⁷ Cs pCi/L $\pm 2u$		¹⁴⁰ Ba pCi/L $\pm 2u$	¹³¹ I pCi/L $\pm 2u$
AL: Montgomery	12/04/96	1.60	0.11	ND		ND	ND
AR: Little Rock	12/09/96	1.525	0.075	ND		ND	ND
AZ: Phoenix	12/20/96	1.54	0.12	ND		ND	ND
CA: Los Angeles	12/04/96	1.573	0.089	ND		ND	ND
CA: Sacramento	12/18/96	1.573	0.079	ND		ND	ND
CA: San Francisco	12/06/96	1.609	0.087	ND		ND	ND
CO: Denver	12/12/96	1.67	0.10	ND		ND	ND
DE: Dover	12/17/96	1.597	0.089	ND		ND	ND
FL: Tampa	12/04/96	1.716	0.069	3.8	2.0	ND	ND
GA: Atlanta	12/03/96	1.49	0.10	ND		ND	ND
HI: Honolulu	12/13/96	1.478	0.074	ND		ND	ND
IA: Des Moines	12/09/96	1.621	0.080	ND		ND	ND
IL: Chicago	12/05/96	1.63	0.14	ND		ND	ND
KS: Wichita	12/09/96	1.73	0.12	ND		ND	ND
KY: Louisville	12/11/96	1.621	0.090	ND		ND	ND
MA: Boston	12/06/96	1.573	0.080	ND		ND	ND
MD: Baltimore	12/05/96	1.716	0.079	ND		ND	ND
ME: Portland	12/04/96	1.609	0.081	ND		ND	ND
MI: Detroit	12/17/96	1.597	0.079	ND		ND	ND
MI: Grand Rapids	12/05/96	1.644	0.061	ND		ND	ND
MN: St. Paul	12/02/96	1.57	0.10	ND		ND	ND
MO: Kansas City	12/31/96	1.54	0.11	ND		ND	ND
MS: Jackson	12/02/96	1.609	0.081	ND		ND	ND
NC: Charlotte	12/03/96	1.668	0.080	ND		ND	ND
ND: Minot	12/05/96	1.656	0.091	ND		ND	ND
NJ: Trenton	12/05/96	1.55	0.14	ND		ND	ND
NM: Albuquerque	12/03/96	1.537	0.075	ND		ND	ND
NV: Las Vegas	12/10/96	1.573	0.079	ND		ND	ND
NY: Buffalo	12/05/96	1.561	0.089	ND		ND	ND
NY: Syracuse	12/05/96	1.680	0.090	ND		ND	ND
OH: Cincinnati	12/19/96	1.632	0.089	ND		ND	ND
OH: Cleveland	12/02/96	1.549	0.076	ND		ND	ND
OR: Portland	12/02/96	1.644	0.081	ND		ND	ND
PA: Philadelphia	12/09/96	1.56	0.11	ND		ND	ND
PA: Philadelphia	12/09/96	1.57	0.10	ND		ND	ND
PA: Pittsburgh	12/03/96	1.549	0.089	ND		ND	ND
PC: Cristobal	12/30/96	1.442	0.075	6.5	2.4	ND	ND
PR: San Juan	12/18/96	1.609	0.080	ND		ND	ND
SC: Charleston	12/03/96	1.621	0.079	ND		ND	ND

Note: ND = Not Detected

Table 19 (continued)
Radionuclides in Pasteurized Milk
December 1996

Location	Date Collected	K g/L $\pm 2u$		¹³⁷ Cs pCi/L $\pm 2u$	¹⁴⁰ Ba pCi/L $\pm 2u$	¹³¹ I pCi/L $\pm 2u$
SD: Rapid City	12/03/96	1.78	0.14	ND	ND	ND
TN: Chattanooga	12/04/96	1.644	0.090	ND	ND	ND
TN: Chattanooga	12/31/96	1.680	0.091	ND	ND	ND
TN: Knoxville	12/04/96	1.632	0.067	ND	ND	ND
TN: Knoxville	12/31/96	1.597	0.066	ND	ND	ND
TN: Memphis	12/18/96	1.621	0.089	ND	ND	ND
TX: Ft. Worth	12/16/96	1.54	0.12	ND	ND	ND
VT: Burlington	12/19/96	1.644	0.082	ND	ND	ND
WA: Seattle	12/04/96	1.609	0.079	ND	ND	ND
WV: Charleston	12/02/96	1.632	0.092	ND	ND	ND

Note: ND = Not Detected

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