

ENVIRONMENTAL

RADIATION

DATA

REPORT 116

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United States Environmental Protection Agency

Office of Radiation and Indoor Air

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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 particulate, precipitation, drinking water, and milk samples.

Sampling locations are selected to provide population and geographic coverage for the United States. The radiation analyses performed on these samples include gross alpha and gross beta analysis, 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 *NAREL Radiochemistry Procedures Manual*. 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 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 the time and effort of 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 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 5 hours after collection to allow natural radon isotopes and their progeny to decay. 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 analysis in a low background beta counter. Gamma scans are performed on all filters showing gross beta activity greater than 1 pCi/m³. The laboratory obtained values are usually lower than the field estimates because of the decay of naturally occurring radionuclides during the time between the two measurements.

Precipitation samples are collected at most field stations that collect air filters. These samples are also sent to NAREL where they are composited monthly for gamma scans, tritium, and gross beta activity measurements.

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 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AK: Fairbanks	2	0.0	0.0	0.0	0.019	0.005	0.012
AL: Montgomery/408	9	0.2	0.0	0.1	0.031	0.010	0.018
AL: Montgomery/411	9	0.2	0.0	0.1	0.023	0.007	0.014
AR: Little Rock	9	0.1	0.0	0.0	0.029	0.009	0.015
AZ: Phoenix	4	0.7	0.5	0.6	0.029	0.017	0.024
CA: Berkeley	9	0.2	0.1	0.1	0.011	0.004	0.007
CA: Los Angeles	9	0.3	0.1	0.2	0.019	0.014	0.017
CO: Denver	9	3.1	0.2	0.9	0.037	0.007	0.017
CT: Hartford	9	0.2	0.0	0.1	0.014	0.004	0.007
DC: Washington	8	0.1	0.0	0.0	0.017	0.004	0.009
DE: Wilmington	7	0.2	0.0	0.1	0.018	0.006	0.010
FL: Jacksonville	8	0.1	0.0	0.1	0.012	0.005	0.008
FL: Miami	4	0.1	0.0	0.0	0.010	0.006	0.008
GA: Atlanta	7	0.3	0.1	0.1	0.025	0.005	0.016
HI: Honolulu	7	0.1	0.0	0.1	0.006	0.003	0.004
IA: Iowa City	9	0.7	0.1	0.3	0.021	0.007	0.013
ID: Idaho Falls	9				0.024	0.006	0.013
IN: Indianapolis	9	0.4	0.0	0.2	0.024	0.005	0.010
KS: Topeka	9	1.5	0.3	0.9	0.027	0.006	0.013
ME: Augusta	6	0.4	0.0	0.1	0.016	0.003	0.008
MI: Lansing	9	0.5	0.1	0.2	0.020	0.007	0.011
MN: Minneapolis	4	0.4	0.2	0.2	0.021	0.009	0.014
MS: Jackson	9	0.8	0.2	0.4	0.037	0.009	0.018
NC: Charlotte	9	0.1	0.0	0.1	0.025	0.008	0.016
NC: Wilmington	1				0.013	0.013	0.013
ND: Bismarck	4	1.3	0.1	0.6	0.032	0.006	0.018
NH: Concord	9	0.4	0.1	0.3	0.019	0.004	0.008
NJ: Trenton	7	0.8	0.0	0.3	0.017	0.003	0.009
NV: Las Vegas/906	8	0.3	0.0	0.1	0.025	0.007	0.013
NV: Las Vegas/913	7	0.2	0.0	0.1	0.010	0.006	0.009
NY: Albany	5	0.0	0.0	0.0	0.024	0.007	0.012
NY: New York City	9	0.1	0.0	0.0	0.024	0.007	0.012
NY: Yaphank	8	0.6	0.0	0.2	0.016	0.005	0.009
OH: Painesville	8	0.2	0.0	0.1	0.017	0.006	0.011
OH: Ross	9				0.019	0.007	0.012
OR: Portland	9	0.4	0.0	0.2	0.016	0.002	0.006
PA: Harrisburg	9	0.4	0.1	0.2	0.028	0.006	0.013
PA: Pittsburgh	7	0.4	0.0	0.1	0.025	0.007	0.013

Table 2 (continued)
Gross Beta in Airborne Particulates
October 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
SC: Barnwell	1	0.0	0.0	0.0	0.010	0.010	0.010
SC: Columbia	3	0.1	0.0	0.1	0.021	0.016	0.018
SD: Pierre	4	0.4	0.0	0.2	0.015	0.008	0.012
TN: Knoxville	6	0.1	0.0	0.1	0.033	0.012	0.020
TN: Nashville	9	0.5	0.1	0.2	0.043	0.010	0.017
TN: Oak Ridge/Bethel	9	1.4	0.5	0.7	0.027	0.009	0.016
TN: Oak Ridge/K25	7	1.9	0.7	1.0	0.022	0.008	0.016
TN: Oak Ridge/Melton	9	1.4	0.4	0.8	0.022	0.010	0.016
TN: Oak Ridge/Y12 E	9	1.5	0.5	0.8	0.026	0.009	0.016
TN: Oak Ridge/Y12 W	9	0.8	0.3	0.5	0.025	0.011	0.017
TX: Austin	5	0.3	0.1	0.2	0.014	0.009	0.012
TX: Dallas	1	0.8	0.8	0.8	0.004	0.004	0.004
TX: El Paso	9	1.5	0.1	0.7	0.023	0.007	0.014
UT: Salt Lake City	8	0.5	0.0	0.2	0.027	0.010	0.015
VA: Lynchburg	9	1.7	0.4	0.8	0.018	0.007	0.012
WA: Olympia	9	0.3	0.0	0.1	0.012	0.002	0.006
WA: Spokane	9	1.0	0.2	0.4	0.027	0.005	0.011

Table 3
Gross Beta in Airborne Particulates
November 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AL: Montgomery/408	8	0.2	0.0	0.1	0.018	0.008	0.012
AL: Montgomery/411	8	0.1	0.0	0.1	0.013	0.005	0.010
AR: Little Rock	2	0.0	0.0	0.0	0.016	0.011	0.014
AZ: Phoenix	4	0.6	0.4	0.5	0.018	0.012	0.015
CA: Los Angeles	7	0.4	0.2	0.3	0.015	0.007	0.011
CO: Denver	7	1.4	0.4	0.8	0.042	0.006	0.015
CT: Hartford	7	0.1	0.0	0.1	0.012	0.006	0.008
DC: Washington	2	0.0	0.0	0.0	0.012	0.003	0.007
DE: Wilmington	7	0.2	0.0	0.1	0.013	0.009	0.011
FL: Jacksonville	7	0.1	0.0	0.1	0.007	0.002	0.005
GA: Atlanta	7	0.2	0.0	0.1	0.018	0.006	0.012
HI: Honolulu	7	0.1	0.0	0.0	0.005	0.001	0.003
IA: Iowa City	7	1.0	0.1	0.3	0.027	0.009	0.015
ID: Idaho Falls	7				0.015	0.005	0.011
IN: Indianapolis	7	0.3	0.1	0.2	0.016	0.006	0.011
KS: Topeka	7	2.3	0.8	1.3	0.036	0.007	0.020
ME: Augusta	6	0.2	0.0	0.1	0.010	0.007	0.008
MI: Lansing	8	0.3	0.1	0.2	0.019	0.010	0.013
MN: Minneapolis	4	0.4	0.0	0.2	0.026	0.009	0.018
MS: Jackson	7	0.8	0.1	0.4	0.022	0.006	0.012
NC: Charlotte	7	0.1	0.0	0.1	0.016	0.004	0.010
NC: Wilmington	2				0.010	0.008	0.009
ND: Bismarck	4	0.4	0.2	0.3	0.041	0.021	0.033
NH: Concord	7	0.3	0.1	0.2	0.012	0.006	0.009
NJ: Trenton	6	0.2	0.1	0.1	0.017	0.008	0.011
NV: Las Vegas/906	7	0.2	0.0	0.1	0.015	0.005	0.010
NV: Las Vegas/913	7	0.2	0.0	0.1	0.016	0.005	0.009
NY: Albany	4	3.3	0.0	0.8	0.015	0.010	0.012
NY: New York City	8	0.1	0.0	0.0	0.021	0.009	0.013
NY: Yaphank	7	0.1	0.0	0.0	0.016	0.006	0.010
OH: Painesville	7	0.2	0.1	0.1	0.015	0.009	0.012
OH: Ross	8				0.020	0.005	0.011
OR: Portland	7	0.3	0.0	0.1	0.014	0.001	0.007
PA: Harrisburg	8	0.4	0.1	0.2	0.019	0.010	0.014
PA: Pittsburgh	8	0.2	0.0	0.1	0.018	0.008	0.013
SC: Columbia	4	0.2	0.1	0.1	0.017	0.004	0.010
SD: Pierre	5	0.3	0.2	0.3	0.037	0.006	0.019
TN: Knoxville	6	0.2	0.0	0.1	0.026	0.009	0.016

Table 3 (continued)
Gross Beta in Airborne Particulates
November 2003

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	7	0.2	0.0	0.2	0.031	0.005	0.014
TN: Oak Ridge/Bethel	7	0.8	0.2	0.4	0.017	0.007	0.013
TN: Oak Ridge/K25	7	1.0	0.2	0.4	0.020	0.010	0.013
TN: Oak Ridge/Melton	7	0.7	0.1	0.3	0.018	0.006	0.011
TN: Oak Ridge/Y12 E	7	1.0	0.1	0.4	0.022	0.010	0.016
TN: Oak Ridge/Y12 W	7	0.5	0.1	0.2	0.019	0.007	0.013
TX: Austin	6	0.6	0.1	0.3	0.017	0.005	0.013
TX: Dallas	7	0.4	0.0	0.2	0.021	0.008	0.013
TX: El Paso	7	2.1	0.5	1.0	0.020	0.009	0.014
UT: Salt Lake City	8	0.4	0.0	0.2	0.014	0.005	0.010
VA: Lynchburg	7	0.8	0.1	0.4	0.015	0.006	0.011
WA: Olympia	6	0.2	0.0	0.1	0.021	0.001	0.008
WA: Spokane	8	0.9	0.1	0.4	0.042	0.004	0.015

Table 4
Gross Beta in Airborne Particulates
December 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m ³)			(pCi/m ³)		
AL: Montgomery/408	7	0.1	0.0	0.1	0.021	0.009	0.014
AL: Montgomery/411	8	0.1	0.0	0.0	0.014	0.007	0.011
AR: Little Rock	3	0.0	0.0	0.0	0.015	0.004	0.010
AZ: Phoenix	5	0.6	0.2	0.4	0.025	0.009	0.018
CA: Los Angeles	8	0.4	0.1	0.2	0.017	0.004	0.010
CO: Denver	8	1.3	0.1	0.5	0.014	0.005	0.010
CT: Hartford	9	0.1	0.0	0.0	0.009	0.004	0.006
DE: Wilmington	8	0.8	0.0	0.1	0.012	0.006	0.010
FL: Jacksonville	9	0.1	0.0	0.1	0.011	0.005	0.008
GA: Atlanta	7	0.2	0.1	0.1	0.018	0.010	0.014
HI: Honolulu	5	0.1	0.0	0.0	0.005	0.001	0.002
IA: Iowa City	9	0.5	0.1	0.2	0.022	0.008	0.017
ID: Idaho Falls	8				0.015	0.005	0.010
IN: Indianapolis	9	0.2	0.0	0.1	0.017	0.000	0.010
KS: Topeka	8	0.8	0.3	0.5	0.025	0.010	0.018
ME: Augusta	6	0.1	0.0	0.0	0.011	0.008	0.010
MI: Lansing	8	0.2	0.1	0.1	0.019	0.008	0.014
MN: Minneapolis	5	0.3	0.2	0.2	0.021	0.016	0.019
MS: Jackson	8	0.2	0.0	0.1	0.014	0.005	0.011
NC: Charlotte	8	0.0	0.0	0.0	0.014	0.006	0.010
NC: Wilmington	5				0.011	0.008	0.010
ND: Bismarck	4	0.3	0.1	0.2	0.031	0.009	0.018
NH: Concord	9	0.2	0.0	0.1	0.013	0.005	0.009
NJ: Trenton	9	0.3	0.1	0.1	0.013	0.007	0.009
NV: Las Vegas/906	5	0.2	0.0	0.1	0.022	0.008	0.015
NV: Las Vegas/913	5	2.6	0.0	0.6	0.018	0.009	0.014
NY: Albany	5	0.0	0.0	0.0	0.021	0.001	0.010
NY: New York City	8	0.1	0.0	0.0	0.013	0.007	0.010
NY: Yaphank	9	0.1	0.0	0.0	0.010	0.005	0.007
OH: Painesville	7	0.1	0.0	0.1	0.015	0.008	0.011
OH: Ross	8				0.018	0.008	0.013
OR: Portland	7	0.4	0.0	0.1	0.008	0.002	0.004
PA: Harrisburg	9	0.3	0.0	0.1	0.015	0.008	0.011
PA: Pittsburgh	10	0.2	0.0	0.1	0.015	0.008	0.011
SC: Columbia	5	0.2	0.0	0.1	0.020	0.006	0.013
SD: Pierre	9	0.5	0.1	0.2	0.028	0.005	0.015
TN: Knoxville	6	0.0	0.0	0.0	0.021	0.002	0.014
TN: Nashville	8	0.1	0.1	0.1	0.017	0.009	0.013

Table 4 (continued)
Gross Beta in Airborne Particulates
December 2003

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/Bethel	8	0.3	0.1	0.2	0.014	0.007	0.011
TN: Oak Ridge/K25	8	0.5	0.1	0.3	0.019	0.007	0.013
TN: Oak Ridge/Melton	8	0.3	0.1	0.2	0.013	0.007	0.010
TN: Oak Ridge/Y12 E	8	0.3	0.1	0.2	0.017	0.009	0.013
TN: Oak Ridge/Y12 W	8	0.2	0.1	0.1	0.014	0.009	0.012
TX: Austin	8	0.4	0.1	0.2	0.019	0.009	0.013
TX: Dallas	5	0.4	0.1	0.3	0.020	0.006	0.013
TX: El Paso	6	2.4	0.8	1.5	0.031	0.011	0.021
UT: Salt Lake City	8	0.1	0.0	0.1	0.034	0.007	0.013
VA: Lynchburg	7	0.3	0.0	0.1	0.010	0.006	0.008
WA: Olympia	9	0.1	0.0	0.1	0.007	0.002	0.003
WA: Spokane	10	0.2	0.1	0.1	0.023	0.005	0.010

Table 5
Gross Beta and Specific Gamma in Precipitation
October 2003

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.99	0.35	Be7	28 16
AR: Little Rock	1.35	0.33		ND
AZ: Phoenix	1.57	0.36		ND
CO: Denver	2.58	0.43	Be7	189 34
CT: Hartford	1.30	0.39	Be7	67 16
DE: Wilmington	0.42	0.33		ND
FL: Jacksonville	1.26	0.36	Be7	31 16
			Tl208	1.0 1.2
FL: Miami	-0.01	0.34	Pb212	2.2 2.3
HI: Honolulu	3.09	0.47		ND
IA: Iowa City	1.15	0.34		ND
MI: Lansing	1.08	0.33	Be7	20 11
			Pb212	1.2 1.2
MN: Minneapolis	0.86	0.30		ND
NC: Charlotte	1.06	0.38	Be7	28 13
NC: Wilmington	1.95	0.40	Be7	86 31
ND: Bismarck	2.95	0.49	Be7	111 24
			Pb212	2.9 3.3
			Ra224	23 25
NH: Concord	1.06	0.36	Be7	28 15
NY: Albany	0.46	0.31	Be7	13 14
NY: Yaphank	9.31	0.72	Be7	21 14
OH: Painesville	7.31	0.59	Be7	65 25
OR: Portland	0.75	0.29	Be7	53 28
			Pb212	5.1 6.4
			Tl208	3.9 3.4
PA: Harrisburg	1.18	0.35		ND
SC: Columbia	1.81	0.39	Pb212	4.7 6.8
			Tl208	2.5 3.6
TN: Knoxville	18.23	0.97	K40	29 48
TX: Austin	0.93	0.30		ND
VA: Lynchburg	3.20	0.48		ND
WA: Olympia	0.11	0.24	Tl208	1.6 1.3

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
November 2003

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.49	0.30	Be7	27 15
AR: Little Rock	0.80	0.35	Pb212	1.7 2.4
AZ: Phoenix	1.12	0.37		ND
CA: Berkeley	2.61	0.49		ND
CT: Hartford	1.90	0.39	Be7	61 17
			Tl208	1.9 1.4
FL: Jacksonville	0.76	0.35	K40	9 12
HI: Honolulu	2.57	0.52		ND
IA: Iowa City	1.84	0.39		ND
ID: Idaho Falls	3.95	0.57	Be7	159 36
			K40	44 40
MI: Lansing	0.38	0.32	Be7	27 12
MN: Minneapolis	1.72	0.45	Be7	31 17
NC: Charlotte	0.36	0.33	Pb212	5.3 6.1
NC: Wilmington	0.60	0.34	Be7	17 13
ND: Bismarck	0.87	0.35	Tl208	3.3 3.3
NH: Concord	3.29	0.46	Be7	49 16
NV: Las Vegas	2.24	0.45		ND
NY: Albany	0.32	0.32	Be7	26 22
			Pb212	4.6 5.3
NY: Yaphank	2.36	0.42	Tl208	1.1 1.2
OH: Painesville	4.42	0.52	Be7	47 10
OR: Portland	0.78	0.34	Be7	39 22
PA: Harrisburg	1.01	0.36	Be7	42 29
SC: Columbia	0.96	0.36		ND
TN: Knoxville	18.07	0.96	K40	18 13
TN: Nashville	0.52	0.34	Be7	35 17
			K40	21 12
TX: Austin	0.46	0.32	K40	25 34
TX: Dallas	0.49	0.33		ND
TX: El Paso	2.05	0.45	Be7	73 29
UT: Salt Lake City	1.45	0.40		ND
VA: Lynchburg	9.11	0.70	Pb212	7.8 8.4
			Tl208	3.7 4.2
WA: Olympia	0.51	0.32		ND

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
December 2003

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	1.02	0.31	Be7	35.8 9.9
AR: Little Rock	0.66	0.28	Be7	29 16
AZ: Phoenix	1.90	0.39		ND
CT: Hartford	1.04	0.31	Be7	33 14
FL: Jacksonville	2.73	0.45	Be7	31 14
HI: Honolulu	0.93	0.33		ND
IA: Iowa City	0.44	0.28		ND
ID: Idaho Falls	0.47	0.28		ND
MN: Minneapolis	4.56	0.91	Be7	83 29
NC: Charlotte	1.43	0.34	Be7	53 14
NC: Wilmington	0.96	0.31	Be7	43 16
NY: Albany	0.66	0.29		ND
NY: Yaphank	1.41	0.33	Be7	13 14
OH: Painesville	2.55	0.40		ND
OR: Portland	0.33	0.26	Be7	37 25
PA: Harrisburg	0.50	0.27		ND
TN: Knoxville	13.57	0.83		ND
TN: Nashville	1.17	0.32	Be7	57 11
UT: Salt Lake City	1.48	0.35	Tl208	1.1 1.1
VA: Lynchburg	4.32	0.49	K40	52 30
			Pb212	3.9 5.8
WA: Olympia	0.06	0.24		ND

Note: ND = Not Detected

Table 8
Tritium in Precipitation
October - December 2003

Location	October 2003		November 2003		December 2003	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery	28	79	-23	73	-15	80
AR: Little Rock	19	77	-16	77	-28	79
AZ: Phoenix	-15	78	-64	75	43	76
CA: Berkeley	NS		-51	76	NS	
CO: Denver	25	80	NS		NS	
CT: Hartford	-23	77	30	77	2	80
DE: Wilmington	2	78	NS		NS	
FL: Jacksonville	-41	76	-36	73	57	83
FL: Miami	44	80	NS		NS	
HI: Honolulu	-59	76	3	79	68	77
IA: Iowa City	-60	75	46	76	15	81
ID: Idaho Falls	NS		-11	78	15	75
MI: Lansing	59	80	55	77	NS	
MN: Minneapolis	29	79	49	76	45	82
NC: Charlotte	-26	77	-33	73	-5	81
NC: Wilmington	-41	76	21	75	-39	79
ND: Bismarck	-6	77	-3	74	NS	
NH: Concord	-18	78	87	78	NS	
NV: Las Vegas	NS		31	79	NS	
NY: Albany	-20	77	65	77	42	82
NY: Yaphank	8	79	57	76	-13	79
OH: Painesville	18	78	39	76	31	82
OR: Portland	-74	76	10	79	15	75
PA: Harrisburg	-8	77	55	76	-33	79
SC: Columbia	88	81	87	78	NS	
TN: Knoxville	-34	77	42	76	-11	80
TN: Nashville	NS		67	77	-16	79
TX: Austin	-8	78	2	74	NS	
TX: Dallas	NS		-15	78	NS	
TX: El Paso	NS		-8	74	NS	
UT: Salt Lake City	NS		-57	75	40	76
VA: Lynchburg	36	80	454	92	-6	80
WA: Olympia	-46	76	10	78	47	77

Note: NS = No Sample

Plutonium and Uranium in Airborne Particulates

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 typically ranges from 120,000 to 500,000 cubic meters.

Plutonium and uranium results are published when they become available.

Beta Activity in Precipitation

All stations routinely submit precipitation samples as rainfall, snow, or sleet occurs. The precipitation samples are composited at the NAREL into single monthly samples for each station. Each month that precipitation occurs, an aliquant of the composited sample is analyzed for gross beta, tritium (H-3), and gamma-emitting nuclides. Additional analyses are performed on precipitation samples with gross beta activities greater than 16 pCi/L.

Table 9
Plutonium and Uranium in Airborne Particulates
January - December 2003 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	1.4	2.8	1.1	1.5	28.6	7.9	2.0	2.6	17.5	6.0
AL: Montgomery	0.5	1.0	-0.04	0.42	7.4	1.9	0.33	0.44	7.0	1.8
AL: Montgomery/411	0.52	0.96	0.00	0.38	8.1	2.0	0.03	0.32	5.9	1.7
AR: Little Rock	0.8	3.0	0.0	1.3	22.1	6.8	3.9	3.1	17.5	6.0
AZ: Phoenix	-0.6	3.8	-0.3	2.6	76	20	4.8	5.6	68	19
CA: Berkeley	0.1	1.6	-0.10	0.64	10.7	4.1	2.7	2.5	10.2	3.9
CA: Los Angeles	0.2	2.7	0.8	1.6	29.4	8.3	2.0	2.8	28.5	8.2
CO: Denver	-0.9	2.8	1.0	1.5	31.2	8.3	2.5	2.7	35.3	8.9
CT: Hartford	0.21	0.90	0.08	0.38	5.6	1.4	0.49	0.45	7.1	1.6
DC: Washington	0.1	1.1	-0.06	0.38	7.9	1.7	0.59	0.51	7.9	1.7
DE: Wilmington	-0.10	0.94	0.27	0.55	13.4	3.2	0.22	0.60	12.3	3.0
FL: Jacksonville	-0.3	1.0	0.25	0.69	8.0	2.1	0.85	0.70	7.0	1.9
FL: Miami	0.2	1.2	0.47	0.72	14.0	3.1	0.18	0.49	12.2	2.8
GA: Atlanta	0.26	0.65	-0.04	0.36	22.1	4.2	1.7	1.1	21.3	4.1
HI: Honolulu	0.7	2.1	-0.11	0.74	6.6	3.8	1.7	2.3	5.5	3.4
IA: Iowa City	1.9	2.5	-0.10	0.93	16.1	5.5	1.3	2.0	14.9	5.3
ID: Boise	0.6	1.8	0.19	0.86	15.4	4.9	0.6	1.6	13.4	4.5
ID: Idaho Falls	1.9	3.5	0.4	1.7	33.6	8.7	3.6	3.0	23.7	7.0
IL: Chicago	0.7	2.7	0.3	1.3	19.8	5.0	0.9	1.2	16.0	4.4
IN: Indianapolis	0.1	2.3	0.3	1.2	21.5	7.2	5.7	4.2	19.3	6.6
KS: Topeka	-0.4	1.6	0.08	0.71	19.3	4.5	2.0	1.5	20.1	4.7
ME: Augusta	0.6	1.9	0.20	0.91	20.2	4.8	1.2	1.2	20.2	4.8
MI: Lansing	-0.2	1.6	0.00	0.78	18.3	5.2	1.0	1.4	9.0	3.5
MN: Minneapolis	-0.4	1.4	0.00	0.64	14.1	4.2	1.2	1.5	15.7	4.3
MN: Welch/510	1.1	2.2	0.00	0.60	18.8	5.7	0.9	1.7	15.0	4.9
MS: Jackson	0.22	0.59	0.00	0.34	8.2	3.5	0.6	1.5	10.7	4.0
NC: Charlotte	0.3	1.3	0.12	0.55	19.3	4.1	0.40	0.71	14.0	3.3
NC: Wilmington	0.08	0.58	0.08	0.35	10.5	2.0	0.89	0.53	9.2	1.8
ND: Bismarck	-0.7	3.4	-0.2	1.2	34	10	4.4	4.1	29.7	9.4
NH: Concord	0.8	1.0	0.10	0.58	9.3	1.9	0.60	0.48	8.4	1.8
NJ: Trenton	-0.3	1.1	-0.07	0.44	10.6	2.4	0.67	0.64	9.8	2.3
NV: Las Vegas/906	3.7	5.5	2.3	3.5	62	16	7.1	5.4	51	14
NV: Las Vegas/913	2.4	4.1	0.0	1.2	58	13	2.3	3.0	38.5	9.9
NY: Albany	-0.3	1.0	0.00	0.47	19.3	5.4	3.4	2.3	26.3	6.4
NY: New York City	0.27	0.94	0.00	0.34	11.6	2.8	1.13	0.87	8.6	2.3
NY: Yaphank	1.0	1.7	0.58	0.90	5.1	1.4	0.38	0.41	5.2	1.4
OH: Painesville	-0.46	0.89	0.05	0.43	12.9	3.4	0.33	0.72	8.3	2.6
OH: Ross	1.0	2.3	0.9	1.3	29.1	7.2	2.6	2.3	21.2	5.9
OR: Portland	1.7	2.8	0.0	1.1	7.6	2.9	0.54	0.95	7.3	2.8

Note: NA = No Analysis

Table 9 (continued)

Plutonium and Uranium in Airborne Particulates January - December 2003 Composites

Location	^{238}Pu		$^{239-240}\text{Pu}$		^{234}U		^{235}U		^{238}U	
	aCi/m ³ $\pm 2u$		aCi/m ³ $\pm 2u$		aCi/m ³ $\pm 2u$		aCi/m ³ $\pm 2u$		aCi/m ³ $\pm 2u$	
PA: Harrisburg	-0.53	0.80	-0.05	0.35	7.9	2.1	1.18	0.88	9.5	2.4
PA: Pittsburgh	0.48	0.92	0.32	0.64	9.1	1.9	0.90	0.59	7.9	1.8
SC: Barnwell	0.05	0.30	0.01	0.12	3.80	0.79	0.28	0.22	3.48	0.75
SC: Columbia	-0.1	1.1	-0.17	0.41	24.4	4.6	3.4	1.5	21.0	4.1
SD: Pierre	0.1	1.9	0.00	0.85	20.2	6.0	2.0	2.1	18.7	5.7
TN: Knoxville	0.3	1.9	0.26	0.96	15.2	4.8	0.2	1.4	12.8	4.3
TN: Nashville	0.0	3.0	1.0	2.1	12.3	3.3	0.59	0.81	15.0	3.7
TN: Oak Ridge/Bethel	0.1	1.2	-0.06	0.57	13.6	3.5	0.8	1.0	9.4	2.8
TN: Oak Ridge/K25	0.07	0.77	-0.04	0.34	44.9	6.9	3.5	1.3	36.6	5.8
TN: Oak Ridge/Melton	0.41	0.92	0.04	0.34	8.0	2.0	0.41	0.53	6.0	1.7
TN: Oak Ridge/Y12 E	0.5	1.7	-0.07	0.48	27.1	5.4	3.2	1.8	13.4	3.5
TN: Oak Ridge/Y12 W	0.7	1.2	0.59	0.67	57.6	8.9	4.4	1.7	35.1	5.9
TX: Austin	0.9	2.9	-0.2	1.0	17.2	6.0	1.0	2.0	18.4	6.0
TX: Dallas	-1.3	3.6	-0.2	1.2	28.4	9.6	1.7	3.1	28.2	9.3
TX: El Paso	0.7	6.1	1.1	3.2	94	31	14	13	94	30
UT: Salt Lake City	0.6	3.8	0.0	1.9	35	10	0.5	2.7	37	11
VA: Lynchburg	-0.4	1.6	0.18	0.78	45.5	6.9	1.13	0.76	11.7	2.5
WA: Olympia	-0.1	1.9	0.27	0.79	5.7	2.5	0.08	0.72	4.0	2.0
WA: Spokane	0.8	6.0	0.3	2.3	26.7	8.3	0.0	1.3	16.2	6.2

Note: NA = No Analysis

2. Drinking Water Program

The ERAMS drinking water program provides data on radionuclide concentrations in the nation's drinking water supplies. Samples are taken at 78 sites which are either major population centers or selected nuclear facility environs.

Drinking water data are used 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.

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 10
Tritium in Drinking Water
October - December 2003

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	10/09/03	0	73
AL: Dothan	10/03/03	-5	66
AL: Montgomery	10/03/03	-26	66
AL: Muscle Shoals	10/01/03	100	71
AL: Scottsboro	10/01/03	82	70
AR: Little Rock	10/08/03	49	76
CA: Berkeley	10/06/03	14	67
CA: Los Angeles	10/06/03	21	67
CO: Denver	10/23/03	61	76
CT: Hartford	10/06/03	15	75
DE: Dover	10/21/03	-15	72
FL: Miami	10/16/03	53	75
FL: Tampa	11/24/03	21	72
GA: Baxley	10/09/03	2	74
GA: Savannah	12/03/03	44	73
HI: Honolulu	10/07/03	-13	73
IA: Cedar Rapids	10/23/03	10	73
ID: Boise	10/31/03	2	73
ID: Idaho Falls	10/17/03	4	73
IL: Morris	10/10/03	16	74
IL: W. Chicago	12/01/03	84	75
KS: Topeka	10/03/03	-33	65
LA: New Orleans	12/09/03	74	74
MD: Baltimore	10/03/03	-26	66
MD: Conowingo	12/02/03	85	75
ME: Augusta	10/06/03	19	68
MI: Detroit	10/15/03	73	84
MI: Grand Rapids	10/10/03	78	77
MN: Minneapolis	10/06/03	76	69
MN: Red Wing	10/13/03	13	74
MO: Jefferson City	10/06/03	72	71
MS: Jackson	10/08/03	18	75
MS: Port Gibson	10/07/03	-2	74
MT: Helena	10/03/03	26	68
NC: Charlotte	11/05/03	148	78
NC: Raleigh	10/15/03	-4	77
ND: Bismarck	10/06/03	33	68
NE: Lincoln	10/09/03	50	75
NH: Concord	10/06/03	24	68
NJ: Trenton	11/17/03	102	76

Table 10 (continued)
Tritium in Drinking Water
October - December 2003

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NJ: Waretown	11/13/03	25	72
NM: Santa Fe	10/06/03	-21	73
NV: Las Vegas	11/13/03	111	77
NY: Albany	10/06/03	100	73
NY: New York City	10/23/03	-13	72
NY: Niagara Falls	12/04/03	133	77
NY: Syracuse	10/27/03	128	78
OH: Cincinnati	12/05/03	63	74
OH: E. Liverpool	12/10/03	117	76
OH: Painesville	10/13/03	127	80
OH: Toledo	10/06/03	40	69
OK: Oklahoma City	10/07/03	-22	65
OR: Portland	10/10/03	13	74
PA: Columbia	12/03/03	78	75
PA: Harrisburg	12/03/03	83	75
PA: Philadelphia/Belmont	11/14/03	93	76
PA: Philadelphia/Queen	11/14/03	93	75
PA: Pittsburgh - Baxter Control Lab.	11/14/03	99	76
PA: Pittsburgh	12/10/03	64	73
RI: Providence	10/30/03	-30	71
SC: Barnwell	10/17/03	-32	71
SC: Columbia	10/17/03	36	75
SC: Jenkinsville	10/20/03	27	74
SC: Seneca	10/20/03	-21	72
TN: Chattanooga	10/06/03	35	69
TN: Knoxville	10/06/03	23	68
TN: Oak Ridge - Knox Co. #371	11/13/03	109	76
TN: Oak Ridge - Roane Co. #360	12/02/03	82	75
TN: Oak Ridge - Anderson Co. #772	12/15/03	19	75
TN: Oak Ridge - Anderson Co. #768	12/15/03	28	75
TX: Austin	10/15/03	75	75
VA: Ashland	10/06/03	647	94
VA: Lynchburg	10/07/03	-8	74
WA: Richland	10/09/03	117	82
WA: Seattle	12/22/03	84	78

Table 11
Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples
January - December 2003

Location	²³⁸ Pu pCi/L ± 2 <i>u</i>		²³⁹⁻²⁴⁰ Pu pCi/L ± 2 <i>u</i>		²³⁴ U pCi/L ± 2 <i>u</i>		²³⁵ U pCi/L ± 2 <i>u</i>		²³⁸ U pCi/L ± 2 <i>u</i>	
ID: Idaho Falls	0.007	0.023	0.0000	0.0074	1.00	0.16	0.015	0.024	0.363	0.088
IL: Morris	0.017	0.054	-0.002	0.016	0.67	0.17	0.000	0.025	0.049	0.053
IL: W. Chicago	0.041	0.082	0.011	0.033	0.97	0.28	-0.007	0.049	0.056	0.087
MN: Red Wing	0.018	0.061	0.013	0.028	0.57	0.16	0.012	0.051	0.035	0.054
MS: Port Gibson	0.009	0.018	0.007	0.012	0.231	0.068	0.009	0.019	0.161	0.056
NE: Lincoln	-0.011	0.025	0.001	0.013	3.54	0.36	0.111	0.053	2.30	0.27
NM: Santa Fe	0.017	0.053	-0.021	0.021	6.24	0.67	0.137	0.087	2.84	0.39
NV: Las Vegas	0.020	0.028	0.001	0.012	2.52	0.30	0.075	0.049	1.34	0.20

Note: NA = No Analysis

Table 12
Iodine-131 in Drinking Water
January - December 2003

Location	Date Collected	¹³¹ I	
		pCi/L $\pm 2u$	
AK: Fairbanks	04/08/03	-0.13	0.30
AK: Fairbanks	10/09/03	0.4	1.2
AL: Dothan	01/15/03	0.04	0.13
AL: Montgomery	01/08/03	0.05	0.16
AL: Muscle Shoals	10/01/03	0.04	0.15
AL: Scottsboro	07/03/03	0.12	0.19
AR: Little Rock	04/11/03	0.00	0.22
CA: Berkeley	01/17/03	0.02	0.25
CA: Los Angeles	07/07/03	-0.04	0.26
CO: Denver	03/14/03	0.05	0.13
CO: Denver	06/16/03	0.02	0.15
CT: Hartford	04/04/03	-0.01	0.14
DE: Dover	04/14/03	0.00	0.12
FL: Miami	01/23/03	0.08	0.14
FL: Tampa	06/09/03	-0.12	0.17
GA: Baxley	10/09/03	0.01	0.15
GA: Savannah	09/10/03	0.00	0.15
HI: Honolulu	10/07/03	0.15	0.16
IA: Cedar Rapids	01/17/03	-0.13	0.25
ID: Boise	01/23/03	0.01	0.14
ID: Idaho Falls	04/11/03	0.03	0.16
IL: Morris	01/15/03	0.02	0.15
IL: W. Chicago	03/13/03	0.11	0.15
KS: Topeka	04/03/03	0.11	0.15
MA: Lawrence	01/22/03	0.26	0.19
MA: Lawrence	01/22/03	0.22	0.21
MD: Baltimore	04/07/03	0.18	0.23
MD: Conowingo	05/13/03	0.18	0.18
ME: Augusta	01/13/03	0.03	0.12
MI: Detroit	10/15/03	0.10	0.26
MI: Grand Rapids	01/23/03	0.10	0.24
MN: Minneapolis	10/06/03	0.06	0.19
MN: Red Wing	07/23/03	-0.02	0.16
MO: Jefferson City	01/13/03	0.60	0.18
MS: Jackson	04/08/03	0.06	0.28
MS: Jackson	10/08/03	-0.03	0.17
MS: Port Gibson	04/08/03	0.03	0.31
MS: Port Gibson	10/07/03	0.05	0.17
MT: Helena	01/17/03	-0.05	0.24
NC: Charlotte	06/17/03	0.06	0.19
NC: Raleigh	04/23/03	0.04	0.16

Table 12 (continued)

Iodine-131 in Drinking Water

January - December 2003

Location	Date Collected	¹³¹ I pCi/L $\pm 2u$	
ND: Bismarck	01/13/03	0.05	0.11
NE: Lincoln	01/13/03	0.08	0.10
NH: Concord	07/03/03	0.06	0.21
NJ: Trenton	11/17/03	0.27	0.16
NJ: Waretown	11/13/03	-0.13	0.22
NM: Santa Fe	10/06/03	0.00	0.19
NV: Las Vegas	05/12/03	-0.03	0.12
NY: Albany	10/06/03	0.00	0.22
NY: New York City	06/12/03	-0.16	0.24
NY: Syracuse	10/27/03	0.07	0.67
OH: Cincinnati	06/13/03	0.03	0.15
OH: Columbus	04/03/03	0.34	0.16
OH: E. Liverpool	03/12/03	0.28	0.17
OH: Painesville	04/03/03	0.21	0.15
OH: Toledo	04/04/03	0.12	0.14
OK: Oklahoma City	04/03/03	-0.01	0.14
OR: Portland	07/09/03	0.10	0.17
PA: Columbia	05/14/03	-0.03	0.16
PA: Harrisburg	05/15/03	-0.13	0.16
PA: Philadelphia/Baxter	05/12/03	0.29	0.12
PA: Philadelphia/Belmont	11/14/03	0.20	0.16
PA: Philadelphia/Queen	05/12/03	1.47	0.14
PA: Pittsburgh	03/12/03	0.17	0.16
RI: Providence	10/30/03	0.21	0.46
SC: Barnwell	01/27/03	0.11	0.16
SC: Columbia	07/29/03	0.00	0.15
SC: Jenkinsville	01/17/03	0.26	0.26
SC: Seneca	07/29/03	0.08	0.14
TN: Chattanooga	01/15/03	-0.01	0.13
TN: Knoxville	04/03/03	0.15	0.15
TN: Oak Ridge - Knox Co. #371	03/18/03	0.12	0.27
TN: Oak Ridge - Anderson Co. #768	03/18/03	0.37	0.30
TN: Oak Ridge - Roane Co. #360	05/29/03	0.05	0.29
TN: Oak Ridge - Roane Co. #4442	08/01/03	0.19	0.34
TX: Austin	10/15/03	0.12	0.25
VA: Ashland	01/13/03	-0.01	0.11
VA: Lynchburg	01/15/03	0.05	0.13
WA: Richland	07/10/03	-0.07	0.17
WA: Seattle	04/28/03	0.21	0.18

Table 13
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 2003 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	69.4	3.14	0.92	0.3	1.4	0.21	0.30
AL: Dothan - 3	112.3	1.74	0.93	1.8	2.6		
AL: Montgomery	27.0	1.36	0.60	0.14	0.78		
AL: Muscle Shoals	35.5	1.26	0.76	0.3	1.2		
AL: Scottsboro	46.1	1.52	0.63	0.1	1.1		
AR: Little Rock	15.7	0.73	0.51	0.11	0.62		
CA: Berkeley	19.1	0.71	0.68	0.06	0.65		
CA: Los Angeles	34.5	2.0	3.8	0.8	5.2		
CO: Denver	78.2	2.04	0.95	-0.1	1.7		
CT: Hartford	25.4	0.89	0.69	0.28	0.87		
DE: Dover	101.1	4.9	1.6	-0.3	2.9	0.04	0.23
FL: Miami	61.6	3.78	0.95	-0.3	1.5		
FL: Tampa	89.9	4.6	1.3	-0.3	2.7		
GA: Baxley	83.5	2.41	0.80	1.9	1.9		
GA: Savannah	67.5	2.26	0.71	0.1	1.3		
HI: Honolulu	84.1	2.7	1.0	0.2	2.0		
IA: Cedar Rapids	67.8	2.82	0.76	0.4	1.5		
ID: Boise	32.8	0.46	0.76	0.2	1.0		
ID: Idaho Falls	63.2	3.9	1.3	2.8	2.7		
IL: Morris	72.4	10.1	2.6	8.4	6.1	-0.10	0.22
IL: W. Chicago	93.8	18.0	2.5	34.8	7.5		
KS: Topeka	86.3	7.3	1.7	1.0	3.3		
LA: New Orleans	62.8	2.60	0.88	0.4	1.7		
MA: Lawrence	85.1	2.84	0.91	0.3	1.7		
MD: Baltimore	59.4	2.97	0.87	-0.6	1.3		
MD: Conowingo	68.1	2.6	1.1	0.9	1.8		
ME: Augusta	23.5	0.82	0.70	0.32	0.73		
MI: Detroit	44.4	1.56	0.64	0.1	1.1		
MI: Grand Rapids	60.6	2.27	0.71	0.6	1.4		
MN: Minneapolis	47.0	3.37	0.76	0.5	1.2	-0.13	0.22
MN: Red Wing	72.1	13.9	1.9	20.1	4.7		
MO: Jefferson City	92.1	5.4	1.4	1.3	2.9		
MS: Jackson	44.5	2.90	0.73	0.1	1.1		
MS: Port Gibson	116.8	12.1	2.1	2.5	4.2		
MT: Helena	66.7	3.71	0.88	0.7	1.5		
NC: Charlotte	24.4	1.98	0.66	0.18	0.77		
NC: Raleigh	60.7	2.51	0.73	0.8	1.4		

Table 13 (continued)
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 2003 Composites

Location	Total Solids (mg/L)	Gross Beta pCi/L $\pm$ 2u		Gross Alpha pCi/L $\pm$ 2u		⁹⁰ Sr pCi/L $\pm$ 2u	
ND: Bismarck							
NE: Lincoln	95.2	4.2	1.6	1.6	3.1		
NH: Concord	61.1	11.3	1.9	6.8	3.6		
NJ: Trenton	68.9	1.22	0.81	0.0	1.4		
NJ: Waretown	51.6	0.79	0.75	0.4	1.2		
NM: Santa Fe	30.3	2.25	0.77	0.23	0.86		
NV: Las Vegas	72.6	6.1	1.4	9.7	3.7		
NY: Albany	96.5	7.4	3.1	5.4	6.6		
NY: New York City	60.4	1.13	0.78	-0.1	1.3		
NY: Niagara Falls	21.4	0.77	0.66	0.26	0.74		
NY: Syracuse	52.6	1.55	0.80	0.3	1.2		
OH: Cincinnati	50.9	1.65	0.79	0.0	1.3		
OH: Columbus	62.6	2.20	0.84	0.0	1.6		
OH: E. Liverpool	155.8	4.3	1.2	0.0	2.8		
OH: Painesville	66.2	2.04	0.85	0.8	1.8		
OH: Toledo	60.2	2.21	0.83	-0.1	1.5		
OK: Oklahoma City	56.8	2.51	0.72	-0.3	1.1		
OR: Portland	55.8	2.35	0.71	0.2	1.2		
PA: Columbia	13.5	-0.08	0.68	-0.06	0.69		
PA: Harrisburg	72.1	2.30	0.85	0.4	1.5		
PA: Philadelphia/Baxter	21.2	0.21	0.80	0.00	0.86		
PA: Philadelphia/Belmont	33.4	1.9	1.2	0.5	1.5		
PA: Philadelphia/Queen	61.3	3.1	1.4	-0.8	2.3		
PA: Pittsburgh	65.4	3.2	1.4	1.0	2.3		
RI: Providence	53.7	1.42	0.95	-0.3	1.6		
SC: Barnwell	51.9	1.83	0.80	0.1	1.3		
SC: Columbia	15.5	0.69	0.53	0.17	0.65	-0.47	0.76
SC: Jenkinsville	38.5	2.95	0.72	-0.07	0.91	0.14	0.21
SC: Seneca	23.0	2.26	0.81	0.38	0.97	0.04	0.20
TN: Chattanooga	17.4	0.99	0.55	0.20	0.65	0.01	0.23
TN: Knoxville	36.5	1.25	0.63	0.14	0.96	0.13	0.23
TN: Oak Ridge - Anderson Co.	52.0	2.29	0.69	-0.2	1.1	0.18	0.21
#768	54.1	1.82	0.75	0.5	1.3	-0.10	0.26
TN: Oak Ridge - Anderson Co.	53.3	1.72	0.80	0.2	1.2	-0.09	0.52
#772	56.1	3.40	0.90	0.2	1.2	0.35	0.28
TN: Oak Ridge - Roane Co. #4442	45.7	1.38	0.83	-0.3	1.2	0.34	0.24
TN: Oak Ridge - Roane Co. #360	53.3	2.17	0.77	0.4	1.3	0.08	0.24
TN: Oak Ridge - Knox Co. #371	46.6	2.10	0.79	0.5	1.4		
TX: Austin							

Table 13 (continued)
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 2003 Composites

Location	Total Solids (mg/L)	Gross Beta pCi/L $\pm$ 2 <i>u</i>		Gross Alpha pCi/L $\pm$ 2 <i>u</i>		⁹⁰ Sr pCi/L $\pm$ 2 <i>u</i>
VA: Ashland	40.4	2.79	0.84	0.5	1.3	
VA: Lynchburg	19.9	0.92	0.58	0.16	0.71	
WA: Richland	26.9	0.55	0.68	0.21	0.78	
WA: Seattle	0.6	-0.35	0.57	0.05	0.50	

Table 14
Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 2003 Composites

Location	²²⁶ Ra		²²⁸ Ra		Gamma-Emitting Radionuclides	
	pCi/L ± 2u		pCi/L ± 2u		Nuclide	pCi/L ± 2u
AK: Fairbanks	NA		NA		K40	12 12
AL: Dothan - 3	NA		NA			ND
AL: Montgomery	NA		NA			ND
AL: Muscle Shoals	NA		NA			ND
AL: Scottsboro	NA		NA			ND
AR: Little Rock	NA		NA			ND
CA: Berkeley	NA		NA			ND
CA: Los Angeles	NA		NA			ND
CO: Denver	NA		NA			ND
CT: Hartford	NA		NA			ND
DE: Dover	NA		NA			ND
FL: Miami	NA		NA			ND
FL: Tampa	NA		NA			ND
GA: Baxley	NA		NA			ND
GA: Savannah	NA		NA		K40	12 13
HI: Honolulu	NA		NA			ND
IA: Cedar Rapids	NA		NA			ND
ID: Boise	NA		NA			ND
ID: Idaho Falls	0.070	0.016	NA			ND
IL: Morris	1.77	0.20	NA			ND
IL: W. Chicago	4.81	0.62	NA			ND
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			ND
MI: Detroit	NA		NA			ND
MI: Grand Rapids	NA		NA			ND
MN: Minneapolis	NA		NA			ND
MN: Red Wing	3.69	0.48	NA		K40	12 13
MO: Jefferson City	NA		NA			ND
MS: Jackson	NA		NA			ND
MS: Port Gibson	0.732	0.098	NA			ND
MT: Helena	NA		NA			ND
NC: Charlotte	NA		NA			ND

Note: ND = Not Detected
NA = No Analysis

Table 14 (continued)

Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 2003 Composites

Location	²²⁶ Ra		²²⁸ Ra		Gamma-Emitting Radionuclides	
	pCi/L ± 2u		pCi/L ± 2u		Nuclide	pCi/L ± 2u
NC: Raleigh	NA		NA			ND
ND: Bismarck	NA		NA			ND
NE: Lincoln	NA		NA			ND
NH: Concord	0.163	0.027	NA		K40	11 13
NJ: Trenton	NA		NA			ND
NJ: Waretown	NA		NA			ND
NM: Santa Fe	NA		NA			ND
NV: Las Vegas	0.090	0.019	NA			ND
NY: Albany	0.104	0.021	NA			ND
NY: New York City	NA		NA			ND
NY: Niagara Falls	NA		NA			ND
NY: Syracuse	NA		NA			ND
OH: Cincinnati	NA		NA			ND
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			ND
PA: Philadelphia/Baxter	NA		NA			ND
PA: Philadelphia/Belmont	NA		NA			ND
PA: Philadelphia/Queen	NA		NA			ND
PA: Pittsburgh	NA		NA			ND
RI: Providence	NA		NA			ND
SC: Barnwell	NA		NA			ND
SC: Columbia	NA		NA			ND
SC: Jenkinsville	NA		NA			ND
SC: Seneca	NA		NA			ND
TN: Chattanooga	NA		NA			ND
TN: Knoxville	NA		NA		K40	8 12
TN: Oak Ridge - Anderson Co. #768	NA		NA			ND
TN: Oak Ridge - Anderson Co. #772	NA		NA			ND
TN: Oak Ridge - Roane Co. #4442	NA		NA			ND
TN: Oak Ridge - Roane Co. #360	NA		NA			ND

Note: ND = Not Detected
NA = No Analysis

Table 14 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 2003 Composites

Location	²²⁶ Ra	²²⁸ Ra	Gamma-Emitting Radionuclides	
	pCi/L ± 2 <i>u</i>	pCi/L ± 2 <i>u</i>	Nuclide	pCi/L ± 2 <i>u</i>
TN: Oak Ridge - Knox Co. #371	NA	NA		ND
TX: Austin	NA	NA		ND
VA: Ashland	NA	NA		ND
VA: Lynchburg	NA	NA		ND
WA: Richland	NA	NA		ND
WA: Seattle	NA	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 certain 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.

Quarterly 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. During the third quarter collection, one-fourth of the samples are also analyzed for strontium-90 on a four year rotating schedule.

Table 15
Radionuclides in Pasteurized Milk
October - December 2003

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	10/07/03	1.63	0.13	ND	ND	ND
CA: Los Angeles	10/24/03	1.64	0.13	ND	ND	ND
CA: San Francisco	10/07/03	1.69	0.13	ND	ND	ND
DE: Dover	10/28/03	1.49	0.12	ND	ND	ND
FL: Tampa	10/13/03	1.58	0.12	ND	ND	ND
HI: Honolulu	11/04/03	1.66	0.12	ND	ND	ND
IA: Des Moines	10/06/03	1.57	0.12	ND	ND	ND
IN: Indianapolis	10/09/03	1.58	0.12	ND	ND	ND
KS: Wichita	10/14/03	1.60	0.12	ND	ND	ND
KY: Louisville	10/14/03	1.56	0.13	ND	ND	ND
MA: Boston	12/03/03	1.69	0.12	ND	ND	ND
MD: Baltimore	10/10/03	1.53	0.12	ND	ND	ND
MI: Detroit	12/08/03	1.74	0.12	ND	ND	ND
MI: Grand Rapids	10/09/03	1.69	0.13	ND	ND	ND
MO: Jefferson City	10/08/03	1.63	0.11	ND	ND	ND
NJ: Trenton	10/02/03	1.61	0.12	ND	ND	ND
NM: Albuquerque	10/15/03	1.53	0.12	ND	ND	ND
NV: Las Vegas	10/06/03	1.39	0.15	ND	ND	ND
NY: Buffalo	10/08/03	1.67	0.13	ND	ND	ND
NY: Syracuse	10/07/03	1.57	0.12	ND	ND	ND
OH: Cincinnati	12/08/03	1.54	0.12	ND	ND	ND
OH: Cleveland	10/20/03	1.57	0.13	ND	ND	ND
PA: Philadelphia	10/06/03	1.43	0.16	ND	ND	ND
PA: Pittsburgh	10/06/03	1.53	0.12	ND	ND	ND
TN: Chattanooga	11/10/03	1.68	0.12	ND	ND	ND
TN: Knoxville	10/13/03	1.45	0.13	ND	ND	ND
TN: Memphis	10/06/03	1.47	0.13	ND	ND	ND
TX: Ft. Worth	12/18/03	1.58	0.12	ND	ND	ND
TX: San Antonio	10/14/03	1.43	0.11	ND	ND	ND
VA: Norfolk	11/18/03	1.55	0.11	ND	ND	ND
VT: Montpelier	12/31/03	1.64	0.13	ND	ND	ND
WA: Spokane	10/06/03	1.53	0.16	ND	ND	ND
WA: Tacoma	12/30/03	1.75	0.12	ND	ND	ND
WV: Charleston	10/07/03	1.53	0.12	ND	ND	ND

Note: ND = Not Detected

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