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ENVIRONMENTAL RADIATION DATA

REPORT 112

October - December 2002

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/m³	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/m³	0.75
	Water	pCi/L	0.1
† Uranium-234,235,238	Air	aCi/m³	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 ^{239}Pu and ^{240}Pu, 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/m^3. 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 2002

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
AL: Montgomery/408	8	0.1	0.0	0.1	0.017	0.005	0.011
AR: Little Rock	7	0.1	0.0	0.1	0.020	0.009	0.015
AZ: Phoenix	5	0.8	0.1	0.6	0.037	0.012	0.024
CA: Berkeley	9	0.2	0.0	0.1	0.017	0.006	0.011
CA: Los Angeles	9	0.4	0.0	0.1	0.029	0.009	0.020
CO: Denver	9	2.0	0.5	1.2	0.019	0.010	0.015
CT: Hartford	8	0.2	0.0	0.1	0.016	0.003	0.007
DE: Wilmington	9	0.3	0.1	0.1	0.018	0.005	0.011
FL: Jacksonville	9	0.1	0.0	0.1	0.016	0.004	0.009
FL: Miami	3	0.0	0.0	0.0	0.006	0.005	0.006
HI: Honolulu	4	0.0	0.0	0.0	0.005	0.002	0.003
IA: Iowa City	9	0.5	0.0	0.2	0.019	0.006	0.014
ID: Boise	3	0.1	0.0	0.1	0.026	0.010	0.018
ID: Idaho Falls	10				0.021	0.004	0.014
IL: Chicago	7	1.4	0.1	0.4	0.023	0.007	0.016
IN: Indianapolis	9	0.7	0.2	0.3	0.016	0.006	0.011
ME: Augusta	6	0.1	0.0	0.1	0.010	0.003	0.007
MI: Lansing	9	0.8	0.1	0.4	0.022	0.010	0.013
MN: Minneapolis	4	0.2	0.1	0.1	0.018	0.010	0.014
MN: Welch/510	3				0.017	0.008	0.012
MS: Jackson	9	0.6	0.1	0.2	0.019	0.005	0.012
NC: Charlotte	9	0.2	0.0	0.1	0.019	0.008	0.013
NC: Wilmington	5				0.016	0.006	0.010
ND: Bismarck	7	2.1	0.3	0.9	0.018	0.008	0.013
NH: Concord	8	0.5	0.1	0.2	0.019	0.004	0.009
NJ: Trenton	8	0.3	0.1	0.2	0.014	0.004	0.009
NV: Las Vegas	7	0.3	0.1	0.2	0.026	0.010	0.017
NY: Albany	5	0.1	0.0	0.0	0.018	0.009	0.011
NY: New York City	7	0.1	0.0	0.0	0.017	0.005	0.009
NY: Yaphank	9	0.0	0.0	0.0	0.013	0.001	0.004
OH: Painesville	7	1.0	0.1	0.4	0.018	0.007	0.012
OH: Ross	9				0.018	0.008	0.014
OR: Portland	8	0.3	0.1	0.2	0.018	0.005	0.009
PA: Harrisburg	9	0.6	0.1	0.2	0.020	0.004	0.011
PA: Pittsburgh	9				0.017	0.008	0.012
SC: Barnwell	1	0.0	0.0	0.0	0.007	0.007	0.007
SC: Columbia	7	0.2	0.1	0.1	0.017	0.007	0.012
SD: Pierre	9	0.5	0.1	0.3	0.013	0.006	0.009

Table 2 (continued)

Gross Beta in Airborne Particulates
October 2002

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
TN: Knoxville	8	0.8	0.1	0.3	0.021	0.010	0.016
TN: Nashville	3	0.5	0.2	0.3	0.013	0.012	0.012
TN: Oak Ridge/Bethel	9	0.8	0.0	0.3	0.020	0.005	0.014
TN: Oak Ridge/K25	9	1.0	0.0	0.4	0.018	0.006	0.013
TN: Oak Ridge/Melton	9	1.0	0.0	0.4	0.019	0.006	0.014
TN: Oak Ridge/Y12 E	9	0.8	0.0	0.3	0.020	0.006	0.014
TN: Oak Ridge/Y12 W	9	0.8	0.0	0.3	0.024	0.006	0.015
TX: Austin	9	0.2	0.0	0.1	0.016	0.003	0.009
TX: El Paso	9	1.7	0.3	0.9	0.023	0.010	0.016
UT: Salt Lake City	8	0.7	0.0	0.5	0.028	0.010	0.020
VA: Lynchburg	9	1.6	0.2	0.6	0.018	0.006	0.012
WA: Olympia	7	0.3	0.0	0.2	0.012	0.003	0.007
WA: Spokane	8	1.5	0.4	0.8	0.031	0.005	0.015

Table 3

Gross Beta in Airborne Particulates
November 2002

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
AL: Montgomery/408	8	0.1	0.0	0.1	0.019	0.012	0.014
AL: Montgomery/411	6	0.1	0.0	0.1	0.022	0.014	0.017
AR: Little Rock	3	0.1	0.0	0.0	0.019	0.014	0.017
AZ: Phoenix	4	0.8	0.5	0.6	0.035	0.017	0.024
CA: Berkeley	9	0.3	0.0	0.1	0.033	0.003	0.015
CA: Los Angeles	8	0.5	0.2	0.3	0.035	0.006	0.020
CO: Denver	6	1.3	0.2	0.8	0.023	0.006	0.011
CT: Hartford	9	0.2	0.0	0.1	0.014	0.004	0.009
DE: Wilmington	8	0.2	0.0	0.1	0.017	0.009	0.014
FL: Jacksonville	7	0.1	0.0	0.1	0.014	0.008	0.011
FL: Miami	4	0.0	0.0	0.0	0.008	0.005	0.006
HI: Honolulu	6	0.1	0.0	0.0	0.004	0.002	0.004
IA: Iowa City	8	1.1	0.1	0.3	0.045	0.011	0.021
ID: Boise	2	0.4	0.0	0.3	0.107	0.030	0.081
ID: Idaho Falls	7				0.033	0.005	0.015
IL: Chicago	4	0.6	0.1	0.3	0.016	0.011	0.013
IN: Indianapolis	8	0.3	0.1	0.2	0.024	0.009	0.014
ME: Augusta	4	0.5	0.0	0.2	0.009	0.005	0.007
MI: Lansing	8	0.4	0.1	0.2	0.029	0.007	0.016
MN: Minneapolis	4	0.5	0.1	0.3	0.040	0.012	0.025
MN: Welch/510	1				0.014	0.014	0.014
MS: Jackson	7	0.3	0.1	0.2	0.036	0.012	0.019
NC: Charlotte	7	0.1	0.0	0.0	0.022	0.005	0.012
NC: Wilmington	4				0.013	0.008	0.010
ND: Bismarck	7	1.5	0.3	0.8	0.040	0.007	0.023
NH: Concord	9	0.3	0.0	0.2	0.014	0.006	0.009
NJ: Trenton	8	0.3	0.2	0.2	0.015	0.004	0.011
NV: Las Vegas	7	0.4	0.1	0.2	0.026	0.005	0.015
NY: Albany	4	0.2	0.0	0.1	0.022	0.012	0.017
NY: New York City	6	0.2	0.0	0.1	0.016	0.007	0.013
NY: Yaphank	8	0.0	0.0	0.0	0.004	0.002	0.003
OH: Painesville	9	0.2	0.1	0.2	0.027	0.006	0.015
OH: Ross	8				0.027	0.009	0.016
OR: Portland	7	0.3	0.1	0.2	0.049	0.002	0.016
PA: Harrisburg	8	0.3	0.1	0.2	0.019	0.006	0.015
PA: Pittsburgh	8				0.025	0.009	0.017
SC: Columbia	4	0.1	0.0	0.1	0.014	0.011	0.012
SD: Pierre	4	0.3	0.1	0.3	0.020	0.014	0.017

Table 3 (continued)

Gross Beta in Airborne Particulates
November 2002

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
TN: Knoxville	8	0.4	0.0	0.2	0.026	0.010	0.018
TN: Nashville	7	0.1	0.1	0.1	0.020	0.010	0.016
TN: Oak Ridge/Bethel	6	0.4	0.1	0.2	0.020	0.009	0.014
TN: Oak Ridge/K25	6	0.5	0.2	0.3	0.019	0.008	0.013
TN: Oak Ridge/Melton	6	0.4	0.1	0.3	0.018	0.008	0.013
TN: Oak Ridge/Y12 E	6	0.4	0.1	0.2	0.021	0.009	0.014
TN: Oak Ridge/Y12 W	6	0.3	0.1	0.2	0.020	0.009	0.014
TX: Austin	7	0.1	0.0	0.1	0.013	0.008	0.011
TX: El Paso	8	1.6	0.3	1.1	0.026	0.009	0.018
UT: Salt Lake City	9	0.8	0.1	0.5	0.037	0.005	0.021
VA: Lynchburg	6	0.7	0.1	0.3	0.013	0.006	0.011
WA: Olympia	7	0.5	0.0	0.1	0.031	0.002	0.012
WA: Spokane	9	0.9	0.2	0.5	0.061	0.003	0.021

Table 4

Gross Beta in Airborne Particulates
December 2002

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
AL: Montgomery/408	9	0.2	0.0	0.1	0.031	0.008	0.017
AL: Montgomery/411	9	0.2	0.0	0.1	0.033	0.012	0.021
AR: Little Rock	5	0.1	0.0	0.0	0.027	0.012	0.021
AZ: Phoenix	5	1.0	0.2	0.8	0.050	0.012	0.036
CA: Berkeley	9	0.8	0.0	0.2	0.059	0.002	0.021
CA: Los Angeles	9	0.4	0.1	0.2	0.032	0.003	0.015
CO: Denver	9	2.1	0.5	1.2	0.034	0.007	0.017
CT: Hartford	9	0.1	0.0	0.0	0.014	0.005	0.009
DE: Wilmington	9	0.1	0.0	0.1	0.018	0.008	0.011
FL: Jacksonville	9	0.2	0.1	0.1	0.017	0.004	0.010
FL: Miami	3	0.8	0.0	0.3	0.008	0.003	0.006
HI: Honolulu	8	0.1	0.0	0.0	0.006	0.003	0.004
IA: Iowa City	9	1.2	0.1	0.6	0.035	0.015	0.023
ID: Boise	1	0.2	0.2	0.2	0.006	0.006	0.006
ID: Idaho Falls	9				0.070	0.006	0.027
IL: Chicago	3	0.9	0.1	0.4	0.022	0.017	0.020
IN: Indianapolis	9	0.4	0.1	0.2	0.018	0.009	0.013
ME: Augusta	6	0.2	0.0	0.0	0.014	0.011	0.013
MI: Lansing	9	0.2	0.1	0.1	0.035	0.006	0.018
MN: Minneapolis	5	0.4	0.2	0.3	0.041	0.012	0.026
MN: Welch/510	1	1.2	1.2	1.2	0.017	0.017	0.017
MS: Jackson	7	1.8	0.1	0.3	0.037	0.011	0.020
NC: Charlotte	8	0.1	0.0	0.0	0.018	0.008	0.014
NC: Wilmington	2				0.014	0.011	0.013
ND: Bismarck	4	2.0	0.1	1.2	0.023	0.018	0.020
NH: Concord	9	0.2	0.0	0.1	0.016	0.005	0.011
NJ: Trenton	8	0.3	0.0	0.1	0.012	0.007	0.010
NV: Las Vegas	9	0.4	0.1	0.2	0.040	0.004	0.020
NV: Las Vegas/906	1	0.2	0.2	0.2	0.018	0.018	0.018
NV: Las Vegas/913	1				0.019	0.019	0.019
NY: Albany	5	0.0	0.0	0.0	0.016	0.010	0.012
NY: New York City	6	0.1	0.0	0.0	0.014	0.006	0.010
NY: Yaphank	8	0.0	0.0	0.0	0.003	0.001	0.002
OH: Painesville	6	0.2	0.0	0.1	0.019	0.008	0.013
OH: Ross	9				0.023	0.010	0.015
OR: Portland	8	0.1	0.0	0.1	0.026	0.001	0.008
PA: Harrisburg	9	0.2	0.1	0.1	0.017	0.008	0.012
PA: Pittsburgh	9				0.021	0.009	0.015

Table 4 (continued)

Gross Beta in Airborne Particulates
December 2002

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m³)			(pCi/m³)		
SC: Columbia	3	0.1	0.0	0.1	0.018	0.013	0.015
SD: Pierre	8	0.5	0.2	0.3	0.031	0.007	0.016
TN: Knoxville	7	0.6	0.1	0.3	0.044	0.011	0.022
TN: Nashville	7	0.2	0.0	0.1	0.023	0.010	0.017
TN: Oak Ridge/Bethel	8	0.5	0.1	0.2	0.025	0.008	0.015
TN: Oak Ridge/K25	8	0.6	0.1	0.3	0.025	0.010	0.015
TN: Oak Ridge/Melton	8	0.3	0.1	0.2	0.022	0.009	0.015
TN: Oak Ridge/Y12 E	8	0.3	0.1	0.2	0.025	0.009	0.016
TN: Oak Ridge/Y12 W	8	0.2	0.1	0.2	0.028	0.010	0.018
TX: Austin	9	0.1	0.0	0.1	0.024	0.010	0.016
TX: El Paso	7	2.4	0.6	1.1	0.046	0.011	0.022
UT: Salt Lake City	9	0.9	0.0	0.4	0.057	0.005	0.028
VA: Lynchburg	7	0.2	0.1	0.1	0.014	0.009	0.011
WA: Olympia	9	0.2	0.0	0.1	0.026	0.001	0.010
WA: Spokane	9	0.4	0.1	0.2	0.061	0.002	0.023

Table 5

Gross Beta and Specific Gamma in Precipitation
October 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	± 2*u*	Nuclide	pCi/L	± 2*u*
AL: Montgomery	0.65	0.33	Be7	62	17
AR: Little Rock	0.69	0.28		ND	
AZ: Phoenix	1.77	0.37		ND	
CO: Denver	1.76	0.36	Be7	52	43
CT: Hartford	0.45	0.33	Pb212	6.8	4.9
DE: Wilmington	0.53	0.33	Be7	26	26
FL: Jacksonville	0.96	0.35	Be7	50	19
FL: Miami	0.29	0.34	Tl208	1.3	1.5
HI: Honolulu	0.54	0.29		ND	
IA: Iowa City	0.54	0.28	K40	33	28
ID: Idaho Falls	0.79	0.29		ND	
ME: Augusta	1.10	0.35		ND	
MI: Lansing	0.81	0.35	Be7	17	15
MN: Minneapolis	1.14	0.32		ND	
MN: Welch	0.30	0.26		ND	
NC: Charlotte	1.81	0.41	Be7	53	17
NC: Wilmington	0.17	0.30	Be7	13	14
			Tl208	1.1	1.4
ND: Bismarck	7.24	0.63		ND	
NH: Concord	3.92	0.50	Be7	55	29
NY: Albany	0.53	0.34		ND	
NY: Yaphank	4.46	0.54	K40	10	14
OH: Painesville	2.13	0.41	Be7	42	16
OR: Portland	0.21	0.25		ND	
SC: Barnwell	1.18	0.38		ND	
SC: Columbia	0.76	0.34	Tl208	2.1	1.5
TN: Knoxville	2.91	0.46	K40	12	13
TN: Nashville	0.27	0.32	Be7	26	16
TX: Austin	0.31	0.26		ND	
TX: El Paso	1.10	0.33		ND	
UT: Salt Lake City	1.67	0.37	Tl208	2.6	2.7
VA: Lynchburg	4.71	0.55	K40	10	14
WA: Olympia	0.50	0.28		ND	

Note: ND = Not Detected

Table 6

Gross Beta and Specific Gamma in Precipitation
November 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	± 2*u*	Nuclide	pCi/L	± 2*u*
AL: Montgomery	0.28	0.25	Be7	28	15
AR: Little Rock	0.25	0.25		ND	
CA: Berkeley	0.32	0.27	K40	21	32
CO: Denver	0.79	0.31	Be7	95	28
CT: Hartford	1.01	0.31	Be7	40	14
DE: Wilmington	1.45	0.34	Be7	53	17
			K40	19	11
FL: Jacksonville	0.48	0.28	Be7	33	15
			K40	10	13
			Tl208	2.1	1.3
FL: Miami	0.55	0.55		ND	
	0.16	0.32		ND	
HI: Honolulu	0.55	0.28	Tl208	1.8	3.4
ID: Idaho Falls	2.76	0.45		ND	
MI: Lansing	1.41	0.35		ND	
NC: Charlotte	0.89	0.29	Be7	37	14
NC: Wilmington	0.24	0.25	Be7	28	15
NY: Albany	0.27	0.25	Be7	37	15
NY: Yaphank	3.31	0.45	K40	19	13
			Tl208	1.8	1.3
OH: Painesville	3.66	0.45		ND	
OR: Portland	0.21	0.24	Be7	25	21
			Bi212	27	36
PA: Harrisburg	1.01	0.31		ND	
SC: Columbia	0.98	0.31	K40	16	11
TN: Knoxville	8.30	0.66	K40	20	15
TN: Nashville	0.54	0.27	Be7	22	16
			Tl208	1.1	1.4
TX: Austin	0.47	0.27		ND	
UT: Salt Lake City	1.80	0.39	K40	23	36
WA: Olympia	0.21	0.24	Pb212	4.4	7.1

Note: ND = Not Detected

Table 7

Gross Beta and Specific Gamma in Precipitation
December 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	± 2*u*	Nuclide	pCi/L	± 2*u*
AL: Montgomery	0.82	0.36	Be7	34	15
AR: Little Rock	0.50	0.33	Be7	15	12
			K40	11	13
AZ: Phoenix	1.08	0.38		ND	
CA: Berkeley	0.25	0.30		ND	
CT: Hartford	2.26	0.45	Be7	21	16
FL: Jacksonville	0.80	0.37	Be7	33	13
FL: Miami	0.41	0.37		ND	
IA: Iowa City	1.94	0.46	Be7	44	31
ID: Idaho Falls	1.12	0.38	Be7	33	23
MN: Minneapolis	3.44	0.65	Be7	146	37
			Tl208	2.5	3.6
NC: Charlotte	1.03	0.37	Be7	30	15
NC: Wilmington	0.17	0.33	Be7	34	36
ND: Bismarck	1.45	0.52	Pb212	3.9	6.2
NY: Albany	0.13	0.35	Be7	22	14
OH: Painesville	2.66	0.46	Be7	120	34
OR: Portland	0.23	0.31		ND	
PA: Harrisburg	0.83	0.36	Be7	29	13
SC: Columbia	1.07	0.38		ND	
TN: Knoxville	2.14	0.43		ND	
TN: Nashville	1.43	0.39	Be7	46	17
TX: Austin	0.41	0.33		ND	
TX: El Paso	1.29	0.40	Pb212	4.2	6.5
UT: Salt Lake City	1.63	0.44	Be7	52	31
			Tl208	3.6	3.7
VA: Lynchburg	4.17	0.53	K40	26	35
WA: Olympia	0.37	0.31	K40	17	28
	-0.01	0.30		ND	

Note: ND = Not Detected

Table 8

Tritium in Precipitation
October - December 2002

Location	October 2002		November 2002		December 2002	
	pCi/L	± 2*u*	pCi/L	± 2*u*	pCi/L	± 2*u*
AL: Montgomery	-22	73	0	70	95	82
AR: Little Rock	23	75	-16	70	71	80
AZ: Phoenix	-21	75	NS		105	77
CA: Berkeley	NS		-11	70	41	75
CO: Denver	-9	74	74	74	NS	
CT: Hartford	100	80	70	74	72	77
DE: Wilmington	23	77	90	75	NS	
FL: Jacksonville	-35	73	2	70	63	82
FL: Miami	-27	73	18	73	63	82
HI: Honolulu	-68	73	60	75	NS	
IA: Iowa City	5	75	NS		91	81
ID: Idaho Falls	5	76	37	74	34	74
ME: Augusta	15	77	NS		NS	
MI: Lansing	74	77	21	71	NS	
MN: Minneapolis	-15	74	NS		140	82
MN: Welch	32	75	NS		NS	
NC: Charlotte	-40	72	23	72	82	84
NC: Wilmington	-24	73	33	72	131	82
ND: Bismarck	-2	75	NS		105	83
NH: Concord	-8	76	NS		NS	
NY: Albany	28	77	40	73	63	83
NY: Yaphank	-45	75	25	72	NS	
OH: Painesville	9	75	57	73	112	82
OR: Portland	-24	75	42	74	64	75
PA: Harrisburg	NS		59	73	62	79
SC: Barnwell	292	88	NS		NS	
SC: Columbia	34	76	61	73	47	79
TN: Knoxville	22	75	-13	70	37	79
TN: Nashville	-17	74	-16	69	48	81
TX: Austin	-55	72	-11	70	52	81
TX: El Paso	-24	73	NS		48	77
UT: Salt Lake City	-25	74	45	72	45	74
VA: Lynchburg	7	76	NS		100	83
WA: Olympia	-30	74	11	73	37	74

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, and gamma-emitting nuclides.

Table 9

Plutonium and Uranium in Airborne Particulates
January - December 2002 Composites

Location	^{238}Pu aCi/m³	± 2*u*	$^{239-240}$Pu aCi/m³	± 2*u*	^{234}U aCi/m³	± 2*u*	^{235}U aCi/m³	± 2*u*	^{238}U aCi/m³	± 2*u*
AK: Fairbanks	0.08	0.40	0.05	0.24	11.0	2.7	0.37	0.66	9.7	2.5
AL: Montgomery/408	0.0	1.2	-0.17	0.42	9.6	2.1	0.51	0.51	11.6	2.4
AL: Montgomery/411	-0.08	0.46	0.08	0.34	8.7	1.9	0.37	0.40	8.7	1.9
AR: Little Rock	0.6	1.3	0.41	0.72	21.8	4.6	1.1	1.1	24.0	4.9
AZ: Phoenix	-1.1	3.3	-0.2	1.8	91	19	3.0	3.5	65	15
CA: Berkeley	1.1	1.2	0.43	0.59	10.8	2.9	1.2	1.1	7.7	2.4
CA: Los Angeles	1.3	1.6	0.00	0.42	28.1	5.8	1.6	1.3	25.1	5.3
CO: Denver	0.9	1.2	0.30	0.65	30.2	6.0	1.8	1.4	32.3	6.3
CT: Hartford	0.43	0.93	0.09	0.42	8.0	2.0	0.26	0.46	6.4	1.8
DE: Wilmington	0.8	1.2	0.61	0.76	13.7	3.7	1.3	1.3	16.3	4.0
FL: Jacksonville	0.1	1.2	0.18	0.52	20.5	4.4	2.1	1.6	19.2	4.3
FL: Miami	-0.22	0.56	0.13	0.35	11.7	2.7	1.04	0.83	10.1	2.5
HI: Honolulu	0.60	0.87	0.14	0.39	3.9	1.5	0.26	0.66	4.7	1.7
IA: Iowa City	2.3	3.2	0.0	1.2	21.2	4.7	1.0	1.1	19.1	4.4
ID: Boise	-0.1	1.5	0.00	0.47	34.2	7.3	1.1	1.5	33.7	7.2
ID: Idaho Falls	0.7	1.6	0.31	0.66	20.8	4.8	1.8	1.5	18.4	4.5
IL: Chicago	0.5	2.2	0.5	2.2	67	15	4.1	4.1	71	15
IN: Indianapolis	0.5	1.0	0.08	0.72	22.1	4.8	1.1	1.2	20.7	4.5
ME: Augusta	-0.1	1.5	0.13	0.60	23.5	5.1	1.9	1.8	18.1	4.4
MI: Lansing	0.1	1.2	-0.09	0.59	22.8	5.4	0.7	1.1	25.0	5.7
MN: Minneapolis	1.3	1.4	0.42	0.65	18.5	3.8	1.25	0.96	19.2	3.9
MN: Welch/510	0.00	0.92	-0.20	0.68	12.9	4.4	1.8	2.0	21.4	5.8
MS: Jackson	0.59	0.89	0.10	0.44	8.3	2.3	0.80	0.84	7.7	2.2
NC: Charlotte	-0.1	1.4	-0.15	0.51	16.1	4.1	0.9	1.3	18.7	4.5
NC: Wilmington	-0.48	0.55	-0.03	0.20	9.2	2.1	0.72	0.75	9.1	2.1
ND: Bismarck	1.8	1.9	0.42	0.91	27.2	6.3	1.9	1.7	23.9	5.8
NH: Concord	0.22	0.94	-0.09	0.31	9.4	1.9	0.71	0.62	10.1	2.0
NJ: Trenton	0.53	0.80	0.09	0.39	16.1	3.2	0.79	0.79	14.0	2.9
NV: Las Vegas/906	-1.3	5.1	1.3	3.3	73	14	4.6	3.1	57	12
NY: Albany	0.3	1.2	-0.08	0.50	26.1	5.4	0.8	1.5	18.2	4.4
NY: New York City	0.4	1.0	0.00	0.37	12.2	3.2	1.0	1.1	13.7	3.4
NY: Yaphank	1.1	2.7	1.0	1.6	7.5	2.3	0.68	0.84	10.3	2.7
OH: Painesville	-0.22	0.75	-0.07	0.72	15.4	3.1	0.60	0.60	13.7	2.9
OH: Ross	1.3	3.2	-0.1	1.3	21.6	5.2	0.6	1.3	31.3	6.6
OR: Portland	0.54	0.60	0.06	0.25	5.8	1.7	0.38	0.52	6.1	1.8
PA: Harrisburg	-0.5	1.1	0.37	0.65	10.1	2.5	0.60	0.69	10.1	2.5
PA: Pittsburgh	0.8	1.0	-0.05	0.33	20.2	3.9	1.3	1.2	18.1	3.7
SC: Barnwell	0.17	0.35	0.28	0.39	14.4	2.6	1.02	0.58	11.9	2.2

Note: NA = No Analysis

Table 9 (continued)

Plutonium and Uranium in Airborne Particulates
January - December 2002 Composites

Location	^{238}Pu aCi/m³	± 2*u*	$^{239-240}$Pu aCi/m³	± 2*u*	^{234}U aCi/m³	± 2*u*	^{235}U aCi/m³	± 2*u*	^{238}U aCi/m³	± 2*u*
SC: Columbia	0.8	1.1	0.17	0.48	29.5	4.9	3.4	1.7	32.3	5.1
SD: Pierre	0.4	1.3	-0.24	0.82	35.0	7.1	4.5	2.5	35.8	7.2
TN: Knoxville	0.2	1.6	0.8	1.2	20.9	4.3	1.5	1.2	19.9	4.1
TN: Nashville	-0.7	1.1	0.11	0.50	11.5	3.2	0.80	0.91	12.0	3.2
TN: Oak Ridge/Bethel	0.3	1.1	0.17	0.98	14.5	2.8	2.7	1.1	12.5	2.5
TN: Oak Ridge/K25	0.08	0.34	-0.04	0.25	24.6	4.2	1.61	0.84	44.2	6.7
TN: Oak Ridge/Melton	0.6	1.0	0.08	0.48	7.7	1.7	0.40	0.39	8.4	1.7
TN: Oak Ridge/Y12 E	0.00	0.84	0.36	0.98	49.6	8.1	4.6	2.0	25.1	5.0
TN: Oak Ridge/Y12 W	-0.15	0.87	0.15	0.65	72	10	6.7	1.9	66.8	9.4
TX: Austin	0.0	1.8	0.09	0.87	12.9	3.6	1.1	1.1	10.7	3.2
TX: El Paso	1.0	5.0	0.7	2.2	103	23	-0.7	2.3	99	22
UT: Salt Lake City	1.5	1.5	0.35	0.74	27.0	5.6	1.0	1.2	24.4	5.3
UT: Salt Lake City	0.0	2.9	0.00	0.84	27.0	5.6	1.0	1.2	24.4	5.3
VA: Lynchburg	0.69	0.88	-0.05	0.31	57.8	6.8	3.9	1.5	11.2	2.4
WA: Olympia	0.3	1.9	-0.25	0.60	3.9	1.3	0.43	0.49	4.1	1.3
WA: Spokane	0.5	1.1	0.15	0.42	12.2	3.1	0.9	1.0	12.3	3.1

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 2002

Location	Date Collected	^{3}H pCi/L	± 2*u*
AK: Fairbanks	10/22/02	47	79
AL: Dothan	10/08/02	-35	75
AL: Montgomery	10/07/02	5	78
AL: Muscle Shoals	10/02/02	108	82
AL: Scottsboro	10/03/02	102	82
AR: Little Rock	10/22/02	-42	75
CA: Berkeley	11/04/02	40	77
CA: Los Angeles	10/23/02	16	77
CT: Hartford	10/07/02	-62	75
DE: Dover	10/10/02	-44	75
FL: Miami	10/14/02	-57	74
FL: Tampa	12/10/02	24	73
GA: Baxley	10/10/02	15	78
HI: Honolulu	11/07/02	-33	74
ID: Boise	10/23/02	-26	76
ID: Idaho Falls	10/10/02	73	80
IL: W. Chicago	10/23/02	-42	75
KS: Topeka	10/08/02	-40	76
MA: Lawrence	11/26/02	54	78
MD: Baltimore	10/07/02	8	78
MD: Conowingo	11/04/02	49	78
ME: Augusta	10/09/02	-23	76
MI: Detroit	10/16/02	138	82
MI: Grand Rapids	10/10/02	-6	77
MN: Minneapolis	11/04/02	15	77
MN: Red Wing	10/28/02	-37	74
MO: Jefferson City	10/04/02	0	78
MS: Jackson	10/09/02	-47	75
MS: Port Gibson - 10/8/2002 0700	10/08/02	-29	76
MT: Helena	10/17/02	46	79
NC: Charlotte	12/03/02	510	94
NC: Wilmington	12/16/02	84	75
ND: Bismarck	10/07/02	50	79
NE: Lincoln	10/08/02	-68	74
NH: Concord	10/08/02	10	78
NM: Santa Fe	12/10/02	18	72
NV: Las Vegas	12/19/02	87	76
NY: Albany	10/08/02	-37	76
NY: New York City	10/29/02	5	77
NY: Niagara Falls	10/17/02	56	78

Table 10 (continued)

Tritium in Drinking Water
October - December 2002

Location	Date Collected	^{3}H pCi/L	± 2*u*
NY: Syracuse	12/06/02	58	75
OH: Cincinnati	12/11/02	33	74
OH: E. Liverpool	12/04/02	25	76
OH: Painesville	10/10/02	67	80
OH: Toledo	10/08/02	11	78
OK: Oklahoma City	10/22/02	-10	76
OR: Portland	10/07/02	-78	75
PA: Columbia	11/01/02	-65	74
PA: Harrisburg	11/01/02	49	79
PA: Philadelphia/Baxter	12/09/02	73	75
PA: Philadelphia/Belmont	12/09/02	33	74
PA: Philadelphia/Queen	12/09/02	31	73
PA: Pittsburgh	12/04/02	-11	74
RI: Providence	10/17/02	18	78
SC: Barnwell	10/14/02	-27	75
SC: Columbia	10/15/02	45	79
SC: Jenkinsville	10/17/02	37	78
SC: Seneca	10/15/02	-31	76
TN: Chattanooga	10/04/02	73	79
TN: Knoxville	10/03/02	16	79
TN: Oak Ridge - Knox Co. #371	12/02/02	-19	74
TN: Oak Ridge - Anderson Co. #768	12/02/02	46	77
TN: Oak Ridge - Roane Co. #360	12/06/02	19	75
TN: Oak Ridge - Roane Co. #4442	12/09/02	255	84
TN: Oak Ridge - Anderson Co. #772	12/09/02	7	73
TX: Austin	10/21/02	0	77
VA: Ashland	10/08/02	1660	130
VA: Lynchburg	10/15/02	-37	75
WA: Richland	10/12/02	24	78
WA: Seattle	10/07/02	-87	74

Table 11

Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples
January - December 2002

Location	^{238}Pu pCi/L ± 2*u*		$^{239-240}$Pu pCi/L ± 2*u*		^{234}U pCi/L ± 2*u*		^{235}U pCi/L ± 2*u*		^{238}U pCi/L ± 2*u*	
GA: Baxley	0.020	0.037	0.002	0.018	0.110	0.053	0.018	0.032	0.102	0.049
ID: Idaho Falls	0.003	0.034	0.005	0.014	0.74	0.15	0.033	0.043	0.37	0.10
IL: Morris	0.020	0.033	-0.0022	0.0076	0.52	0.11	0.016	0.028	0.055	0.036
IL: W. Chicago	-0.005	0.034	-0.002	0.011	1.07	0.20	0.015	0.032	0.094	0.056
MN: Red Wing	0.023	0.043	-0.005	0.013	0.304	0.086	0.021	0.029	0.055	0.037
MS: Port Gibson	-0.034	0.031	-0.001	0.017	0.143	0.054	0.004	0.016	0.066	0.037
NE: Lincoln	0.034	0.038	0.003	0.012	4.03	0.47	0.160	0.077	2.38	0.32
NM: Santa Fe	-0.001	0.027	-0.003	0.010	10.5	1.0	0.37	0.13	5.64	0.63
SC: Jenkinsville	0.032	0.046	0.023	0.025	0.87	0.15	0.035	0.037	0.43	0.10

Note: NA = No Analysis

Table 12

Iodine-131 in Drinking Water
January - December 2002

Location	Date Collected	^{131}I pCi/L ± 2*u*	
AK: Fairbanks	10/22/02	0.03	0.97
AL: Dothan	10/08/02	-0.10	0.22
AL: Montgomery	01/07/02	-0.03	0.10
AL: Muscle Shoals	07/18/02	0.13	0.24
AL: Scottsboro	07/19/02	0.03	0.20
AR: Little Rock	04/10/02	0.19	0.17
CA: Berkeley	11/04/02	0.06	0.42
CA: Los Angeles	01/10/02	0.06	0.22
CT: Hartford	04/03/02	0.10	0.17
DE: Dover	01/11/02	0.04	0.17
FL: Miami	07/13/02	0.01	0.17
FL: Tampa	06/13/02	0.13	0.15
GA: Baxley	07/24/02	0.15	0.18
GA: Savannah	03/05/02	-0.10	0.17
HI: Honolulu	11/07/02	0.5	1.0
IA: Cedar Rapids	07/05/02	-0.01	0.14
ID: Boise	04/08/02	0.13	0.27
ID: Idaho Falls	10/10/02	0.03	0.17
IL: Morris	03/15/02	0.12	0.23
IL: W. Chicago	06/14/02	0.12	0.16
KS: Topeka	04/05/02	0.17	0.26
LA: New Orleans	03/19/02	0.16	0.15
MA: Lawrence	07/24/02	0.45	0.16
MD: Baltimore	01/07/02	0.08	0.20
MD: Conowingo	11/04/02	-0.20	0.32
ME: Augusta	01/07/02	0.05	0.15
MI: Detroit	10/16/02	0.02	0.15
MI: Grand Rapids	04/09/02	-0.04	0.18
MN: Minneapolis	11/04/02	0.05	0.16
MN: Red Wing	10/28/02	-0.21	0.65
MO: Jefferson City	07/03/02	0.08	0.17
MS: Jackson	04/09/02	0.00	0.18
MS: Port Gibson	04/09/02	0.00	0.17
MT: Helena	10/17/02	0.05	0.15
NC: Charlotte	03/21/02	0.43	0.19
NC: Charlotte	05/06/02	0.06	0.19
NC: Wilmington	12/16/02	0.20	0.54
ND: Bismarck	01/14/02	0.11	0.12
NE: Lincoln	04/04/02	0.18	0.15
NH: Concord	04/03/02	0.05	0.16
NJ: Trenton	03/06/02	0.35	0.19

Table 12 (continued)

Iodine-131 in Drinking Water
January - December 2002

Location	Date Collected	^{131}I pCi/L	± 2*u*
NJ: Waretown	03/06/02	0.16	0.24
NM: Santa Fe	08/29/02	0.04	0.19
NV: Las Vegas	12/19/02	0.23	0.50
NY: Albany	04/03/02	0.02	0.15
NY: New York City	07/16/02	0.05	0.19
NY: Niagara Falls	10/17/02	0.09	0.97
NY: Syracuse	12/06/02	1.0	1.6
OH: Cincinnati	05/01/02	0.03	0.16
OH: E. Liverpool	02/27/02	0.28	0.17
OH: Painesville	01/09/02	0.21	0.28
OH: Painesville	04/11/02	0.12	0.14
OH: Toledo	10/08/02	-0.05	0.20
OK: Oklahoma City	01/10/02	0.07	0.18
OR: Portland	10/07/02	0.32	0.26
PA: Columbia	05/10/02	0.10	0.23
PA: Harrisburg	05/10/02	0.05	0.30
PA: Philadelphia/Baxter	12/09/02	1.25	0.21
PA: Philadelphia/Baxter	12/09/02	1.18	0.20
PA: Philadelphia/Belmont	12/09/02	1.16	0.32
PA: Philadelphia/Belmont	12/09/02	1.67	0.23
PA: Philadelphia/Queen	05/01/02	1.28	0.17
PA: Pittsburgh	02/27/02	0.52	0.12
RI: Providence	10/17/02	-0.04	0.14
SC: Barnwell	07/04/02	0.10	0.15
SC: Columbia	04/03/02	0.01	0.16
SC: Jenkinsville	07/19/02	0.09	0.29
SC: Jenkinsville	10/17/02	0.02	0.13
SC: Seneca	10/15/02	-0.10	0.17
TN: Chattanooga	01/08/02	0.05	0.14
TN: Knoxville	01/07/02	-0.16	0.19
TN: Oak Ridge - Roane Co. #4442	06/04/02	0.05	0.15
TN: Oak Ridge - Knox Co. #371	08/12/02	0.05	0.17
TN: Oak Ridge - Anderson Co. #786	08/12/02	-0.16	0.18
TN: Oak Ridge - Roane Co. #360	08/23/02	-0.05	0.17
TN: Oak Ridge - Anderson Co. #768	12/02/02	-0.05	0.21
TN: Oak Ridge - Anderson Co. #768	12/02/02	0.27	0.20
TN: Oak Ridge - Knox Co.#371	12/02/02	0.15	0.17
TN: Oak Ridge - Knox Co.#371	12/02/02	0.01	0.19
TN: Oak Ridge - Anderson Co. #772	12/09/02	-0.16	0.32
TX: Austin	04/23/02	0.11	0.17
VA: Ashland	04/10/02	0.06	0.15

Table 12 (continued)

Iodine-131 in Drinking Water
January - December 2002

Location	Date Collected	^{131}I pCi/L	± 2*u*
VA: Lynchburg	10/15/02	-0.06	0.16
WA: Richland	10/12/02	0.04	0.22
WA: Seattle	10/07/02	0.22	0.27

Table 13

Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 2002 Composites

Location	Total Solids (mg/L)	Gross Beta pCi/L ± 2*u*		Gross Alpha pCi/L ± 2*u*		^{90}Sr pCi/L ± 2*u*	
AK: Fairbanks	79.3	3.43	0.98	0.0	1.6		
AL: Dothan	77.5	2.11	0.85	-0.2	1.8	-0.35	0.30
AL: Montgomery	31.8	1.40	0.61	0.50	0.91	0.12	0.26
AL: Muscle Shoals	39.5	1.82	0.78	0.1	1.2	0.17	0.32
AL: Scottsboro	43.8	2.18	0.67	0.4	1.1		
AR: Little Rock	15.0	0.70	0.54	-0.03	0.60		
CA: Berkeley	29.7	0.51	0.71	0.22	0.87		
CA: Los Angeles	42.1	3.7	3.6	1.4	5.7		
CT: Hartford	22.0	0.67	0.54	0.26	0.74		
DE: Dover	101.6	5.0	1.4	-0.3	3.0	0.20	0.23
FL: Miami	52.0	3.20	0.91	0.5	1.6		
FL: Tampa	108.3	2.4	1.2	-0.2	3.0		
GA: Baxley	68.4	5.53	0.95	6.4	2.2		
GA: Savannah	72.0	1.60	0.68	0.1	1.4		
HI: Honolulu	82.7	1.7	1.1	0.0	2.1		
IA: Cedar Rapids	64.4	2.38	0.73	0.6	1.4		
ID: Boise	32.2	0.37	0.69	-0.08	0.90		
ID: Idaho Falls	63.0	1.5	1.3	2.0	2.7		
IL: Morris	64.9	10.2	2.7	12.5	6.2		
IL: W. Chicago	91.1	13.1	2.2	22.7	6.3		
KS: Topeka	88.1	7.3	1.7	0.2	3.3		
LA: New Orleans	62.3	2.85	0.90	0.3	1.6		
MA: Lawrence	85.1	2.25	0.75	1.1	1.8		
MD: Baltimore	72.2	2.25	0.72	0.0	1.4	0.08	0.32
MD: Conowingo	71.7	2.56	0.89	0.4	1.8	0.07	0.27
ME: Augusta	44.6	1.99	0.66	0.0	1.0		
MI: Detroit	43.3	1.96	0.68	0.4	1.1		
MI: Grand Rapids	61.0	2.22	0.71	0.0	1.2		
MN: Minneapolis	46.4	3.13	0.76	0.2	1.1		
MN: Red Wing	76.6	15.1	2.0	26.3	5.4		
MO: Jefferson City	98.5	6.1	1.5	1.8	3.1		
MS: Jackson	50.0	3.33	0.75	0.0	1.1		
MS: Port Gibson	107.2	7.0	1.8	2.1	4.1		
MT: Helena	64.3	3.14	0.93	1.1	1.6		
NC: Charlotte	28.0	2.03	0.64	0.56	0.85		
NC: Wilmington	101.4	4.21	0.90	0.4	1.8		
ND: Bismarck	98.4	3.6	1.6	0.5	3.2		

Table 13 (continued)

Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 2002 Composites

Location	Total Solids (mg/L)	Gross Beta pCi/L ± 2*u*		Gross Alpha pCi/L ± 2*u*		^{90}Sr pCi/L ± 2*u*	
NE: Lincoln							
NH: Concord	67.0	11.9	1.9	6.3	3.7		
NJ: Trenton	68.6	2.00	0.69	0.2	1.4		
NJ: Waretown	50.5	1.08	0.60	0.4	1.2	-0.10	0.30
NM: Santa Fe	30.4	2.52	0.69	0.94	0.96	0.10	0.31
NV: Las Vegas	111.1	11.2	1.9	12.1	4.9		
NY: Albany	77.8	4.2	2.8	1.4	5.6		
NY: New York City	54.3	1.14	0.61	0.3	1.2	0.28	0.32
NY: Niagara Falls	39.4	1.44	0.61	0.6	1.0	0.08	0.22
NY: Syracuse	55.7	1.71	0.66	0.4	1.3	0.43	0.27
OH: Cincinnati	51.6	1.71	0.66	0.9	1.3	0.14	0.26
OH: Columbus	82.2	2.95	0.96	0.1	1.9		
OH: E. Liverpool	132.4	4.4	1.2	1.6	2.9		
OH: Painesville	71.3	2.74	0.91	0.3	1.8		
OH: Toledo	51.9	2.04	0.83	0.4	1.5		
OK: Oklahoma City	54.0	1.59	0.66	0.0	1.1		
OR: Portland	31.7	2.29	0.67	0.08	0.80		
PA: Columbia	10.3	-0.13	0.62	0.05	0.64		
PA: Harrisburg	76.8	2.32	0.73	0.2	1.5	0.25	0.25
PA: Philadelphia/Baxter	12.3	-0.12	0.57	-0.22	0.70	0.16	0.25
PA: Philadelphia/Belmont	78.6	3.5	1.2	0.0	2.4	0.15	0.21
PA: Philadelphia/Queen	68.2	2.8	1.1	0.4	2.3	-0.1	1.1
PA: Pittsburgh	87.4	4.3	1.3	1.1	2.9	0.20	0.23
RI: Providence	91.9	2.84	0.96	0.0	2.1	0.13	0.23
SC: Barnwell	39.7	2.82	0.73	1.2	1.2		
SC: Columbia	14.8	1.37	0.57	0.49	0.68		
SC: Jenkinsville	48.6	2.64	0.73	0.3	1.2		
SC: Seneca	31.6	3.55	0.88	2.2	1.4		
TN: Chattanooga	18.9	0.79	0.53	0.02	0.65		
TN: Knoxville	38.9	1.71	0.64	-0.01	0.96		
TN: Oak Ridge - Anderson Co.	61.3	2.15	0.69	0.0	1.2		
#768	57.7	1.31	0.81	0.1	1.4	-0.06	0.37
TN: Oak Ridge - Anderson Co.	56.4	1.31	0.82	0.3	1.3	0.24	0.38
#772	58.9	3.77	0.92	-0.1	1.4	0.68	0.32
TN: Oak Ridge - Roane Co. #4442	47.4	0.89	0.76	0.0	1.2	0.07	0.23
TN: Oak Ridge - Roane Co. #360	59.1	1.69	0.84	0.1	1.4	0.16	0.31
TN: Oak Ridge - Knox #371	39.5	3.67	0.92	0.3	1.2		
TX: Austin	71.1	4.7	1.0	1.3	1.9	0.07	0.29
VA: Ashland							

Table 13 (continued)

Drinking Water
Alpha, Beta, and Sr-90 Concentrations
January - December 2002 Composites

Location	Total Solids (mg/L)	Gross Beta pCi/L ± 2*u*		Gross Alpha pCi/L ± 2*u*		^{90}Sr pCi/L ± 2*u*	
VA: Lynchburg	52.7	1.46	0.65	0.5	1.3	0.13	0.31
WA: Richland	28.2	0.45	0.71	0.29	0.86		
WA: Seattle	1.2	0.02	0.59	-0.14	0.54		

Table 14

Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 2002 Composites

Location	^{226}Ra		^{228}Ra		Gamma-Emitting Radionuclides		
	pCi/L	± 2*u*	pCi/L	± 2*u*	Nuclide	pCi/L	± 2*u*
AK: Fairbanks	NA		NA			ND	
AL: Dothan	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	
CT: Hartford	NA		NA			ND	
DE: Dover	NA		NA			ND	
FL: Miami	NA		NA		K40	11	13
FL: Tampa	NA		NA			ND	
GA: Baxley	2.15	0.25	1.17	0.60		ND	
GA: Savannah	NA		NA			ND	
HI: Honolulu	NA		NA			ND	
IA: Cedar Rapids	NA		NA			ND	
ID: Boise	NA		NA			ND	
ID: Idaho Falls	0.072	0.016	NA			ND	
IL: Morris	2.47	0.28	2.35	0.66		ND	
IL: W. Chicago	4.69	0.52	2.99	0.73		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		Pb212	2.2	2.4
ME: Augusta	NA		NA			ND	
MI: Detroit	NA		NA			ND	
MI: Grand Rapids	NA		NA		K40	11	13
MN: Minneapolis	NA		NA			ND	
MN: Red Wing	3.34	0.37	4.92	0.90		ND	
MO: Jefferson City	NA		NA			ND	
MS: Jackson	NA		NA			ND	
MS: Port Gibson	0.450	0.061	NA			ND	
MT: Helena	NA		NA			ND	
NC: Charlotte	NA		NA			ND	
NC: Wilmington	NA		NA			ND	

Note: ND = Not Detected
NA = No Analysis

Table 14 (continued)

Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 2002 Composites

Location	^{226}Ra		^{228}Ra		Gamma-Emitting Radionuclides		
	pCi/L	± 2*u*	pCi/L	± 2*u*	Nuclide	pCi/L	± 2*u*
ND: Bismarck							
NE: Lincoln	NA		NA			ND	
NH: Concord	0.227	0.035	NA			ND	
NJ: Trenton	NA		NA			ND	
NJ: Waretown	NA		NA			ND	
NM: Santa Fe	NA		NA			ND	
NV: Las Vegas	0.202	0.032	NA			ND	
NY: Albany	NA		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		K40	12	11
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		Tl208	1.7	2.0
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		K40	13	13
SC: Barnwell	NA		NA		Pb212	1.2	1.2
SC: Columbia	NA		NA			ND	
SC: Jenkinsville	NA		NA			ND	
SC: Seneca	0.354	0.048	NA			ND	
TN: Chattanooga	NA		NA			ND	
TN: Knoxville	NA		NA			ND	
TN: Oak Ridge - Anderson Co.	NA		NA			ND	
#768	NA		NA			ND	
TN: Oak Ridge - Anderson Co.	NA		NA			ND	
#772	NA		NA			ND	
TN: Oak Ridge - Roane Co. #4442	NA		NA			ND	
TN: Oak Ridge - Roane Co. #360	NA		NA			ND	
TN: Oak Ridge - Knox Co. #371							

Note: ND = Not Detected
NA = No Analysis

Table 14 (continued)

Drinking Water
Radium and Gamma-Emitting Radionuclides
January - December 2002 Composites

Location	^{226}Ra	^{228}Ra	Gamma-Emitting Radionuclides	
	pCi/L ± 2*u*	pCi/L ± 2*u*	Nuclide	pCi/L ± 2*u*
TX: Austin	NA	NA		ND
VA: Ashland	NA	NA	K40	13 13
			Pb212	1.9 2.5
			Tl208	1.5 1.8
VA: Lynchburg	NA	NA		ND
WA: Richland	NA	NA		ND
WA: Seattle	NA	NA		ND

Note: ND = Not Detected
NA = No Analysis

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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 2002

Location	Date Collected	K g/L ± 2*u*		^{137}Cs pCi/L ± 2*u*	^{140}Ba pCi/L ± 2*u*	^{131}I pCi/L ± 2*u*
AL: Montgomery	10/03/02	1.39	0.11	ND	ND	ND
AR: Little Rock	11/19/02	1.58	0.12	ND	ND	ND
CA: Los Angeles	10/08/02	1.58	0.12	ND	ND	ND
CA: Sacramento	12/17/02	1.55	0.12	ND	ND	ND
CA: San Francisco	10/07/02	1.35	0.11	ND	ND	ND
DE: Dover	10/29/02	1.54	0.12	ND	ND	ND
FL: Tampa	10/08/02	1.56	0.12	ND	ND	ND
HI: Honolulu	10/17/02	1.50	0.12	ND	ND	ND
IA: Des Moines	10/07/02	1.47	0.13	ND	ND	ND
IL: Chicago	10/16/02	1.47	0.12	ND	ND	ND
IN: Indianapolis	10/08/02	1.60	0.12	ND	ND	ND
KS: Wichita	10/14/02	1.38	0.16	ND	ND	ND
KY: Louisville	10/09/02	1.61	0.12	ND	ND	ND
MA: Boston	12/23/02	1.51	0.13	ND	ND	ND
MD: Baltimore	10/04/02	1.63	0.17	ND	ND	ND
ME: Portland	10/30/02	1.56	0.13	ND	ND	ND
MI: Grand Rapids	10/09/02	1.61	0.11	ND	ND	ND
MO: Jefferson City	10/07/02	1.60	0.13	ND	ND	ND
NJ: Trenton	10/18/02	1.55	0.15	ND	ND	ND
NM: Albuquerque	10/03/02	1.50	0.15	ND	ND	ND
NV: Las Vegas	11/12/02	1.64	0.11	ND	ND	ND
NY: Buffalo	10/07/02	1.57	0.12	ND	ND	ND
OH: Cincinnati	11/12/02	1.43	0.11	ND	ND	ND
OH: Cleveland	10/29/02	1.55	0.12	ND	ND	ND
OR: Portland	10/14/02	1.45	0.15	ND	ND	ND
PA: Philadelphia	10/17/02	1.57	0.12	ND	ND	ND
PA: Pittsburgh	10/07/02	1.42	0.11	ND	ND	ND
TN: Chattanooga	12/10/02	1.54	0.12	ND	ND	ND
TN: Knoxville	10/30/02	1.58	0.12	ND	ND	ND
TN: Memphis	10/21/02	1.51	0.12	ND	ND	ND
TX: Ft. Worth	10/15/02	1.56	0.12	ND	ND	ND
TX: San Antonio	10/07/02	1.35	0.16	ND	ND	ND
VA: Norfolk	10/30/02	1.66	0.13	ND	ND	ND
VT: Montpelier	12/19/02	1.43	0.11	ND	ND	ND
WA: Spokane	10/14/02	1.58	0.13	ND	ND	ND
WA: Tacoma	12/17/02	1.45	0.12	ND	ND	ND
WV: Charleston	10/07/02	1.60	0.17	ND	ND	ND

Note: ND = Not Detected

For More Information

Environmental Radiation Data (ERD) is published quarterly by the U.S. Environmental Protection Agency's Office of Radiation and Indoor Air.

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