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ENVIRONMENTAL RADIATION DATA

REPORT 113

January - March 2003

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 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 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
January 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m³)			(pCi/m³)		
AL: Montgomery/408	9	0.2	0.0	0.1	0.023	0.007	0.015
AL: Montgomery/411	9	0.1	0.0	0.1	0.023	0.010	0.018
AR: Little Rock	7	0.1	0.0	0.0	0.027	0.010	0.021
AZ: Phoenix	4	2.0	0.2	0.8	0.044	0.018	0.029
CA: Berkeley	8	0.2	0.0	0.1	0.024	0.004	0.011
CA: Los Angeles	9	0.5	0.1	0.3	0.024	0.004	0.017
CO: Denver	8	1.6	0.3	0.8	0.030	0.007	0.014
CT: Hartford	9	0.1	0.0	0.0	0.014	0.005	0.010
DE: Wilmington	4	0.1	0.0	0.1	0.019	0.006	0.011
FL: Jacksonville	9	0.1	0.0	0.1	0.017	0.009	0.012
FL: Miami	4	0.1	0.0	0.0	0.011	0.005	0.008
HI: Honolulu	9	0.2	0.0	0.1	0.006	0.002	0.004
IA: Iowa City	9	0.6	0.0	0.3	0.032	0.012	0.019
ID: Boise	2	0.2	0.0	0.1	0.026	0.015	0.021
ID: Idaho Falls	9				0.030	0.006	0.016
IL: Chicago	5	0.3	0.1	0.2	0.028	0.010	0.021
IN: Indianapolis	9	0.4	0.1	0.2	0.019	0.009	0.013
ME: Augusta	7	0.1	0.0	0.0	0.018	0.009	0.013
MI: Lansing	9	0.2	0.1	0.1	0.020	0.009	0.015
MN: Minneapolis	4	0.3	0.1	0.2	0.021	0.013	0.018
MN: Welch/510	5	2.1	0.6	1.4	0.026	0.010	0.019
MS: Jackson	9	0.2	0.1	0.1	0.028	0.012	0.019
NC: Charlotte	9	0.1	0.0	0.0	0.021	0.010	0.013
NC: Wilmington	4				0.018	0.011	0.015
ND: Bismarck	7	0.4	0.1	0.2	0.029	0.006	0.019
NH: Concord	9	0.1	0.0	0.1	0.015	0.006	0.010
NJ: Trenton	7	0.3	0.1	0.1	0.017	0.009	0.013
NV: Las Vegas/906	9	0.6	0.1	0.3	0.031	0.007	0.018
NV: Las Vegas/913	3				0.021	0.015	0.019
NY: Albany	4	0.0	0.0	0.0	0.017	0.009	0.013
NY: New York City	8	0.1	0.0	0.0	0.016	0.006	0.011
NY: Yaphank	9	0.1	0.0	0.0	0.005	0.001	0.002
OH: Painesville	8	0.1	0.0	0.1	0.020	0.008	0.013
OH: Ross	9				0.021	0.009	0.015
OR: Portland	9	0.1	0.0	0.1	0.014	0.002	0.007
PA: Harrisburg	7	0.2	0.0	0.1	0.016	0.008	0.012
PA: Pittsburgh	9				0.021	0.010	0.015
SC: Barnwell	1	0.0	0.0	0.0	0.006	0.006	0.006

Table 2 (continued)

Gross Beta in Airborne Particulates
January 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m³)			(pCi/m³)		
SC: Columbia	4	0.1	0.0	0.1	0.018	0.010	0.014
SD: Pierre	7	1.6	0.1	0.4	0.024	0.011	0.019
TN: Knoxville	8	0.4	0.0	0.2	0.025	0.014	0.018
TN: Nashville	8	0.3	0.0	0.1	0.020	0.013	0.016
TN: Oak Ridge/Bethel	8	0.4	0.0	0.2	0.018	0.010	0.013
TN: Oak Ridge/K25	8	0.4	0.1	0.2	0.014	0.010	0.012
TN: Oak Ridge/Melton	8	0.3	0.0	0.2	0.015	0.010	0.012
TN: Oak Ridge/Y12 E	8	0.3	0.1	0.2	0.015	0.011	0.013
TN: Oak Ridge/Y12 W	8	0.3	0.0	0.2	0.018	0.013	0.015
TX: Austin	9	0.3	0.0	0.2	0.037	0.010	0.021
TX: El Paso	9	1.7	0.8	1.2	0.030	0.012	0.023
UT: Salt Lake City	8	0.6	0.0	0.3	0.026	0.005	0.017
VA: Lynchburg	9	0.2	0.1	0.1	0.015	0.007	0.011
WA: Olympia	9	0.3	0.0	0.1	0.014	0.002	0.005
WA: Spokane	9	0.1	0.1	0.1	0.018	0.003	0.010

Table 3

Gross Beta in Airborne Particulates
February 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m³)			(pCi/m³)		
AK: Fairbanks	1	0.0	0.0	0.0	0.014	0.014	0.014
AL: Montgomery/408	8	0.1	0.0	0.0	0.016	0.008	0.012
AL: Montgomery/411	7	0.1	0.0	0.0	0.020	0.011	0.015
AR: Little Rock	6	0.1	0.0	0.0	0.021	0.011	0.016
AZ: Phoenix	4	0.5	0.4	0.5	0.023	0.013	0.018
CA: Berkeley	8	0.2	0.0	0.1	0.015	0.004	0.008
CA: Los Angeles	8	0.4	0.0	0.2	0.014	0.005	0.009
CO: Denver	7	1.0	0.0	0.5	0.023	0.010	0.014
CT: Hartford	8	0.0	0.0	0.0	0.020	0.006	0.010
DE: Wilmington	7	0.1	0.0	0.0	0.016	0.007	0.013
FL: Jacksonville	8	0.1	0.0	0.1	0.013	0.004	0.008
FL: Miami	3	0.0	0.0	0.0	0.009	0.004	0.007
HI: Honolulu	6	0.3	0.0	0.1	0.006	0.002	0.004
IA: Iowa City	8	0.4	0.0	0.2	0.027	0.010	0.019
ID: Idaho Falls	8				0.017	0.003	0.010
IL: Chicago	3	0.1	0.0	0.0	0.024	0.016	0.021
IN: Indianapolis	8	0.2	0.0	0.1	0.016	0.009	0.013
ME: Augusta	5	0.1	0.0	0.0	0.019	0.012	0.015
MI: Lansing	5	0.1	0.0	0.0	0.019	0.014	0.016
MN: Minneapolis	3	0.2	0.1	0.1	0.023	0.012	0.016
MS: Jackson	8	0.1	0.0	0.1	0.021	0.010	0.014
NC: Charlotte	8	0.0	0.0	0.0	0.013	0.006	0.010
NC: Wilmington	3				0.013	0.006	0.010
ND: Bismarck	5	0.2	0.0	0.1	0.023	0.011	0.020
NH: Concord	7	0.1	0.0	0.0	0.012	0.006	0.010
NJ: Trenton	7	0.2	0.0	0.1	0.021	0.009	0.014
NV: Las Vegas/906	7	0.3	0.1	0.1	0.021	0.007	0.013
NV: Las Vegas/913	4				0.018	0.008	0.012
NY: Albany	4	0.0	0.0	0.0	0.020	0.008	0.013
NY: New York City	6	0.1	0.0	0.0	0.018	0.009	0.013
NY: Yaphank	8	0.0	0.0	0.0	0.003	0.001	0.002
OH: Painesville	7	0.1	0.1	0.1	0.020	0.009	0.013
OH: Ross	8				0.020	0.008	0.014
OR: Portland	8	0.1	0.0	0.1	0.015	0.002	0.007
PA: Harrisburg	8	0.1	0.0	0.1	0.019	0.010	0.013
PA: Pittsburgh	8				0.019	0.007	0.014
SC: Columbia	3	0.1	0.0	0.0	0.011	0.008	0.010
SD: Pierre	7	0.4	0.1	0.2	0.019	0.011	0.013

Table 3 (continued)

Gross Beta in Airborne Particulates
February 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m³)			(pCi/m³)		
TN: Knoxville	8	0.6	0.1	0.3	0.020	0.006	0.015
TN: Nashville	8	0.2	0.0	0.1	0.023	0.010	0.016
TN: Oak Ridge/Bethel	7	0.3	0.1	0.1	0.015	0.009	0.013
TN: Oak Ridge/K25	7	0.2	0.1	0.2	0.015	0.010	0.012
TN: Oak Ridge/Melton	7	0.1	0.1	0.1	0.016	0.009	0.012
TN: Oak Ridge/Y12 E	7	0.2	0.1	0.1	0.017	0.008	0.013
TN: Oak Ridge/Y12 W	7	0.2	0.1	0.1	0.017	0.010	0.014
TX: Austin	6	0.2	0.0	0.1	0.023	0.008	0.014
TX: El Paso	8	1.5	0.4	0.9	0.019	0.009	0.016
UT: Salt Lake City	5	0.3	0.0	0.1	0.017	0.008	0.012
VA: Lynchburg	8	0.2	0.0	0.1	0.013	0.007	0.010
WA: Olympia	8	0.3	0.0	0.1	0.015	0.001	0.006
WA: Spokane	8	0.4	0.1	0.2	0.028	0.002	0.012

Table 4

Gross Beta in Airborne Particulates
March 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m³)			(pCi/m³)		
AL: Montgomery/408	8	0.1	0.0	0.1	0.020	0.006	0.011
AL: Montgomery/411	8	0.2	0.0	0.1	0.027	0.007	0.013
AR: Little Rock	8	0.1	0.0	0.1	0.032	0.013	0.021
AZ: Phoenix	4	0.8	0.2	0.5	0.019	0.008	0.015
CA: Berkeley	8	0.1	0.0	0.0	0.012	0.003	0.005
CA: Los Angeles	8	0.3	0.0	0.2	0.022	0.005	0.010
CO: Denver	8	1.0	0.2	0.4	0.025	0.007	0.013
CT: Hartford	9	0.1	0.0	0.0	0.016	0.005	0.010
DE: Wilmington	8	0.2	0.0	0.1	0.017	0.008	0.013
FL: Jacksonville	9	0.1	0.0	0.1	0.012	0.004	0.008
FL: Miami	4	0.0	0.0	0.0	0.010	0.005	0.007
HI: Honolulu	12	0.4	0.0	0.2	0.007	0.003	0.005
IA: Iowa City	9	0.5	0.1	0.2	0.028	0.009	0.019
ID: Idaho Falls	9				0.019	0.004	0.008
IL: Chicago	5	0.2	0.0	0.1	0.026	0.013	0.017
IN: Indianapolis	8	0.1	0.1	0.1	0.021	0.008	0.014
ME: Augusta	5	0.1	0.0	0.0	0.020	0.004	0.013
MI: Lansing	9	0.3	0.0	0.1	0.025	0.008	0.015
MN: Minneapolis	5	0.3	0.0	0.2	0.040	0.005	0.020
MN: Welch/510	5	2.9	0.9	1.9	0.029	0.015	0.023
MS: Jackson	8	0.1	0.1	0.1	0.019	0.007	0.015
NC: Charlotte	8	0.4	0.0	0.1	0.018	0.005	0.011
NC: Wilmington	3				0.009	0.009	0.009
ND: Bismarck	6	1.3	0.1	0.6	0.034	0.008	0.021
NH: Concord	9	0.2	0.0	0.1	0.017	0.004	0.011
NJ: Trenton	6	0.3	0.0	0.1	0.019	0.010	0.014
NV: Las Vegas/906	8	0.5	0.0	0.2	0.029	0.009	0.015
NV: Las Vegas/913	4				0.016	0.008	0.011
NY: Albany	3	0.0	0.0	0.0	0.024	0.022	0.023
NY: New York City	6	0.0	0.0	0.0	0.016	0.008	0.013
NY: Yaphank	9	0.0	0.0	0.0	0.003	0.001	0.002
OH: Painesville	7	0.1	0.0	0.1	0.018	0.010	0.013
OH: Ross	8				0.023	0.008	0.015
OR: Portland	8	0.1	0.0	0.0	0.004	0.002	0.003
PA: Harrisburg	9	0.2	0.0	0.1	0.021	0.007	0.013
PA: Pittsburgh	9				0.020	0.007	0.014
SC: Columbia	4	0.1	0.0	0.0	0.011	0.007	0.009
SD: Pierre	7	0.4	0.1	0.3	0.023	0.005	0.015

Table 4 (continued)

Gross Beta in Airborne Particulates
March 2003

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min	Avg	Max	Min	Avg
		(pCi/m³)			(pCi/m³)		
TN: Knoxville	6	0.7	0.1	0.4	0.023	0.008	0.016
TN: Nashville	9	0.2	0.1	0.1	0.023	0.007	0.014
TN: Oak Ridge/Bethel	9	0.7	0.2	0.3	0.019	0.005	0.011
TN: Oak Ridge/K25	9	0.7	0.2	0.3	0.019	0.005	0.012
TN: Oak Ridge/Melton	9	0.4	0.1	0.2	0.021	0.005	0.011
TN: Oak Ridge/Y12 E	9	0.8	0.1	0.3	0.020	0.005	0.012
TN: Oak Ridge/Y12 W	9	0.3	0.1	0.2	0.023	0.005	0.013
TX: Austin	8	0.4	0.0	0.2	0.023	0.007	0.015
TX: El Paso	8	1.2	0.4	0.9	0.017	0.009	0.014
UT: Salt Lake City	8	0.3	0.0	0.2	0.026	0.005	0.011
VA: Lynchburg	9	0.8	0.1	0.3	0.018	0.005	0.010
WA: Olympia	8	0.1	0.0	0.1	0.007	0.002	0.003
WA: Spokane	9	0.3	0.1	0.2	0.023	0.002	0.006

Table 5

Gross Beta and Specific Gamma in Precipitation
January 2003

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L	± 2*u*	Nuclide	pCi/L ± 2*u*
AL: Montgomery	1.04	0.37	Be7	58 14
AR: Little Rock	0.48	0.34		ND
AZ: Phoenix	0.65	0.36		ND
CA: Berkeley	0.15	0.33		ND
CT: Hartford	1.24	0.34	Be7	26 15
FL: Jacksonville	0.51	0.29	Be7	31 14
FL: Miami	1.63	0.41		ND
HI: Honolulu	0.58	0.36		ND
IA: Iowa City	2.01	0.47	Be7	76 33
ID: Idaho Falls	0.52	0.36		ND
NC: Charlotte	3.50	0.46	Be7	44 16
NC: Wilmington	0.75	0.31		ND
ND: Bismarck	1.62	0.51	Be7	87 31
NY: Albany	1.20	0.33	Bi212	35 38
NY: Yaphank	0.39	0.26		ND
OH: Painesville	2.78	0.46	Be7	65 32
			Pb212	4.4 6.5
OR: Portland	0.53	0.34	Bi212	31 40
PA: Harrisburg	1.05	0.33		ND
SC: Columbia	0.52	0.29		ND
TN: Knoxville	0.85	0.38	Be7	13 13
TN: Nashville	1.04	0.31	Be7	45 38
			Tl208	2.7 3.4
TX: Austin	0.38	0.33	Tl208	3.0 3.7
UT: Salt Lake City	1.24	0.44		ND
VA: Lynchburg	1.29	0.33	Tl208	2.2 3.3
WA: Olympia	0.02	0.31		ND

Note: ND = Not Detected

Table 6

Gross Beta and Specific Gamma in Precipitation
February 2003

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L	± 2*u*	Nuclide	pCi/L ± 2*u*
AL: Montgomery	1.49	0.34	Be7	40 15
AR: Little Rock	1.14	0.31	Be7	35 24
AZ: Phoenix	0.63	0.28		ND
CA: Berkeley	0.34	0.26		ND
CT: Hartford	3.12	0.45	Be7	64 15
FL: Jacksonville	0.38	0.27	Be7	16 15
FL: Miami	0.77	0.33		ND
HI: Honolulu	2.73	0.43		ND
IA: Iowa City	1.42	0.39	Be7	63 32
			Pb212	5.1 6.4
			Tl208	2.3 3.3
ID: Idaho Falls	1.06	0.32		ND
MN: Minneapolis	4.86	0.57	Be7	75 27
NC: Charlotte	1.57	0.36	Be7	41 14
NC: Wilmington	0.72	0.29	Be7	70 16
ND: Bismarck	2.93	0.53	Be7	53 27
			Tl208	2.6 3.2
NV: Las Vegas	0.95	0.32		ND
NY: Albany	0.97	0.37	Be7	28 14
OH: Painesville	3.04	0.44	Be7	53 29
OR: Portland	0.66	0.28	Be7	44 26
			K40	21 32
PA: Harrisburg	0.42	0.28	Pb212	4.1 5.9
SC: Columbia	0.96	0.32	Be7	22 13
TN: Knoxville	1.02	0.32	Be7	40 14
TN: Nashville	0.90	0.31	Be7	33 14
TX: Austin	0.70	0.29		ND
TX: El Paso	1.88	0.39	Be7	23 19
			Pb212	5.5 3.7
UT: Salt Lake City	1.32	0.36	Pb212	1.9 2.7
VA: Lynchburg	2.46	0.42	Tl208	2.9 3.3
WA: Olympia	0.13	0.24	Be7	12.1 8.8

Note: ND = Not Detected

Table 7

Gross Beta and Specific Gamma in Precipitation
March 2003

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	± 2*u*	Nuclide	pCi/L	± 2*u*
AL: Montgomery	1.05	0.30	Be7	69	15
AR: Little Rock	1.66	0.34	Be7	35	18
AZ: Phoenix	0.75	0.30		ND	
CA: Berkeley	0.54	0.27		ND	
CO: Denver	3.07	0.45	Be7	92	34
CT: Hartford	1.85	0.37	Be7	45	16
FL: Jacksonville	0.78	0.29	Be7	27	13
FL: Miami	0.43	0.28		ND	
HI: Honolulu	0.95	0.32		ND	
ID: Idaho Falls	0.80	0.31	Tl208	3.8	3.5
MN: Minneapolis	2.03	0.43	Be7	34	14
NC: Charlotte	0.52	0.27	Be7	25	16
			K40	9	13
NC: Wilmington	0.92	0.30	Be7	40	16
			K40	12	14
NY: Albany	0.31	0.29		ND	
NY: Yaphank	0.82	0.30	Be7	22	14
			K40	11	13
			Tl208	1.5	1.5
OH: Painesville	1.34	0.34	Be7	51	21
OR: Portland	0.58	0.28	Be7	21	22
PA: Harrisburg	0.34	0.26	Pb212	4.1	3.9
SC: Columbia	1.03	0.31	Be7	25	15
TX: Austin	1.26	0.34	Be7	37	20
UT: Salt Lake City	0.91	0.32		ND	
VA: Lynchburg	0.83	0.29		ND	
WA: Olympia	0.26	0.25	Be7	14.4	8.6

Note: ND = Not Detected

Table 8

Tritium in Precipitation
January - March 2003

Location	January 2003		February 2003		March 2003	
	pCi/L	± 2*u*	pCi/L	± 2*u*	pCi/L	± 2*u*
AL: Montgomery	-15	67	31	75	-23	76
AR: Little Rock	30	70	3	73	25	79
AZ: Phoenix	56	72	-46	74	-43	75
CA: Berkeley	3	78	17	77	-62	74
CO: Denver	NS		NS		-13	77
CT: Hartford	50	71	108	78	2	76
FL: Jacksonville	11	69	25	75	-12	77
FL: Miami	11	69	55	76	-40	75
HI: Honolulu	40	79	-34	74	-33	75
IA: Iowa City	56	71	58	76	NS	
ID: Idaho Falls	8	70	-10	75	-13	77
MN: Minneapolis	NS		23	74	-2	76
NC: Charlotte	34	71	76	77	3	76
NC: Wilmington	77	73	28	75	33	78
ND: Bismarck	-17	67	12	75	NS	
NV: Las Vegas	NS		-2	76	NS	
NY: Albany	50	71	96	78	-10	76
NY: Yaphank	-20	67	NS		-23	76
OH: Painesville	37	71	297	86	12	78
OR: Portland	40	72	-18	75	0	73
PA: Harrisburg	45	71	48	76	80	81
SC: Columbia	59	72	106	78	20	78
TN: Knoxville	-46	66	54	75	NS	
TN: Nashville	46	71	70	76	NS	
TX: Austin	22	70	76	77	0	77
TX: El Paso	NS		51	76	NS	
UT: Salt Lake City	58	72	13	74	0	76
VA: Lynchburg	11	69	71	76	10	77
WA: Olympia	66	73	-13	76	-45	76

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

Plutonium and uranium results are published when they become available.

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 9

Tritium in Drinking Water
January - March 2003

Location	Date Collected	^{3}H pCi/L ± 2*u*	
AK: Fairbanks	01/15/03	0	77
AL: Dothan	01/15/03	-54	74
AL: Montgomery	01/08/03	26	73
AL: Muscle Shoals	01/08/03	-24	76
AL: Scottsboro	01/07/03	-69	73
AR: Little Rock	01/16/03	76	76
CA: Berkeley	01/17/03	-42	71
CA: Los Angeles	01/14/03	27	74
CO: Denver	03/14/03	16	70
CT: Hartford	01/16/03	18	77
DE: Dover	01/15/03	-32	75
FL: Miami	01/23/03	11	76
FL: Tampa	03/10/03	-30	69
GA: Baxley	01/29/03	31	76
GA: Savannah	03/28/03	-48	77
HI: Honolulu	01/16/03	-31	74
IA: Cedar Rapids	01/17/03	-63	73
ID: Boise	01/23/03	-41	73
ID: Idaho Falls	01/20/03	30	77
IL: Morris	01/15/03	-49	74
IL: W. Chicago	03/13/03	-41	68
KS: Topeka	01/13/03	102	77
MA: Lawrence	01/22/03	41	77
MD: Baltimore	01/14/03	-50	74
MD: Conowingo	02/04/03	52	75
ME: Augusta	01/13/03	90	75
MI: Detroit	01/21/03	122	80
MI: Grand Rapids	01/23/03	74	78
MN: Minneapolis	01/27/03	38	77
MN: Red Wing	01/21/03	-2	75
MO: Jefferson City	01/13/03	55	74
MS: Port Gibson	01/14/03	-38	75
MT: Helena	01/17/03	92	77
NC: Charlotte	03/04/03	444	87
NC: Raleigh	02/06/03	16	76
ND: Bismarck	01/13/03	124	80
NE: Lincoln	01/13/03	42	73
NH: Concord	01/13/03	-12	75
NJ: Trenton	01/30/03	36	77
NJ: Waretown	02/04/03	5	75

Table 9 (continued)

Tritium in Drinking Water
January - March 2003

Location	Date Collected	^{3}H pCi/L ± 2*u*	
NM: Santa Fe	03/31/03	17	73
NV: Las Vegas	03/26/03	-78	76
NY: Albany	01/14/03	-36	75
NY: New York City	02/25/03	15	78
NY: Syracuse	02/13/03	55	72
OH: Cincinnati	01/16/03	-34	75
OH: E. Liverpool	03/12/03	46	72
OH: Painesville	01/13/03	13	77
OH: Toledo	01/14/03	115	78
OK: Oklahoma City	01/14/03	42	75
OR: Portland	01/14/03	-40	75
PA: Columbia	02/06/03	0	75
PA: Harrisburg	02/06/03	16	76
PA: Philadelphia/Baxter	02/10/03	8	70
PA: Philadelphia/Belmont	02/10/03	76	73
PA: Philadelphia/Queen	02/10/03	24	71
PA: Pittsburgh	03/12/03	21	71
RI: Providence	01/14/03	-11	76
SC: Barnwell	01/27/03	-69	72
SC: Columbia	01/14/03	53	75
SC: Jenkinsville	01/17/03	36	77
SC: Seneca	01/21/03	55	75
TN: Chattanooga	01/15/03	9	76
TN: Knoxville	01/13/03	30	73
TN: Oak Ridge - Knox Co. #371	03/18/03	27	71
TN: Oak Ridge - Anderson Co. #768	03/18/03	17	70
TN: Oak Ridge - Roane Co. #360	03/24/03	20	81
TN: Oak Ridge - Roane Co. #4442	03/26/03	540	100
TN: Oak Ridge - Anderson Co. #772	03/26/03	-4	82
VA: Ashland	01/13/03	1390	120
VA: Lynchburg	01/15/03	-31	75
WA: Richland	01/30/03	72	78
WA: Seattle	01/13/03	-45	74

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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 10

Radionuclides in Pasteurized Milk
January - March 2003

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	01/14/03	1.38	0.16	ND	ND	ND
AR: Little Rock	03/18/03	1.51	0.12	ND	ND	ND
CA: Los Angeles	02/05/03	1.60	0.13	ND	ND	ND
CA: Sacramento	02/18/03	1.55	0.12	ND	ND	ND
CA: San Francisco	01/13/03	1.54	0.12	ND	ND	ND
DE: Dover	01/21/03	1.57	0.12	ND	ND	ND
GA: Atlanta	01/28/03	1.48	0.11	ND	ND	ND
HI: Honolulu	01/30/03	1.57	0.11	ND	ND	ND
IA: Des Moines	01/13/03	1.56	0.12	ND	ND	ND
IN: Indianapolis	01/21/03	1.70	0.12	ND	ND	ND
KS: Wichita	01/28/03	1.53	0.12	ND	ND	ND
KY: Louisville	01/22/03	1.72	0.12	ND	ND	ND
MA: Boston	02/26/03	1.62	0.16	ND	ND	ND
MD: Baltimore	01/10/03	1.49	0.11	ND	ND	ND
ME: Portland	02/06/03	1.53	0.12	ND	ND	ND
MI: Detroit	01/14/03	1.68	0.13	ND	ND	ND
MI: Grand Rapids	01/23/03	1.58	0.12	ND	ND	ND
MO: Jefferson City	02/04/03	1.55	0.12	ND	ND	ND
NJ: Trenton	01/09/03	1.49	0.12	ND	ND	ND
NM: Albuquerque	02/25/03	1.55	0.13	ND	ND	ND
NV: Las Vegas	01/14/03	1.56	0.16	ND	ND	ND
NY: Buffalo	01/17/03	1.58	0.12	ND	ND	ND
NY: Syracuse	01/16/03	1.60	0.12	ND	ND	ND
OH: Cincinnati	02/11/03	1.53	0.12	ND	ND	ND
OH: Cleveland	01/21/03	1.54	0.15	ND	ND	ND
PA: Philadelphia	01/14/03	1.54	0.13	ND	ND	ND
PA: Pittsburgh	02/03/03	1.62	0.13	ND	ND	ND
TN: Chattanooga	02/03/03	1.55	0.12	ND	ND	ND
TN: Knoxville	03/10/03	1.58	0.11	ND	ND	ND
TN: Memphis	01/27/03	1.61	0.11	ND	ND	ND
TX: Ft. Worth	02/03/03	1.53	0.15	ND	ND	ND
TX: San Antonio	01/21/03	1.48	0.11	ND	ND	ND
VA: Norfolk	02/13/03	1.67	0.12	ND	ND	ND
VT: Montpelier	03/28/03	1.54	0.12	ND	ND	ND
WA: Spokane	01/17/03	1.58	0.11	ND	ND	ND
WA: Tacoma	03/17/03	1.57	0.11	ND	ND	ND
WV: Charleston	01/13/03	1.61	0.12	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.

Requests for information concerning the operation of ERAMS and the data that are generated should be directed as follows:

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