

ENVIRONMENTAL

RADIATION

DATA

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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 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/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
April 2001

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
AK: Fairbanks	1	0.0	0.0	0.0	0.017	0.017	0.017
AL: Montgomery/411	9	0.0	0.0	0.0	0.019	0.004	0.011
AR: Little Rock	6	0.2	0.0	0.1	0.021	0.010	0.014
AZ: Phoenix	4	0.5	0.1	0.3	0.013	0.007	0.009
CA: Berkeley	7	0.1	0.0	0.0	0.005	0.003	0.004
CA: Los Angeles	8	0.2	0.0	0.1	0.012	0.005	0.008
CO: Denver	7	2.2	0.3	0.8	0.017	0.005	0.011
CT: Hartford	9	0.1	0.0	0.1	0.011	0.003	0.007
DE: Wilmington	9	0.3	0.1	0.1	0.014	0.004	0.009
FL: Jacksonville	8	0.2	0.0	0.1	0.013	0.007	0.010
FL: Miami	7	0.0	0.0	0.0	0.010	0.004	0.008
HI: Honolulu	7	0.1	0.1	0.1	0.004	0.003	0.003
IA: Iowa City	9				0.014	0.009	0.011
ID: Boise	7	0.6	0.1	0.3	0.013	0.003	0.007
ID: Idaho Falls	9				0.013	0.003	0.007
IN: Indianapolis	8	0.4	0.1	0.3	0.014	0.008	0.011
KS: Topeka	8	0.8	0.2	0.4	0.013	0.007	0.010
ME: Augusta	6	0.1	0.0	0.1	0.012	0.005	0.009
MI: Lansing	9	0.3	0.1	0.2	0.013	0.005	0.010
MN: Minneapolis	5	0.2	0.1	0.1	0.014	0.007	0.010
MS: Jackson	6	0.2	0.0	0.1	0.014	0.008	0.011
NC: Charlotte	2	0.0	0.0	0.0	0.014	0.008	0.011
NC: Wilmington	4				0.012	0.008	0.010
ND: Bismarck	5	0.8	0.2	0.4	0.010	0.007	0.009
NH: Concord	9	0.2	0.0	0.1	0.011	0.003	0.008
NV: Las Vegas	8	0.2	0.1	0.1	0.015	0.005	0.009
NY: Albany	4	0.1	0.0	0.0	0.015	0.008	0.010
NY: New York City	8	0.1	0.0	0.0	0.015	0.005	0.010
NY: Syracuse	4	0.1	0.0	0.0	0.014	0.005	0.010
NY: Yaphank	8	0.1	0.0	0.1	0.015	0.003	0.009
OH: Painesville	6	0.2	0.1	0.1	0.013	0.008	0.010
OH: Ross	8				0.013	0.008	0.010
OR: Portland	7	0.1	0.0	0.0	0.005	0.002	0.004
PA: Harrisburg	9	0.4	0.1	0.2	0.015	0.004	0.010
PA: Pittsburgh	9				0.015	0.004	0.010
SC: Barnwell	1	0.0	0.0	0.0	0.004	0.004	0.004
SC: Columbia	7	0.1	0.0	0.1	0.014	0.008	0.011
TN: Knoxville	6	0.4	0.1	0.3	0.018	0.008	0.014

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2001

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
TN: Nashville	8	0.3	0.1	0.1	0.016	0.010	0.013
TN: Oak Ridge/Bethel	8	0.5	0.0	0.3	0.015	0.007	0.011
TN: Oak Ridge/K25	8	0.4	0.0	0.3	0.013	0.006	0.010
TN: Oak Ridge/Melton	8	0.3	0.0	0.2	0.014	0.008	0.011
TN: Oak Ridge/Y12 E	8	0.5	0.0	0.3	0.014	0.006	0.011
TN: Oak Ridge/Y12 W	8	0.2	0.0	0.2	0.016	0.008	0.013
TX: Austin	6	0.1	0.0	0.1	0.018	0.008	0.010
TX: El Paso	9	0.9	0.3	0.6	0.019	0.009	0.014
UT: Salt Lake City	9	0.4	0.1	0.2	0.014	0.005	0.009
VA: Lynchburg	8	0.7	0.1	0.3	0.015	0.003	0.009
WA: Olympia	7	0.1	0.0	0.0	0.005	0.002	0.004
WA: Spokane	9	0.3	0.1	0.1	0.010	0.004	0.006

Table 3
Gross Beta in Airborne Particulates
May 2001

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
AL: Montgomery/411	9	0.1	0.0	0.0	0.033	0.007	0.013
AR: Little Rock	8	0.1	0.0	0.0	0.018	0.007	0.013
AZ: Phoenix	5	0.8	0.3	0.6	0.018	0.010	0.012
CA: Berkeley	7	0.1	0.0	0.0	0.008	0.003	0.005
CA: Los Angeles	9	0.3	0.1	0.1	0.012	0.008	0.010
CO: Denver	8	2.1	0.1	0.6	0.012	0.005	0.009
CT: Hartford	8	0.3	0.0	0.1	0.015	0.003	0.008
DE: Wilmington	8	0.3	0.0	0.1	0.019	0.004	0.010
FL: Jacksonville	8	0.1	0.0	0.1	0.015	0.006	0.011
FL: Miami	4	0.0	0.0	0.0	0.011	0.005	0.008
HI: Honolulu	7	0.1	0.0	0.1	0.006	0.003	0.004
IA: Iowa City	9				0.015	0.002	0.008
ID: Boise	7	0.9	0.1	0.3	0.014	0.006	0.010
ID: Idaho Falls	8				0.011	0.005	0.008
IN: Indianapolis	9	0.8	0.1	0.3	0.019	0.004	0.009
KS: Topeka	10	1.7	0.1	0.7	0.013	0.005	0.010
ME: Augusta	9	0.4	0.1	0.2	0.017	0.004	0.008
MI: Lansing	9	0.3	0.1	0.1	0.018	0.004	0.009
MN: Minneapolis	4	0.2	0.1	0.2	0.010	0.005	0.008
MN: Welch/510	1				0.007	0.007	0.007
MS: Jackson	9	0.4	0.1	0.2	0.023	0.007	0.016
NC: Wilmington	5				0.013	0.009	0.010
ND: Bismarck	6	1.3	0.0	0.8	0.013	0.004	0.007
NH: Concord	7	0.3	0.1	0.1	0.017	0.006	0.009
NJ: Trenton	1				0.006	0.006	0.006
NV: Las Vegas	9	0.2	0.1	0.1	0.012	0.007	0.010
NY: Albany	5	0.2	0.0	0.1	0.024	0.005	0.012
NY: New York City	8	0.2	0.0	0.1	0.016	0.004	0.009
NY: Syracuse	3	0.0	0.0	0.0	0.013	0.006	0.010
NY: Yaphank	7	0.1	0.0	0.1	0.015	0.006	0.009
OH: Painesville	8	0.3	0.1	0.2	0.014	0.006	0.010
OH: Ross	8				0.021	0.004	0.011
OR: Portland	4	0.1	0.0	0.0	0.006	0.003	0.005
PA: Harrisburg	8	0.2	0.1	0.2	0.018	0.004	0.010
PA: Pittsburgh	9				0.016	0.004	0.009
SC: Barnwell	1	0.0	0.0	0.0	0.013	0.013	0.013
SC: Columbia	6	0.2	0.0	0.1	0.012	0.009	0.011
TN: Knoxville	7	0.2	0.0	0.1	0.023	0.008	0.016

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2001

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	9	0.2	0.1	0.1	0.018	0.007	0.013
TN: Oak Ridge/Bethel	8	1.0	0.2	0.4	0.018	0.007	0.012
TN: Oak Ridge/K25	8	1.1	0.3	0.5	0.017	0.007	0.012
TN: Oak Ridge/Melton	8	1.0	0.3	0.5	0.021	0.007	0.012
TN: Oak Ridge/Y12 E	8	1.3	0.3	0.5	0.023	0.007	0.013
TN: Oak Ridge/Y12 W	8	0.7	0.2	0.3	0.022	0.007	0.014
TX: Austin	9	0.2	0.1	0.1	0.016	0.007	0.009
TX: El Paso	7	0.8	0.3	0.5	0.015	0.009	0.012
UT: Salt Lake City	8	0.5	0.2	0.3	0.015	0.005	0.010
VA: Lynchburg	7	1.1	0.1	0.5	0.014	0.005	0.009
WA: Olympia	7	0.1	0.0	0.0	0.005	0.001	0.003
WA: Spokane	9	0.3	0.1	0.2	0.013	0.001	0.008

Table 4
Gross Beta in Airborne Particulates
June 2001

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
AK: Fairbanks	1	0.0	0.0	0.0	0.009	0.009	0.009
AL: Montgomery/411	8	0.1	0.0	0.0	0.017	0.007	0.010
AR: Little Rock	6	0.1	0.0	0.0	0.019	0.009	0.012
AZ: Phoenix	4	0.5	0.3	0.4	0.014	0.010	0.012
CA: Berkeley	9	0.1	0.0	0.1	0.007	0.002	0.004
CA: Los Angeles	9	0.3	0.0	0.1	0.010	0.006	0.008
CO: Denver	8	1.0	0.2	0.6	0.011	0.006	0.008
CT: Hartford	9	0.2	0.0	0.1	0.010	0.003	0.007
DE: Wilmington	9	0.3	0.0	0.2	0.014	0.005	0.009
FL: Jacksonville	8	0.1	0.0	0.1	0.011	0.006	0.009
FL: Miami	3	0.0	0.0	0.0	0.013	0.005	0.009
HI: Honolulu	7	0.2	0.1	0.1	0.005	0.002	0.003
IA: Iowa City	8				0.015	0.004	0.008
ID: Boise	6	0.4	0.0	0.2	0.008	0.004	0.006
ID: Idaho Falls	9				0.010	0.004	0.006
IN: Indianapolis	9	1.3	0.1	0.4	0.018	0.003	0.010
KS: Topeka	7	1.4	0.1	0.5	0.018	0.005	0.009
ME: Augusta	9	0.2	0.0	0.1	0.010	0.003	0.007
MI: Lansing	8	0.4	0.1	0.2	0.012	0.004	0.009
MN: Minneapolis	4	0.5	0.1	0.2	0.012	0.005	0.008
MN: Welch/510	3				0.008	0.004	0.006
MS: Jackson	8	0.4	0.1	0.1	0.019	0.008	0.010
NC: Wilmington	4				0.011	0.008	0.009
ND: Bismarck	7	1.6	0.0	0.4	0.012	0.005	0.007
NH: Concord	9	0.3	0.0	0.1	0.012	0.003	0.008
NJ: Trenton	2				0.006	0.005	0.005
NV: Las Vegas	8	0.2	0.0	0.1	0.010	0.005	0.007
NY: Albany	4	0.1	0.0	0.1	0.012	0.004	0.008
NY: New York City	9	0.1	0.0	0.0	0.013	0.004	0.008
NY: Syracuse	2	0.0	0.0	0.0	0.008	0.005	0.006
NY: Yaphank	7	0.2	0.0	0.1	0.011	0.004	0.007
OH: Painesville	7	0.5	0.1	0.2	0.015	0.004	0.009
OH: Ross	9				0.019	0.004	0.011
OR: Portland	9	0.1	0.0	0.1	0.005	0.001	0.003
PA: Harrisburg	9	0.5	0.1	0.2	0.014	0.006	0.009
PA: Pittsburgh	8				0.011	0.006	0.009
SC: Barnwell	1	0.0	0.0	0.0	0.009	0.009	0.009
SC: Columbia	6	0.2	0.0	0.1	0.012	0.007	0.010

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2001

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
TN: Knoxville	5	0.4	0.0	0.2	0.020	0.010	0.014
TN: Nashville	9	0.9	0.1	0.2	0.026	0.005	0.013
TN: Oak Ridge/Bethel	8	1.2	0.2	0.6	0.019	0.006	0.012
TN: Oak Ridge/K25	8	1.1	0.2	0.6	0.016	0.006	0.010
TN: Oak Ridge/Melton	8	1.2	0.2	0.6	0.017	0.006	0.011
TN: Oak Ridge/Y12 E	8	1.2	0.2	0.6	0.017	0.006	0.012
TN: Oak Ridge/Y12 W	8	0.9	0.1	0.4	0.019	0.008	0.013
TX: Austin	8	0.2	0.1	0.1	0.013	0.005	0.009
TX: El Paso	8	0.7	0.3	0.5	0.013	0.010	0.011
UT: Salt Lake City	9	0.5	0.0	0.1	0.016	0.005	0.009
VA: Lynchburg	8	0.9	0.0	0.6	0.012	0.005	0.008
WA: Olympia	7	0.1	0.0	0.0	0.004	0.001	0.002
WA: Spokane	8	0.2	0.1	0.1	0.008	0.002	0.004

Table 5
Gross Beta and Specific Gamma in Precipitation
April 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	1.32	0.36	K40	58 35
AR: Little Rock	2.12	0.52		ND
AZ: Phoenix	0.15	0.41	K40	26 35
CA: Berkeley	0.68	0.39	K40	24 37
			Tl208	2.6 3.5
CO: Denver	1.15	0.41	Pb212	5.8 6.9
CT: Hartford	2.67	0.44	Be7	56 43
DE: Wilmington	2.47	0.43	Be7	50 43
			Pb212	5.1 6.5
FL: Jacksonville	1.17	0.35	Pb212	7.5 6.6
			Tl208	3.5 4.2
FL: Miami	0.48	0.30		ND
HI: Honolulu	2.17	0.51	Bi214	6.6 6.5
IA: Iowa City	0.90	0.34	Bi214	38.7 7.8
			K40	31 40
			Pb212	5.8 6.4
			Pb214	29.7 7.1
			Tl208	2.6 3.7
ID: Boise	0.31	0.37		ND
ID: Idaho Falls	4.12	0.57	Tl208	3.7 4.1
KS: Topeka	2.85	0.46		ND
MI: Lansing	0.96	0.34		ND
MN: Minneapolis	1.48	0.37	K40	26 37
			Ra224	57 80
NC: Wilmington	3.20	0.47	Be7	82 63
ND: Bismarck	0.65	0.31	Pb212	6.5 6.3
			Tl208	2.4 3.8
NY: Albany	1.50	0.37	K40	33 37
			Pb212	5.7 6.2
NY: Syracuse	0.93	0.35	Bi214	5.7 7.3
NY: Yaphank	1.83	0.39	Be7	88 56
OH: Painesville	1.32	0.36	K40	26 40
OR: Portland	0.59	0.43		ND
PA: Harrisburg	3.92	0.51	Be7	81 45
			Bi214	12.6 7.0
			Pb212	7.4 6.0
			Tl208	2.7 3.6

Note: ND = Not Detected

Table 5 (continued)
Gross Beta and Specific Gamma in Precipitation
April 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
TN: Knoxville	36.5	1.4	K40	39 36
TN: Nashville	0.84	0.33		ND
TX: Austin	1.83	0.41		ND
UT: Salt Lake City	1.52	0.47	K40	27 37
VA: Lynchburg	3.31	0.48		ND
WA: Olympia	0.02	0.37		ND

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
May 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	1.52	0.37	Be7	52 36
			Bi214	8.0 6.6
AR: Little Rock	0.80	0.33	K40	33 59
CO: Denver	3.22	0.47	Be7	28 32
			Tl208	2.1 3.4
CT: Hartford	0.77	0.33	Be7	54 39
DE: Wilmington	1.73	0.40	Pb212	5.9 6.1
			Tl208	3.4 4.2
FL: Jacksonville	0.55	0.31		ND
FL: Miami	0.67	0.34		ND
HI: Honolulu	1.65	0.40	Tl208	2.4 3.6
IA: Iowa City	1.35	0.37	K40	62 32
ID: Boise	0.89	0.34		ND
ID: Idaho Falls	0.63	0.32	Be7	60 48
			Bi214	11.9 8.1
			K40	32 46
KS: Topeka	1.82	0.40	Pb212	8.3 4.2
MI: Lansing	0.85	0.34	Pb212	5.1 6.2
MN: Minneapolis	0.68	0.31		ND
NC: Wilmington	0.83	0.34		ND
ND: Bismarck	1.72	0.40		ND
NH: Concord	1.58	0.37	Be7	64 31
NY: Albany	1.03	0.35	Be7	44 31
NY: Syracuse	0.43	0.30	Be7	49 33
			Pb212	5.7 6.7
NY: Yaphank	3.78	0.49	Be7	48 35
			Pb212	10.0 7.1
OH: Painesville	1.93	0.40	Be7	59 37
			Bi214	7.1 7.0
			K40	87 29
			Tl208	2.8 3.6
OR: Portland	0.43	0.30		ND
PA: Harrisburg	1.26	0.36		ND
SC: Barnwell	3.72	0.49	Pb212	6.3 5.9
SC: Columbia	2.55	0.44		ND
TN: Knoxville	8.91	0.72	Bi214	8.5 6.7
			K40	74 31

Note: ND = Not Detected

Table 6 (continued)
Gross Beta and Specific Gamma in Precipitation
May 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
TN: Knoxville	8.91	0.72	Pb212	11.2 6.0
TN: Nashville	0.96	0.33	Be7	74 36
TX: Austin	0.70	0.33	K40	24 43
			Pb212	5.0 6.6
UT: Salt Lake City	1.76	0.41	K40	76 33
WA: Olympia	0.48	0.30		ND

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
June 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	1.36	0.37		ND
AR: Little Rock	0.60	0.41		ND
CO: Denver	1.85	0.44	Be7	140 54
			Bi214	12.2 7.2
CT: Hartford	5.78	0.60	Be7	91 47
DE: Wilmington	4.30	0.52	Be7	68 44
			K40	65 26
			Pb212	9.3 4.3
FL: Jacksonville	0.41	0.30	K40	48 26
			Pb212	4.1 3.8
FL: Miami	0.57	0.31	K40	27 36
HI: Honolulu	1.12	0.45	Pb212	6.6 6.7
			Tl208	3.3 3.6
IA: Iowa City	0.67	0.33		ND
ID: Idaho Falls	2.07	0.44	Pb212	5.5 5.9
KS: Topeka	0.67	0.37		ND
ME: Augusta	2.83	0.45	Be7	45 39
			Bi214	8.1 7.1
			Pb212	6.3 6.3
MI: Lansing	0.83	0.34	Bi214	10.8 6.9
MN: Minneapolis	0.90	0.43		ND
MN: Welch	0.83	0.33		ND
NC: Wilmington	0.66	0.33	Tl208	3.2 4.9
ND: Bismarck	0.70	0.37		ND
NH: Concord	3.46	0.49	Tl208	4.5 5.0
NV: Las Vegas	3.89	0.56	Pb214	5.2 5.6
NY: Albany	1.73	0.39	Pb212	7.1 5.6
NY: Syracuse	0.89	0.34		ND
NY: Yaphank	10.20	0.75		ND
OH: Painesville	4.20	0.53		ND
OR: Portland	0.61	0.36	Pb212	6.1 6.0
PA: Harrisburg	4.83	0.56	Be7	78 38
			K40	20 37
SC: Columbia	1.20	0.35		ND
TN: Knoxville	3.04	0.46		ND
TN: Nashville	0.44	0.31	Pb212	4.8 6.6
TX: Austin	1.02	0.38		ND

Note: ND = Not Detected

Table 7 (continued)
Gross Beta and Specific Gamma in Precipitation
June 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
UT: Salt Lake City	2.80	0.50		ND
VA: Lynchburg	22.2	1.1		ND
WA: Olympia	0.36	0.40		ND

Note: ND = Not Detected

Table 8
Tritium in Precipitation
April - June 2001

Location	April 2001		May 2001		June 2001	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery	17	82	-19	79	-4	73
AR: Little Rock	-43	78	11	79	9	75
AZ: Phoenix	-9	80	NS		NS	
CA: Berkeley	-15	80	NS		NS	
CO: Denver	43	82	24	80	60	79
CT: Hartford	-19	81	-54	76	105	79
DE: Wilmington	26	83	6	79	13	74
FL: Jacksonville	-7	81	-26	77	39	76
FL: Miami	-30	80	45	81	17	74
HI: Honolulu	2	80	-36	78	0	75
IA: Iowa City	-44	80	-13	78	71	77
ID: Boise	211	89	-17	78	NS	
ID: Idaho Falls	-22	78	51	82	48	77
KS: Topeka	51	84	0	79	37	77
ME: Augusta	NS		NS		58	76
MI: Lansing	17	81	36	81	71	77
MN: Minneapolis	-9	82	26	80	77	79
MN: Welch	NS		NS		69	77
NC: Wilmington	7	82	4	79	-9	73
ND: Bismarck	26	82	-19	79	69	79
NH: Concord	NS		-4	79	28	76
NV: Las Vegas	NS		NS		7	76
NY: Albany	-14	81	43	81	43	75
NY: Syracuse	9	82	7	79	124	80
NY: Yaphank	51	84	42	80	6	74
OH: Painesville	69	84	2	79	121	79
OR: Portland	-19	79	-28	78	28	76
PA: Harrisburg	33	82	37	81	32	75
SC: Barnwell	NS		-26	78	NS	
SC: Columbia	NS		43	81	30	75
TN: Knoxville	-16	80	-30	78	32	75
TN: Nashville	-9	81	-13	78	7	74
TX: Austin	-5	81	15	80	-40	72
UT: Salt Lake City	17	81	-26	78	35	77
VA: Lynchburg	10	82	NS		34	75
WA: Olympia	-36	78	-32	78	0	75

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.

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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
April - June 2001

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	05/18/01	-17	80
AL: Dothan	04/10/01	-48	75
AL: Montgomery	04/02/01	-44	70
AL: Muscle Shoals	04/03/01	24	73
AL: Scottsboro	04/04/01	-17	72
AR: Little Rock	04/10/01	-47	75
CA: Berkeley	04/16/01	-41	80
CA: Los Angeles	04/10/01	-42	75
CO: Denver	06/01/01	-5	80
CO: Platteville	06/01/01	-15	75
CT: Hartford	04/05/01	-29	76
DE: Dover	04/10/01	-45	80
FL: Miami	04/03/01	-50	69
FL: Tampa	05/08/01	61	79
GA: Baxley	04/16/01	-68	80
GA: Savannah	04/12/01	-25	82
HI: Honolulu	05/01/01	23	77
IA: Cedar Rapids	05/25/01	-40	79
ID: Idaho Falls	04/12/01	-10	82
IL: Morris	04/30/01	13	76
KS: Topeka	04/03/01	-37	70
LA: New Orleans	06/29/01	5	80
MA: Lawrence	04/04/01	-26	76
MD: Baltimore	04/06/01	8	77
MD: Conowingo	05/01/01	26	77
ME: Augusta	04/04/01	-8	78
MI: Detroit	04/13/01	102	85
MI: Grand Rapids	04/13/01	31	83
MN: Minneapolis	04/30/01	-43	74
MN: Red Wing	04/16/01	-34	80
MO: Jefferson City	04/06/01	-24	70
MS: Jackson	04/11/01	-40	75
MS: Port Gibson	04/11/01	-43	79
MT: Helena	04/20/01	38	81
NC: Charlotte	04/11/01	810	110
NC: Wilmington	04/09/01	-29	76
ND: Bismarck	04/04/01	-8	79
NE: Lincoln	04/05/01	-40	75
NH: Manchester	04/11/01	-3	77
NJ: Trenton	04/18/01	-28	81

Table 9 (continued)
Tritium in Drinking Water
April - June 2001

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NM: Santa Fe	05/30/01	2	80
NV: Las Vegas	04/11/01	-17	81
NY: Albany	04/09/01	-46	75
NY: Niagara Falls	04/19/01	24	82
NY: Syracuse	05/29/01	65	83
OH: E. Liverpool	05/02/01	75	79
OH: Painesville	04/04/01	104	76
OH: Painesville	06/11/01	2	80
OH: Toledo	04/05/01	117	83
OK: Oklahoma City	04/18/01	-13	80
OR: Portland	04/05/01	-13	76
PA: Columbia	04/30/01	50	78
PA: Harrisburg	05/01/01	71	79
PA: Philadelphia/Baxter	05/01/01	71	79
PA: Philadelphia/Queen	05/01/01	54	77
PA: Pittsburgh	05/02/01	35	77
RI: Providence	04/09/01	26	78
SC: Barnwell	04/27/01	7	76
SC: Columbia	04/05/01	3	77
SC: Jenkinsville	04/26/01	61	78
SC: Seneca	04/26/01	31	77
TN: Chattanooga	04/03/01	24	73
TN: Knoxville	04/09/01	5	77
TN: Oak Ridge - Anderson Co. #768	05/04/01	0	76
TN: Oak Ridge - Roane Co. #360	05/04/01	137	82
TN: Oak Ridge - Knox Co. #371	05/04/01	18	77
TN: Oak Ridge - Anderson Co. #772	05/04/01	81	80
TN: Oak Ridge - Roane Co. #4442	05/21/01	271	92
TX: Austin	05/01/01	15	76
VA: Ashland	04/10/01	2	78
VA: Lynchburg	04/03/01	-14	71
WA: Richland	04/09/01	40	79
WA: Seattle	05/21/01	-10	80

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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
April - June 2001

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	04/10/01	1.50	0.12	ND	ND	ND
AR: Little Rock	06/04/01	1.60	0.13	ND	ND	ND
CA: Los Angeles	04/23/01	1.70	0.11	ND	ND	ND
CA: Sacramento	05/14/01	1.66	0.13	ND	ND	ND
CA: San Francisco	04/03/01	1.55	0.12	ND	ND	ND
DE: Wilmington	04/30/01	1.60	0.13	ND	ND	ND
FL: Tampa	04/09/01	1.61	0.17	ND	ND	ND
HI: Honolulu	05/04/01	1.67	0.17	ND	ND	ND
IA: Des Moines	04/10/01	1.72	0.11	ND	ND	ND
IL: Chicago	05/02/01	1.45	0.12	ND	ND	ND
IN: Indianapolis	04/03/01	1.66	0.11	ND	ND	ND
KS: Wichita	04/23/01	1.66	0.13	ND	ND	ND
KY: Louisville	04/16/01	1.76	0.14	ND	ND	ND
MA: Boston	04/13/01	1.70	0.11	1.2	1.2	ND
MD: Baltimore	04/06/01	1.51	0.16	ND	ND	ND
MI: Detroit	04/10/01	1.57	0.17	ND	ND	ND
MI: Grand Rapids	04/11/01	1.66	0.11	ND	ND	ND
MO: Jefferson City	04/04/01	1.66	0.11	ND	ND	ND
MS: Jackson	04/09/01	1.61	0.13	ND	ND	ND
NJ: Trenton	04/16/01	1.66	0.13	ND	ND	ND
NJ: Trenton	05/11/01	1.64	0.12	ND	ND	ND
NJ: Trenton	06/01/01	1.61	0.13	ND	ND	ND
NV: Las Vegas	04/03/01	1.70	0.13	ND	ND	ND
NY: Buffalo	04/06/01	1.75	0.11	ND	ND	ND
NY: Syracuse	04/04/01	1.70	0.11	ND	ND	ND
OH: Cincinnati	05/21/01	1.64	0.12	ND	ND	ND
OH: Cleveland	04/05/01	1.70	0.11	ND	ND	ND
OR: Portland	04/06/01	1.53	0.12	ND	ND	ND
PA: Philadelphia	04/04/01	1.69	0.11	ND	ND	ND
PA: Pittsburgh	04/04/01	1.68	0.11	ND	ND	ND
TN: Chattanooga	04/03/01	1.67	0.11	ND	ND	ND
TN: Knoxville	04/09/01	1.60	0.17	ND	ND	ND
TN: Memphis	04/17/01	1.57	0.12	ND	ND	ND
TX: Ft. Worth	04/17/01	1.68	0.13	ND	ND	ND
TX: San Antonio	04/10/01	1.60	0.13	ND	ND	ND
VA: Norfolk	04/14/01	1.68	0.11	ND	ND	ND
VT: Montpelier	06/22/01	1.51	0.12	ND	ND	ND
WA: Spokane	05/14/01	1.49	0.13	ND	ND	ND
WA: Tacoma	04/23/01	1.79	0.11	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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