

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
January 2002

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	0.014	0.014	0.014
AL: Montgomery/408	9	0.0	0.0	0.0	0.016	0.004	0.009
AR: Little Rock	9	0.0	0.0	0.0	0.023	0.006	0.014
AZ: Phoenix	5	3.3	0.0	1.0	0.038	0.021	0.030
CA: Berkeley	9	0.1	0.0	0.1	0.016	0.002	0.007
CA: Los Angeles	8	0.4	0.1	0.2	0.016	0.007	0.012
CO: Denver	9	0.9	0.1	0.4	0.024	0.005	0.012
CT: Hartford	9	0.2	0.0	0.1	0.012	0.005	0.009
DE: Wilmington	9	0.2	0.1	0.1	0.018	0.008	0.012
FL: Jacksonville	9	0.1	0.0	0.1	0.014	0.006	0.010
FL: Miami	4	0.0	0.0	0.0	0.009	0.003	0.007
HI: Honolulu	5	0.1	0.1	0.1	0.008	0.002	0.003
IA: Iowa City	9	0.9	0.0	0.5	0.026	0.008	0.016
ID: Boise	2	0.0	0.0	0.0	0.006	0.003	0.005
ID: Idaho Falls	9				0.020	0.005	0.014
IN: Indianapolis	8	0.5	0.1	0.3	0.018	0.008	0.013
KS: Topeka	1				0.020	0.020	0.020
ME: Augusta	7	0.1	0.0	0.0	0.015	0.007	0.011
MI: Lansing	10	0.2	0.1	0.1	0.027	0.008	0.014
MN: Minneapolis	4	0.2	0.1	0.1	0.021	0.008	0.015
MN: Welch/510	2	0.3	0.0	0.2	0.016	0.015	0.015
MS: Jackson	9	0.1	0.0	0.1	0.023	0.008	0.013
NC: Charlotte	8	0.1	0.0	0.0	0.015	0.007	0.011
NC: Wilmington	3				0.014	0.010	0.011
ND: Bismarck	7	0.8	0.1	0.4	0.025	0.005	0.015
NH: Concord	8	0.1	0.0	0.1	0.017	0.005	0.010
NJ: Trenton	1				0.024	0.024	0.024
NV: Las Vegas	9	0.2	0.1	0.1	0.022	0.004	0.011
NY: Albany	5	0.0	0.0	0.0	0.017	0.009	0.014
NY: New York City	7	0.1	0.0	0.0	0.018	0.008	0.012
NY: Yaphank	9	0.1	0.0	0.1	0.013	0.006	0.010
OH: Painesville	8	0.3	0.0	0.2	0.019	0.009	0.012
OH: Ross	8				0.037	0.008	0.015
OR: Portland	8	0.1	0.0	0.0	0.025	0.001	0.006
PA: Harrisburg	9	0.5	0.1	0.2	0.017	0.008	0.012
PA: Pittsburgh	9				0.021	0.009	0.013
SC: Barnwell	1	0.0	0.0	0.0	0.010	0.010	0.010
SC: Columbia	6	0.2	0.0	0.1	0.012	0.008	0.011

Table 2 (continued)
Gross Beta in Airborne Particulates
January 2002

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
SD: Pierre	1	0.4	0.4	0.4	0.018	0.018	0.018
TN: Knoxville	8	0.1	0.0	0.0	0.023	0.010	0.015
TN: Nashville	7	0.1	0.1	0.1	0.018	0.008	0.012
TN: Oak Ridge/Bethel	8	0.6	0.1	0.3	0.014	0.009	0.011
TN: Oak Ridge/K25	8	0.6	0.1	0.3	0.016	0.007	0.011
TN: Oak Ridge/Melton	8	0.3	0.1	0.2	0.016	0.007	0.010
TN: Oak Ridge/Y12 E	8	0.7	0.1	0.3	0.016	0.009	0.012
TN: Oak Ridge/Y12 W	8	0.2	0.1	0.1	0.019	0.009	0.013
TX: Austin	8	0.4	0.1	0.1	0.022	0.004	0.011
TX: El Paso	4	1.2	0.3	0.7	0.019	0.013	0.017
UT: Salt Lake City	8	0.1	0.0	0.1	0.032	0.005	0.014
VA: Lynchburg	9	0.4	0.1	0.3	0.012	0.006	0.009
WA: Olympia	7	0.1	0.0	0.0	0.004	0.001	0.002
WA: Spokane	9	0.2	0.0	0.1	0.022	0.002	0.007

Table 3
Gross Beta in Airborne Particulates
February 2002

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/408	8	0.1	0.0	0.1	0.016	0.007	0.011
AR: Little Rock	7	0.0	0.0	0.0	0.019	0.009	0.012
AZ: Phoenix	4	0.9	0.3	0.6	0.020	0.014	0.017
CA: Berkeley	4	0.2	0.0	0.1	0.009	0.005	0.007
CA: Los Angeles	8	0.3	0.2	0.3	0.019	0.005	0.010
CO: Denver	8	0.6	0.3	0.4	0.014	0.006	0.010
CT: Hartford	7	0.1	0.0	0.1	0.011	0.006	0.007
DE: Wilmington	8	0.3	0.1	0.2	0.014	0.007	0.010
FL: Jacksonville	8	0.1	0.1	0.1	0.016	0.006	0.010
FL: Miami	5	0.1	0.0	0.0	0.011	0.003	0.008
HI: Honolulu	6	0.1	0.1	0.1	0.004	0.001	0.002
IA: Iowa City	8	0.3	0.0	0.2	0.036	0.007	0.015
ID: Boise	5	0.6	0.1	0.3	0.029	0.007	0.018
ID: Idaho Falls	7				0.028	0.010	0.018
IN: Indianapolis	8	0.4	0.1	0.1	0.015	0.007	0.009
ME: Augusta	5	0.1	0.0	0.0	0.017	0.007	0.010
MI: Lansing	8	0.1	0.0	0.1	0.024	0.007	0.012
MN: Minneapolis	4	0.2	0.1	0.1	0.020	0.009	0.015
MN: Welch/510	4	0.2	0.1	0.2	0.016	0.009	0.011
MS: Jackson	8	0.2	0.0	0.1	0.014	0.007	0.011
NC: Charlotte	5	0.1	0.0	0.0	0.013	0.007	0.009
NC: Wilmington	4				0.011	0.009	0.010
ND: Bismarck	6	0.6	0.1	0.3	0.040	0.006	0.019
NH: Concord	8	0.1	0.0	0.1	0.014	0.007	0.010
NJ: Trenton	4				0.015	0.007	0.010
NV: Las Vegas	8	0.3	0.1	0.2	0.013	0.006	0.009
NY: Albany	4	0.0	0.0	0.0	0.015	0.010	0.012
NY: New York City	6	0.1	0.0	0.0	0.015	0.007	0.010
NY: Yaphank	8	0.4	0.0	0.1	0.013	0.006	0.008
OH: Painesville	8	0.2	0.1	0.1	0.015	0.006	0.010
OH: Ross	4				0.016	0.007	0.011
OR: Portland	8	0.1	0.0	0.1	0.009	0.002	0.004
PA: Harrisburg	8	0.6	0.1	0.3	0.015	0.006	0.010
PA: Pittsburgh	8				0.012	0.007	0.009
SC: Barnwell	1	0.0	0.0	0.0	0.010	0.010	0.010
SC: Columbia	6	0.4	0.0	0.1	0.013	0.006	0.010
SD: Pierre	8	0.5	0.1	0.3	0.026	0.005	0.012
TN: Knoxville	7	0.2	0.0	0.1	0.015	0.009	0.012

Table 3 (continued)
Gross Beta in Airborne Particulates
February 2002

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	0.2	0.1	0.1	0.015	0.008	0.011
TN: Oak Ridge/Bethel	7	0.4	0.1	0.2	0.011	0.008	0.009
TN: Oak Ridge/K25	7	0.4	0.1	0.2	0.011	0.006	0.008
TN: Oak Ridge/Melton	7	0.3	0.1	0.2	0.012	0.007	0.009
TN: Oak Ridge/Y12 E	7	0.4	0.1	0.2	0.011	0.008	0.009
TN: Oak Ridge/Y12 W	7	0.2	0.1	0.1	0.014	0.009	0.011
TX: Austin	7	0.2	0.1	0.1	0.013	0.007	0.010
TX: El Paso	8	1.3	0.2	0.7	0.022	0.009	0.014
UT: Salt Lake City	8	0.1	0.0	0.1	0.031	0.005	0.015
VA: Lynchburg	8	0.6	0.0	0.3	0.010	0.006	0.007
WA: Olympia	7	0.1	0.0	0.0	0.008	0.001	0.004
WA: Spokane	7	0.2	0.1	0.1	0.018	0.003	0.008

Table 4
Gross Beta in Airborne Particulates
March 2002

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	0.014	0.014	0.014
AL: Montgomery/408	8	0.2	0.0	0.1	0.021	0.009	0.013
AR: Little Rock	7	0.0	0.0	0.0	0.015	0.006	0.011
AZ: Phoenix	4	0.7	0.2	0.4	0.017	0.010	0.014
CA: Berkeley	8	0.1	0.0	0.0	0.010	0.002	0.005
CA: Los Angeles	9	0.3	0.1	0.2	0.016	0.005	0.010
CO: Denver	5	1.0	0.1	0.6	0.029	0.011	0.018
CT: Hartford	9	0.1	0.0	0.1	0.012	0.005	0.008
DE: Wilmington	8	0.2	0.1	0.1	0.015	0.004	0.011
FL: Jacksonville	8	0.1	0.0	0.1	0.015	0.005	0.009
FL: Miami	4	0.0	0.0	0.0	0.008	0.005	0.006
HI: Honolulu	7	0.1	0.1	0.1	0.007	0.003	0.004
IA: Iowa City	8	0.7	0.1	0.3	0.027	0.014	0.019
ID: Boise	4	0.2	0.0	0.1	0.021	0.007	0.014
ID: Idaho Falls	9				0.022	0.005	0.011
IN: Indianapolis	9	0.2	0.1	0.2	0.016	0.009	0.012
ME: Augusta	8	0.1	0.0	0.0	0.019	0.006	0.011
MI: Lansing	8	0.2	0.0	0.1	0.021	0.010	0.015
MN: Minneapolis	4	0.1	0.1	0.1	0.018	0.014	0.016
MN: Welch/510	8	0.2	0.0	0.1	0.022	0.012	0.016
MS: Jackson	8	0.1	0.0	0.1	0.016	0.008	0.012
NC: Charlotte	8	0.1	0.0	0.0	0.015	0.006	0.010
NC: Wilmington	4				0.010	0.008	0.009
ND: Bismarck	7	0.2	0.0	0.1	0.026	0.012	0.018
NH: Concord	9	0.7	0.0	0.2	0.014	0.007	0.011
NJ: Trenton	5				0.020	0.008	0.013
NV: Las Vegas	8	0.1	0.0	0.1	0.013	0.004	0.008
NY: Albany	4	0.1	0.0	0.0	0.019	0.010	0.014
NY: New York City	7	0.1	0.0	0.1	0.017	0.008	0.013
NY: Yaphank	8	0.2	0.0	0.1	0.014	0.004	0.010
OH: Painesville	9	0.2	0.1	0.1	0.018	0.008	0.013
OH: Ross	8				0.015	0.010	0.012
OR: Portland	9	0.1	0.0	0.1	0.015	0.002	0.007
PA: Harrisburg	8	0.5	0.1	0.2	0.017	0.004	0.012
PA: Pittsburgh	8				0.016	0.008	0.012
SC: Barnwell	1	0.0	0.0	0.0	0.014	0.014	0.014
SC: Columbia	7	0.5	0.1	0.2	0.014	0.008	0.012
SD: Pierre	7	0.9	0.0	0.3	0.023	0.010	0.017

Table 4 (continued)
Gross Beta in Airborne Particulates
March 2002

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	7	0.3	0.0	0.1	0.025	0.007	0.013
TN: Nashville	2	0.1	0.1	0.1	0.076	0.039	0.063
TN: Oak Ridge/Bethel	7	0.4	0.1	0.2	0.013	0.005	0.009
TN: Oak Ridge/K25	7	0.5	0.1	0.3	0.014	0.005	0.010
TN: Oak Ridge/Melton	7	0.5	0.1	0.2	0.013	0.006	0.010
TN: Oak Ridge/Y12 E	7	0.5	0.1	0.2	0.015	0.006	0.010
TN: Oak Ridge/Y12 W	7	0.3	0.0	0.1	0.018	0.006	0.012
TX: Austin	9	0.3	0.1	0.2	0.017	0.011	0.014
TX: El Paso	9	0.8	0.5	0.6	0.024	0.014	0.017
UT: Salt Lake City	9	0.3	0.0	0.1	0.017	0.005	0.009
VA: Lynchburg	8	0.6	0.1	0.3	0.011	0.004	0.008
WA: Olympia	8	0.1	0.0	0.0	0.012	0.002	0.006
WA: Spokane	9	0.3	0.1	0.2	0.025	0.002	0.011

Table 5
Gross Beta and Specific Gamma in Precipitation
January 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	1.15	0.35		ND
AR: Little Rock	0.68	0.33	Be7	68 33
			Pb212	3.9 3.7
CA: Berkeley	0.17	0.28		ND
CO: Denver	1.64	0.38		ND
CT: Hartford	3.80	0.51	Be7	71 35
FL: Jacksonville	0.41	0.31	K40	17 17
FL: Miami	0.15	0.29		ND
HI: Honolulu	1.18	0.37		ND
IA: Iowa City	0.69	0.33	Tl208	4.6 4.1
ID: Idaho Falls	0.50	0.32	K40	30 37
MI: Lansing	0.03	0.27		ND
MN: Minneapolis	1.10	0.37	Be7	87 35
NC: Charlotte	0.80	0.33		ND
NC: Wilmington	0.55	0.32		ND
ND: Bismarck	1.55	0.41		ND
NY: Albany	0.91	0.34		ND
NY: Yaphank	1.18	0.35	Pb212	3.6 6.6
OH: Painesville	2.93	0.46		ND
OR: Portland	0.89	0.33	Bi212	34 33
			Pb212	5.7 6.0
			Be7	28 28
PA: Harrisburg	0.94	0.34		ND
SC: Barnwell	0.83	0.33		ND
TN: Knoxville	0.99	0.35		ND
TN: Nashville	0.86	0.33	Be7	48 31
TX: Austin	0.69	0.32		ND
UT: Salt Lake City	0.61	0.33	K40	15 16
VA: Lynchburg	4.02	0.51	K40	53 23
			Tl208	2.3 3.2
WA: Olympia	0.15	0.27		ND

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
February 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2\sigma$		Nuclide	pCi/L $\pm 2\sigma$
AL: Montgomery	0.30	0.26		ND
AR: Little Rock	0.54	0.28	Be7	36 22
CA: Berkeley	0.48	0.33	Tl208	2.3 3.1
CT: Hartford	2.81	0.42	Be7	56 24
FL: Jacksonville	1.31	0.37		ND
FL: Miami	0.67	0.30		ND
HI: Honolulu	1.08	0.40	Pb212	3.7 5.1
			Tl208	2.2 2.1
IA: Iowa City	0.59	0.30		ND
ID: Idaho Falls	0.60	0.35		ND
MN: Minneapolis	3.69	0.66	Be7	51 35
NC: Wilmington	1.89	0.37	Be7	85 22
NY: Albany	1.29	0.34	Be7	61 23
OH: Painesville	3.96	0.47	Be7	47 26
OR: Portland	0.47	0.33	K40	25 43
			Pb212	4.4 7.0
			Tl208	4.5 4.0
SC: Barnwell	0.99	0.30	Be7	43 26
SC: Columbia	0.95	0.31		ND
TN: Knoxville	0.92	0.31	K40	14 16
TX: El Paso	0.41	0.27		ND
UT: Salt Lake City	1.83	0.49		ND
VA: Lynchburg	3.51	0.47	K40	39 64
WA: Olympia	0.27	0.31		ND

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
March 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.74	0.29		ND
AR: Little Rock	1.12	0.36	Be7	51 35
CA: Berkeley	0.42	0.31		ND
CO: Denver	1.14	0.38		ND
CT: Hartford	2.37	0.39	Be7	53 32
			K40	23 38
			Pb212	3.5 5.9
DE: Wilmington	3.06	0.42	Be7	55 44
FL: Jacksonville	0.80	0.31	Pb212	4.5 5.9
FL: Miami	0.55	0.30		ND
HI: Honolulu	1.43	0.40		ND
IA: Iowa City	0.29	0.26		ND
ID: Idaho Falls	23.6	6.7		ND
MN: Minneapolis	0.80	0.32	Be7	29 28
			Tl208	2.7 4.2
MN: Welch	0.21	0.26		ND
NC: Charlotte	0.63	0.28		ND
	1.86	0.36	Be7	42 37
NC: Wilmington	0.42	0.27	Tl208	3.5 3.5
ND: Bismarck	1.30	0.38		ND
NY: Albany	0.63	0.29		ND
NY: Yaphank	0.31	0.26		ND
OH: Painesville	3.93	0.47	Be7	39 36
OR: Portland	0.87	0.34		ND
PA: Harrisburg	0.33	0.27		ND
SC: Barnwell	1.11	0.32		ND
SC: Columbia	0.81	0.30		ND
TN: Knoxville	1.80	0.36		ND
TN: Nashville	1.15	0.32	Be7	49 37
			Bi212	37 42
TX: Austin	0.35	0.27		ND
UT: Salt Lake City	0.80	0.37	K40	41 61
WA: Olympia	0.63	0.34	Be7	65 34

Note: ND = Not Detected

Table 8
Tritium in Precipitation
January - March 2002

Location	January 2002		February 2002		March 2002	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery	53	76	-11	70	11	75
AR: Little Rock	33	75	64	82	42	77
CA: Berkeley	42	73	-11	79	-42	73
CO: Denver	155	79	NS		79	79
CT: Hartford	187	82	74	75	91	79
DE: Wilmington	NS		NS		49	77
FL: Jacksonville	2	74	59	74	74	78
FL: Miami	-15	73	59	74	-31	74
HI: Honolulu	76	76	25	81	15	76
IA: Iowa City	4	74	22	72	-25	73
ID: Idaho Falls	59	75	12	80	27	77
MI: Lansing	22	74	NS		NS	
MN: Minneapolis	35	75	74	83	-13	74
MN: Welch	NS		NS		-11	74
NC: Charlotte	22	75	NS		72	74
NC: Wilmington	50	76	22	73	-16	73
ND: Bismarck	50	76	NS		-25	73
NY: Albany	128	79	61	74	84	79
NY: Yaphank	2	73	NS		176	83
OH: Painesville	38	74	81	76	29	76
OR: Portland	26	73	23	81	33	77
PA: Harrisburg	53	76	NS		4	74
SC: Barnwell	328	88	345	87	24	76
SC: Columbia	NS		91	76	109	79
TN: Knoxville	-4	73	65	75	-24	74
TN: Nashville	-17	73	NS		44	77
TX: Austin	9	74	NS		-16	74
TX: El Paso	NS		38	81	NS	
UT: Salt Lake City	93	76	41	81	33	77
VA: Lynchburg	-11	73	63	74	NS	
WA: Olympia	43	74	8	80	-48	73

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 2002

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	01/16/02	78	83
AL: Dothan	01/08/02	-5	79
AL: Montgomery	01/07/02	78	82
AL: Muscle Shoals	01/15/02	118	78
AL: Scottsboro	01/16/02	158	80
AR: Little Rock	01/10/02	20	80
CA: Berkeley	01/29/02	2	78
CA: Los Angeles	01/10/02	8	81
CT: Hartford	01/07/02	37	81
DE: Dover	01/11/02	-2	80
FL: Miami	01/25/02	35	75
FL: Tampa	03/11/02	-2	79
GA: Baxley	01/16/02	33	75
GA: Savannah	03/05/02	28	81
HI: Honolulu	01/23/02	13	74
IA: Cedar Rapids	01/10/02	0	80
ID: Boise	01/14/02	-18	78
ID: Idaho Falls	01/22/02	69	80
IL: Morris	03/15/02	28	81
KS: Topeka	01/08/02	7	79
LA: New Orleans	03/19/02	89	83
MA: Lawrence	01/08/02	53	81
MD: Baltimore	01/07/02	22	79
MD: Conowingo	01/28/02	82	80
ME: Augusta	01/07/02	190	89
MI: Detroit	01/17/02	110	78
MI: Grand Rapids	01/11/02	45	76
MN: Minneapolis	01/28/02	53	81
MN: Red Wing	01/22/02	35	75
MO: Jefferson City	01/08/02	75	84
MS: Jackson	01/08/02	23	80
MS: Port Gibson	01/08/02	57	82
NC: Charlotte	03/21/02	650	100
NC: Wilmington	01/14/02	125	79
ND: Bismarck	01/14/02	40	81
NE: Lincoln	01/08/02	-40	78
NH: Manchester	01/09/02	-2	80
NJ: Trenton	03/06/02	25	81
NJ: Waretown	03/06/02	38	82
NM: Santa Fe	02/07/02	-48	77

Table 9 (continued)
Tritium in Drinking Water
January - March 2002

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NY: Albany	01/07/02	23	80
NY: Niagara Falls	03/11/02	57	82
NY: Syracuse	03/07/02	111	84
OH: Cincinnati	01/15/02	76	77
OH: E. Liverpool	02/27/02	-2	78
OH: Painesville	01/09/02	261	89
OH: Toledo	01/08/02	113	84
OK: Oklahoma City	01/10/02	-48	78
OR: Portland	01/17/02	33	74
PA: Columbia	01/29/02	-11	79
PA: Harrisburg	01/29/02	63	80
PA: Philadelphia/Baxter	01/24/02	2	73
PA: Philadelphia/Queen	01/24/02	24	75
PA: Pittsburgh	02/27/02	-13	78
RI: Providence	01/07/02	-15	79
SC: Barnwell	01/24/02	26	74
SC: Columbia	01/25/02	121	79
SC: Jenkinsville	01/25/02	42	75
SC: Seneca	01/23/02	-13	73
TN: Chattanooga	01/08/02	173	88
TN: Knoxville	01/07/02	54	77
TN: Oak Ridge - Knox Co. #371	02/21/02	-17	78
TN: Oak Ridge - Anderson Co. #768	02/21/02	44	80
TN: Oak Ridge - Roane Co. #360	02/26/02	31	79
TN: Oak Ridge - Anderson Co. #772	03/01/02	-9	78
TN: Oak Ridge - Roane Co. #4442	03/04/02	1000	120
VA: Ashland	01/16/02	1040	110
VA: Lynchburg	01/08/02	-25	77
WA: Richland	02/11/02	81	82
WA: Seattle	02/12/02	-41	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
January - March 2002

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	01/15/02	1.45	0.11	ND		ND	ND
AR: Little Rock	03/25/02	1.45	0.12	ND		ND	ND
AZ: Phoenix	02/26/02	1.54	0.12	ND		ND	ND
CA: Los Angeles	01/17/02	1.57	0.12	ND		ND	ND
CA: Sacramento	02/25/02	1.54	0.12	ND		ND	ND
CA: San Francisco	01/12/02	1.61	0.13	ND		ND	ND
DE: Wilmington	01/23/02	1.64	0.12	ND		ND	ND
FL: Tampa	01/15/02	1.58	0.12	2.7	2.3	ND	ND
GA: Atlanta	01/08/02	1.50	0.12	ND		ND	ND
HI: Honolulu	02/08/02	1.50	0.11	ND		ND	ND
IA: Des Moines	01/14/02	1.64	0.12	ND		ND	ND
IL: Chicago	02/06/02	1.55	0.13	ND		ND	ND
IN: Indianapolis	01/22/02	1.54	0.12	ND		ND	ND
KS: Wichita	01/15/02	1.63	0.13	ND		ND	ND
KY: Louisville	01/16/02	1.48	0.12	ND		ND	ND
MA: Boston	01/18/02	1.58	0.12	ND		ND	ND
MD: Baltimore	01/11/02	1.64	0.13	ND		ND	ND
MI: Detroit	01/24/02	1.61	0.11	ND		ND	ND
MI: Grand Rapids	01/10/02	1.58	0.12	ND		ND	ND
MO: Jefferson City	01/30/02	1.61	0.12	ND		ND	ND
MS: Jackson	01/15/02	1.54	0.12	ND		ND	ND
NC: Charlotte	01/24/02	1.56	0.12	ND		ND	ND
NJ: Trenton	01/22/02	1.60	0.13	ND		ND	ND
NM: Albuquerque	01/09/02	1.57	0.13	ND		ND	ND
NV: Las Vegas	01/09/02	1.48	0.12	ND		ND	ND
NY: Buffalo	01/10/02	1.51	0.12	ND		ND	ND
NY: Syracuse	01/16/02	1.44	0.13	ND		ND	ND
OH: Cincinnati	03/18/02	1.48	0.12	ND		ND	ND
OH: Cleveland	01/22/02	1.62	0.12	ND		ND	ND
OR: Portland	01/10/02	1.53	0.12	ND		ND	ND
PA: Philadelphia	01/10/02	1.51	0.13	ND		ND	ND
PA: Pittsburgh	01/09/02	1.48	0.12	ND		ND	ND
TN: Chattanooga	01/23/02	1.39	0.11	ND		ND	ND
TN: Knoxville	01/14/02	1.44	0.11	ND		ND	ND
TN: Memphis	01/28/02	1.55	0.12	ND		ND	ND
TX: Ft. Worth	01/14/02	1.58	0.13	ND		ND	ND
TX: Ft. Worth	01/16/02	1.49	0.12	ND		ND	ND
TX: San Antonio	01/29/02	1.45	0.12	ND		ND	ND
VA: Norfolk	02/14/02	1.54	0.12	ND		ND	ND

Note: ND = Not Detected

Table 10 (continued)
Radionuclides in Pasteurized Milk
January - March 2002

Location	Date Collected	K g/L $\pm 2u$		¹³⁷ Cs pCi/L $\pm 2u$	¹⁴⁰ Ba pCi/L $\pm 2u$	¹³¹ I pCi/L $\pm 2u$
VT: Montpelier	01/07/02	1.44	0.11	ND	ND	ND
VT: Montpelier	02/21/02	1.54	0.12	ND	ND	ND
WA: Spokane	01/15/02	1.56	0.12	ND	ND	ND
WA: Tacoma	03/12/02	1.56	0.13	ND	ND	ND
WV: Charleston	01/10/02	1.55	0.12	ND	ND	ND

Note: ND = Not Detected

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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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