

ENVIRONMENTAL

RADIATION

DATA

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July - September 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/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
July 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	0.005	0.005	0.005
AL: Montgomery/408	6	0.1	0.0	0.1	0.011	0.006	0.009
AR: Little Rock	8	0.1	0.0	0.0	0.020	0.010	0.015
AZ: Phoenix	5	0.6	0.1	0.3	0.021	0.015	0.018
CA: Berkeley	9	0.1	0.0	0.0	0.004	0.001	0.003
CA: Los Angeles	9	2.1	0.0	0.4	0.011	0.007	0.008
CO: Denver	8	1.9	0.5	1.0	0.018	0.010	0.012
CT: Hartford	9	0.3	0.1	0.1	0.012	0.005	0.008
DE: Wilmington	8	0.6	0.1	0.3	0.023	0.007	0.014
FL: Jacksonville	9	0.1	0.0	0.1	0.014	0.004	0.007
FL: Miami	4	0.0	0.0	0.0	0.008	0.005	0.006
HI: Honolulu	8	0.0	0.0	0.0	0.005	0.001	0.003
IA: Iowa City	9	0.8	0.0	0.2	0.019	0.006	0.014
ID: Boise	3	0.2	0.0	0.1	0.017	0.009	0.012
ID: Idaho Falls	9				0.012	0.007	0.009
IN: Indianapolis	9	0.8	0.2	0.5	0.018	0.006	0.010
ME: Augusta	5	0.2	0.0	0.1	0.012	0.005	0.008
MI: Lansing	9	0.5	0.2	0.3	0.019	0.005	0.011
MN: Minneapolis	5	0.4	0.1	0.2	0.013	0.010	0.012
MN: Welch/510	3	0.4	0.0	0.2	0.012	0.008	0.010
MS: Jackson	7	0.2	0.1	0.1	0.020	0.008	0.012
NC: Charlotte	8	0.1	0.1	0.1	0.023	0.006	0.013
NC: Wilmington	5				0.014	0.006	0.009
ND: Bismarck	6	0.9	0.4	0.6	0.015	0.009	0.011
NH: Concord	9	1.0	0.1	0.4	0.016	0.008	0.011
NJ: Trenton	7				0.018	0.007	0.012
NV: Las Vegas	9	0.1	0.1	0.1	0.015	0.008	0.011
NY: Albany	5	0.1	0.0	0.1	0.018	0.011	0.015
NY: New York City	7	0.3	0.0	0.1	0.017	0.006	0.011
NY: Yaphank	9	0.1	0.0	0.0	0.015	0.005	0.010
OH: Painesville	8	0.6	0.2	0.3	0.018	0.006	0.011
OH: Ross	9				0.019	0.007	0.013
OR: Portland	8	0.3	0.0	0.1	0.005	0.002	0.003
PA: Harrisburg	9	1.2	0.0	0.5	0.022	0.009	0.014
PA: Pittsburgh	9				0.022	0.007	0.013
SC: Barnwell	1	0.0	0.0	0.0	0.015	0.015	0.015
SC: Columbia	5	0.2	0.0	0.1	0.023	0.012	0.016
SD: Pierre	8	2.7	0.2	0.7	0.011	0.006	0.008

Table 2 (continued)
Gross Beta in Airborne Particulates
July 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	0.5	0.2	0.4	0.017	0.011	0.014
TN: Nashville	7	0.3	0.1	0.2	0.017	0.009	0.012
TN: Oak Ridge/Bethel	8	1.0	0.4	0.7	0.014	0.010	0.013
TN: Oak Ridge/K25	8	1.0	0.4	0.8	0.015	0.009	0.013
TN: Oak Ridge/Melton	8	1.0	0.4	0.7	0.016	0.009	0.012
TN: Oak Ridge/Y12 E	8	0.9	0.3	0.5	0.017	0.010	0.014
TN: Oak Ridge/Y12 W	8	0.6	0.2	0.4	0.019	0.010	0.014
TX: Austin	9	0.2	0.0	0.1	0.014	0.007	0.010
TX: El Paso	9	0.8	0.3	0.6	0.020	0.009	0.013
UT: Salt Lake City	9	0.4	0.0	0.2	0.019	0.008	0.012
VA: Lynchburg	7	1.2	0.3	0.6	0.015	0.006	0.011
WA: Olympia	8	0.1	0.0	0.1	0.003	0.001	0.002
WA: Spokane	9	0.5	0.1	0.3	0.011	0.003	0.007

Table 3
Gross Beta in Airborne Particulates
August 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	0.005	0.005	0.005
AL: Montgomery/408	9	0.2	0.0	0.1	0.015	0.006	0.010
AR: Little Rock	8	0.1	0.0	0.0	0.027	0.005	0.013
AZ: Phoenix	4	0.9	0.4	0.6	0.025	0.010	0.018
CA: Berkeley	9	0.2	0.0	0.1	0.009	0.003	0.005
CA: Los Angeles	9	0.2	0.0	0.1	0.013	0.007	0.010
CO: Denver	8	1.0	0.5	0.7	0.017	0.008	0.012
CT: Hartford	9	0.2	0.0	0.1	0.014	0.004	0.008
DE: Wilmington	9	0.5	0.1	0.3	0.016	0.006	0.010
FL: Jacksonville	9	0.1	0.0	0.1	0.009	0.003	0.006
FL: Miami	3	0.0	0.0	0.0	0.009	0.004	0.007
HI: Honolulu	8	0.0	0.0	0.0	0.004	0.002	0.003
IA: Iowa City	9	0.7	0.0	0.2	0.016	0.005	0.011
ID: Boise	3	0.1	0.0	0.1	0.009	0.006	0.008
ID: Idaho Falls	9				0.014	0.005	0.010
IN: Indianapolis	9	0.6	0.1	0.3	0.019	0.003	0.009
ME: Augusta	8	0.5	0.1	0.2	0.024	0.003	0.010
MI: Lansing	9	0.6	0.2	0.3	0.014	0.004	0.010
MN: Minneapolis	4	0.2	0.0	0.2	0.013	0.006	0.010
MN: Welch/510	9	2.9	0.0	0.8	0.017	0.005	0.009
MS: Jackson	8	0.4	0.1	0.2	0.029	0.005	0.013
NC: Charlotte	9	0.2	0.0	0.1	0.016	0.006	0.011
NC: Wilmington	4				0.010	0.008	0.009
ND: Bismarck	6	2.3	0.3	1.2	0.019	0.005	0.011
NH: Concord	9	0.9	0.1	0.4	0.026	0.004	0.011
NJ: Trenton	7	0.2	0.2	0.2	0.023	0.006	0.012
NV: Las Vegas	3	0.2	0.1	0.1	0.011	0.007	0.010
NY: Albany	4	0.1	0.0	0.1	0.024	0.011	0.015
NY: New York City	9	0.2	0.0	0.1	0.017	0.007	0.010
NY: Yaphank	9	0.1	0.0	0.1	0.018	0.006	0.009
OH: Painesville	9	0.7	0.2	0.4	0.017	0.003	0.010
OH: Ross	9				0.020	0.004	0.012
OR: Portland	7	0.2	0.0	0.1	0.007	0.003	0.005
PA: Harrisburg	9	0.7	0.1	0.3	0.025	0.008	0.012
PA: Pittsburgh	9				0.020	0.007	0.013
SC: Columbia	8	0.5	0.0	0.2	0.016	0.007	0.011
SD: Pierre	6	0.5	0.1	0.3	0.015	0.005	0.010
TN: Knoxville	7	0.9	0.0	0.5	0.029	0.011	0.016

Table 3 (continued)
Gross Beta in Airborne Particulates
August 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	0.5	0.0	0.2	0.024	0.006	0.013
TN: Oak Ridge/Bethel	9	1.4	0.4	0.9	0.019	0.009	0.013
TN: Oak Ridge/K25	9	1.5	0.5	1.0	0.020	0.008	0.012
TN: Oak Ridge/Melton	9	1.4	0.5	1.0	0.018	0.008	0.012
TN: Oak Ridge/Y12 E	9	1.1	0.4	0.8	0.018	0.010	0.014
TN: Oak Ridge/Y12 W	9	0.9	0.3	0.6	0.020	0.009	0.015
TX: Austin	9	0.3	0.0	0.2	0.018	0.005	0.011
TX: El Paso	9	1.5	0.3	0.9	0.022	0.011	0.016
UT: Salt Lake City	9	0.9	0.0	0.4	0.024	0.012	0.018
VA: Lynchburg	8	1.1	0.1	0.6	0.023	0.008	0.012
WA: Olympia	9	0.2	0.0	0.1	0.006	0.002	0.004
WA: Spokane	9	0.4	0.1	0.2	0.012	0.004	0.008

Table 4
Gross Beta in Airborne Particulates
September 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	2	0.0	0.0	0.0	0.004	0.004	0.004
AL: Montgomery/408	9	0.3	0.0	0.1	0.022	0.005	0.012
AR: Little Rock	5	0.2	0.0	0.1	0.029	0.012	0.019
AZ: Phoenix	4	0.5	0.4	0.5	0.020	0.017	0.018
CA: Berkeley	8	0.2	0.0	0.1	0.011	0.005	0.007
CA: Los Angeles	8	0.3	0.1	0.2	0.014	0.010	0.013
CO: Denver	9	1.6	0.2	0.8	0.019	0.005	0.013
CT: Hartford	9	0.2	0.0	0.1	0.011	0.005	0.008
DE: Wilmington	9	0.3	0.1	0.2	0.014	0.004	0.009
FL: Jacksonville	8	0.1	0.0	0.1	0.010	0.002	0.006
FL: Miami	2	0.0	0.0	0.0	0.005	0.004	0.004
HI: Honolulu	9	0.1	0.0	0.0	0.006	0.002	0.004
IA: Iowa City	9	0.6	0.1	0.3	0.028	0.011	0.017
ID: Boise	2	0.0	0.0	0.0	0.012	0.011	0.011
ID: Idaho Falls	7				0.016	0.002	0.010
IN: Indianapolis	8	0.7	0.2	0.4	0.020	0.009	0.012
ME: Augusta	6	0.2	0.0	0.1	0.015	0.004	0.010
MI: Lansing	9	1.2	0.2	0.5	0.023	0.006	0.014
MN: Minneapolis	5	0.5	0.2	0.3	0.022	0.014	0.019
MN: Welch/510	7	1.5	0.4	1.0	0.021	0.007	0.014
MS: Jackson	8	0.6	0.1	0.3	0.033	0.008	0.016
NC: Charlotte	8	0.1	0.0	0.1	0.016	0.002	0.012
NC: Wilmington	4				0.011	0.003	0.008
ND: Bismarck	6	1.2	0.7	0.9	0.015	0.005	0.012
NH: Concord	9	0.5	0.0	0.3	0.015	0.005	0.011
NJ: Trenton	8	0.3	0.1	0.2	0.012	0.004	0.009
NV: Las Vegas	9	0.1	0.1	0.1	0.014	0.007	0.010
NY: Albany	3	0.1	0.0	0.0	0.022	0.007	0.017
NY: New York City	7	0.3	0.0	0.1	0.011	0.004	0.008
NY: Yaphank	9	0.1	0.0	0.1	0.010	0.004	0.007
OH: Painesville	7	1.0	0.2	0.4	0.016	0.007	0.012
OH: Ross	8				0.021	0.008	0.014
OR: Portland	6	0.2	0.1	0.1	0.007	0.003	0.006
PA: Harrisburg	9	1.4	0.1	0.4	0.015	0.005	0.011
PA: Pittsburgh	9				0.025	0.007	0.014
SC: Columbia	6	0.4	0.1	0.2	0.015	0.004	0.011
SD: Pierre	6	0.4	0.1	0.3	0.014	0.005	0.010
TN: Knoxville	9	0.8	0.0	0.3	0.022	0.006	0.015

Table 4 (continued)
Gross Beta in Airborne Particulates
September 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	9	0.5	0.1	0.3	0.025	0.010	0.015
TN: Oak Ridge/Bethel	8	0.8	0.2	0.5	0.018	0.007	0.012
TN: Oak Ridge/K25	8	0.9	0.3	0.5	0.018	0.006	0.012
TN: Oak Ridge/Melton	8	1.0	0.3	0.5	0.019	0.007	0.013
TN: Oak Ridge/Y12 E	8	1.0	0.1	0.4	0.023	0.006	0.013
TN: Oak Ridge/Y12 W	8	0.7	0.1	0.3	0.023	0.007	0.015
TX: Austin	8	0.3	0.1	0.2	0.032	0.005	0.016
TX: El Paso	6	1.0	0.2	0.6	0.018	0.012	0.015
UT: Salt Lake City	8	0.5	0.1	0.3	0.023	0.008	0.015
VA: Lynchburg	9	1.6	0.5	0.8	0.019	0.003	0.011
WA: Olympia	9	0.3	0.1	0.2	0.007	0.003	0.005
WA: Spokane	9	0.7	0.1	0.4	0.015	0.007	0.010

Table 5
Gross Beta and Specific Gamma in Precipitation
July 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	1.64	0.35	Be7	66 25
			K40	32 35
AR: Little Rock	1.24	0.33		ND
AZ: Phoenix	15.1	1.0		ND
CO: Denver	1.52	0.34	Be7	22 19
CT: Hartford	5.47	0.54	Be7	76 32
			Pb212	6.4 6.8
DE: Wilmington	2.00	0.37	Be7	33 25
			Pb212	7.9 6.6
FL: Jacksonville	0.92	0.30	Be7	38 30
			Tl208	2.8 3.6
FL: Miami	0.35	0.26		ND
IA: Iowa City	0.41	0.27		ND
ID: Idaho Falls	1.30	0.36		ND
ME: Augusta	2.48	0.39	Be7	71 34
			Pb212	5.8 6.5
MI: Lansing	0.91	0.31	Be7	44 31
			Pb212	7.5 6.9
MN: Minneapolis	1.19	0.33	Be7	41 28
			Tl208	2.2 3.7
MN: Welch	1.12	0.33		ND
NC: Charlotte	0.97	0.30	Be7	23 26
			Pb212	6.3 7.3
NC: Wilmington	1.89	0.36	Be7	56 29
			Pb212	6.4 7.1
ND: Bismarck	0.85	0.30		ND
NH: Concord	2.20	0.38	Be7	32 29
			K40	22 35
			Pb212	6.3 6.7
			Tl208	1.9 3.4
NY: Albany	1.34	0.34	Pb212	4.5 6.5
NY: Yaphank	15.35	0.90	Pb212	5.7 6.6
OR: Portland	0.16	0.25		ND
PA: Harrisburg	2.94	0.43	Be7	69 33
			Pb212	6.9 6.1
SC: Barnwell	3.40	0.44		ND
SC: Columbia	0.97	0.32	Pb212	4.5 6.5

Note: ND = Not Detected

Table 5 (continued)
Gross Beta and Specific Gamma in Precipitation
July 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
TN: Knoxville	3.10	0.45		ND
TN: Nashville	2.58	0.40	Be7	54 18
			Bi212	17 18
TX: Austin	0.01	0.23		ND
TX: El Paso	0.40	0.27		ND
UT: Salt Lake City	2.15	0.41		ND
VA: Lynchburg	7.37	0.63		ND
WA: Olympia	0.93	0.32		ND

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
August 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	3.54	0.49	Be7	75 20
AR: Little Rock	0.36	0.25	Be7	32 19
CT: Hartford	4.41	0.54	Be7	60 31
			Bi212	30 40
DE: Wilmington	1.11	0.39	Be7	50 31
			Pb212	13.1 6.0
FL: Jacksonville	0.52	0.34	Tl208	3.7 2.9
FL: Miami	0.22	0.33		ND
				ND
				ND
IA: Iowa City	0.44	0.26		ND
ID: Idaho Falls	19.2	6.1		ND
ME: Augusta	7.78	0.64	Be7	92 34
MI: Lansing	0.92	0.30		ND
MN: Minneapolis	0.43	0.26		ND
MN: Welch	0.73	0.29		ND
NC: Charlotte	2.64	0.44	Be7	62 31
			K40	46 30
			Pb212	12.9 5.9
			Be7	64 31
NC: Wilmington	2.93	0.48	Pb212	15.7 6.2
			Tl208	2.3 3.4
				ND
ND: Bismarck	0.94	0.30		ND
NH: Concord	4.22	0.52	Be7	47 33
			Pb212	10.4 6.9
NY: Albany	1.22	0.40	Be7	74 37
			Pb212	15.5 6.1
NY: Yaphank	11.90	0.81	Tl208	2.4 3.6
OH: Painesville	3.53	0.45	Be7	38 28
PA: Harrisburg	1.04	0.40	Be7	53 28
SC: Columbia	1.03	0.38	K40	45 31
TN: Knoxville	5.69	0.56		ND
TN: Nashville	0.63	0.34		ND
TX: El Paso	0.74	0.30		ND
VA: Lynchburg	2.99	0.48	Tl208	2.1 3.5
WA: Olympia	0.91	0.30	Be7	65 24

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
September 2002

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.47	0.33		ND
AR: Little Rock	0.52	0.27		ND
AZ: Phoenix	2.06	0.42		ND
CO: Denver	0.99	0.31	Be7	21 19
CT: Hartford	1.15	0.36		ND
DE: Wilmington	1.34	0.39		ND
FL: Jacksonville	0.53	0.33		ND
FL: Miami	0.40	0.26	K40	17 27
HI: Honolulu	1.66	0.59		ND
IA: Iowa City	0.25	0.25	Pb212	2.2 2.7
			Tl208	1.4 1.5
ID: Idaho Falls	5.97	0.88		ND
ME: Augusta	2.86	0.45		ND
MI: Lansing	0.86	0.37		ND
MN: Minneapolis	0.87	0.30	Be7	37 17
MN: Welch	0.77	0.30		ND
NC: Charlotte	0.81	0.34		ND
NC: Wilmington	0.26	0.30		ND
ND: Bismarck	1.53	0.35	Pb212	5.7 4.5
NH: Concord	0.73	0.33	Be7	51 28
NY: Albany	1.60	0.42		ND
NY: Yaphank	5.02	0.57		ND
OH: Painesville	0.55	0.28	Be7	16 14
OR: Portland	0.71	0.29		ND
PA: Harrisburg	0.31	0.33		ND
SC: Columbia	1.01	0.36		ND
TN: Knoxville	5.42	0.59		ND
TN: Nashville	0.52	0.34		ND
TX: Austin	0.35	0.27		ND
UT: Salt Lake City	1.51	0.36	Pb212	3.3 2.9
VA: Lynchburg	8.41	0.73	K40	24 41
			Pb212	6.9 6.8
WA: Olympia	0.67	0.29		ND

Note: ND = Not Detected

Table 8
Tritium in Precipitation
July - September 2002

Location	July 2002		August 2002		September 2002	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery	-15	76	-18	75	2	76
AR: Little Rock	47	72	13	79	-20	75
AZ: Phoenix	-30	69	NS		24	76
CO: Denver	42	73	NS		5	77
CT: Hartford	84	81	15	77	20	77
DE: Wilmington	-33	76	27	77	-16	76
FL: Jacksonville	4	77	-51	74	-22	75
FL: Miami	22	78	-31	74	-33	75
HI: Honolulu	NS		NS		56	79
IA: Iowa City	-4	77	-11	75	-53	74
ID: Idaho Falls	64	73	28	78	-13	76
ME: Augusta	103	82	57	79	-5	76
MI: Lansing	-13	76	-2	76	-72	73
MN: Minneapolis	17	71	-42	77	38	78
MN: Welch	4	77	-24	75	-45	74
NC: Charlotte	9	78	18	77	-26	75
NC: Wilmington	-9	77	48	76	-42	74
ND: Bismarck	21	72	0	79	5	76
NH: Concord	20	79	-5	76	0	76
NY: Albany	-20	77	-4	77	2	76
NY: Yaphank	17	78	-9	76	-35	75
OH: Painesville	NS		37	78	-51	73
OR: Portland	55	73	NS		33	78
PA: Harrisburg	64	80	-4	76	-18	75
SC: Barnwell	225	87	NS		NS	
SC: Columbia	101	82	35	78	-57	74
TN: Knoxville	27	78	-51	73	-5	76
TN: Nashville	5	77	-16	75	38	78
TX: Austin	-4	70	NS		5	76
TX: El Paso	45	72	-55	76	NS	
UT: Salt Lake City	51	73	NS		8	77
VA: Lynchburg	57	80	24	77	-17	76
WA: Olympia	19	71	31	80	-23	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.

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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
July - September 2002

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	07/09/02	64	75
AL: Dothan	07/01/02	25	77
AL: Montgomery	07/01/02	31	77
AL: Muscle Shoals	07/18/02	60	74
AL: Scottsboro	07/19/02	136	78
AR: Little Rock	07/03/02	-55	74
CA: Berkeley	07/08/02	29	77
CA: Los Angeles	07/02/02	-52	73
CT: Hartford	07/10/02	77	83
DE: Dover	07/03/02	-65	77
FL: Miami	07/13/02	-16	79
FL: Tampa	09/27/02	39	80
GA: Baxley	07/24/02	9	72
GA: Savannah	09/30/02	0	78
HI: Honolulu	07/02/02	-2	72
IA: Cedar Rapids	07/05/02	18	76
ID: Boise	07/15/02	-46	78
ID: Idaho Falls	08/05/02	42	74
IL: Morris	09/25/02	16	79
IL: W. Chicago	07/22/02	33	73
KS: Topeka	07/02/02	66	78
MA: Lawrence	07/24/02	13	72
MD: Baltimore	07/02/02	-3	75
MD: Conowingo	07/23/02	118	77
ME: Augusta	07/01/02	31	77
MI: Detroit	07/02/02	90	80
MI: Grand Rapids	07/11/02	-21	78
MN: Minneapolis	07/02/02	5	76
MN: Red Wing	07/10/02	-52	77
MO: Jefferson City	07/03/02	41	77
MS: Jackson	07/03/02	8	75
MS: Port Gibson	07/03/02	80	78
MT: Helena	07/11/02	-5	79
NC: Charlotte	07/31/02	670	100
ND: Bismarck	07/01/02	54	78
NE: Lincoln	07/03/02	41	77
NH: Concord	07/05/02	55	82
NM: Santa Fe	08/29/02	-29	77
NV: Las Vegas	08/26/02	-38	78
NY: Albany	07/03/02	69	79

Table 9 (continued)
Tritium in Drinking Water
July - September 2002

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NY: New York City	07/16/02	8	79
OH: Cincinnati	07/31/02	33	73
OH: E. Liverpool	09/04/02	-23	77
OH: Painesville	07/05/02	48	79
OH: Toledo	07/02/02	175	83
OK: Oklahoma City	07/02/02	0	75
OR: Portland	07/01/02	-14	75
PA: Columbia	07/16/02	-16	78
PA: Harrisburg	07/16/02	-32	78
PA: Philadelphia/Baxter	08/23/02	15	79
PA: Philadelphia/Queen	08/23/02	77	82
PA: Pittsburgh	09/04/02	-5	79
RI: Providence	07/03/02	-60	73
SC: Barnwell	07/04/02	11	76
SC: Columbia	07/03/02	72	78
SC: Jenkinsville	07/19/02	93	76
SC: Seneca	07/02/02	63	78
TN: Chattanooga	07/15/02	119	84
TN: Knoxville	07/08/02	25	77
TN: Oak Ridge - Knox Co. #371	08/12/02	121	77
TN: Oak Ridge - Anderson Co. #786	08/12/02	59	73
TN: Oak Ridge - Roane Co. #360	08/23/02	630	98
TN: Oak Ridge - Anderson Co. #772	08/27/02	26	79
TN: Oak Ridge - Roane Co. #4442	09/24/02	195	86
TX: Austin	07/30/02	16	72
VA: Ashland	07/02/02	1180	120
VA: Lynchburg	07/01/02	7	76
WA: Richland	07/08/02	44	81
WA: Seattle	08/13/02	-13	69

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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
July - September 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	07/08/02	1.53	0.12	ND	ND	ND
AR: Little Rock	09/22/02	1.48	0.15	ND	ND	ND
AZ: Phoenix	07/31/02	1.49	0.12	ND	ND	ND
CA: Los Angeles	07/19/02	1.55	0.12	ND	ND	ND
CA: Sacramento	08/19/02	1.64	0.12	ND	ND	ND
CA: San Francisco	07/08/02	1.54	0.12	ND	ND	ND
DE: Dover	07/16/02	1.56	0.12	ND	ND	ND
FL: Tampa	07/16/02	1.63	0.11	ND	ND	ND
GA: Atlanta	07/09/02	1.32	0.12	ND	ND	ND
HI: Honolulu	07/25/02	1.50	0.12	ND	ND	ND
IA: Des Moines	07/08/02	1.61	0.12	ND	ND	ND
IL: Chicago	08/08/02	1.49	0.12	ND	ND	ND
IN: Indianapolis	07/15/02	1.58	0.13	ND	ND	ND
KS: Wichita	07/16/02	1.54	0.12	ND	ND	ND
KY: Louisville	07/08/02	1.33	0.12	ND	ND	ND
MA: Boston	08/09/02	1.62	0.13	ND	ND	ND
MD: Baltimore	07/12/02	1.56	0.17	ND	ND	ND
MI: Detroit	07/16/02	1.61	0.12	ND	ND	ND
MI: Grand Rapids	07/09/02	1.53	0.12	ND	ND	ND
MO: Jefferson City	07/05/02	1.33	0.11	ND	ND	ND
NJ: Trenton	07/18/02	1.62	0.13	ND	ND	ND
NM: Albuquerque	07/11/02	1.69	0.12	ND	ND	ND
NV: Las Vegas	07/30/02	1.45	0.11	ND	ND	ND
NY: Buffalo	07/11/02	1.63	0.11	ND	ND	ND
NY: Syracuse	07/10/02	1.62	0.12	ND	ND	ND
OH: Cincinnati	09/23/02	1.44	0.16	ND	ND	ND
OH: Cleveland	07/16/02	1.55	0.12	ND	ND	ND
OR: Portland	07/08/02	1.47	0.11	ND	ND	ND
PA: Pittsburgh	07/10/02	1.56	0.12	ND	ND	ND
TN: Chattanooga	09/10/02	1.50	0.12	ND	ND	ND
TN: Knoxville	07/05/02	1.49	0.11	ND	ND	ND
TN: Memphis	07/15/02	1.51	0.12	ND	ND	ND
TX: Ft. Worth	09/25/02	1.49	0.12	ND	ND	ND
TX: San Antonio	07/24/02	1.44	0.11	ND	ND	ND
VA: Norfolk	08/26/02	1.62	0.16	ND	ND	ND
VT: Montpelier	08/28/02	1.56	0.12	ND	ND	ND
WA: Spokane	07/15/02	1.56	0.12	ND	ND	ND
WA: Tacoma	09/24/02	1.67	0.12	ND	ND	ND
WV: Charleston	07/05/02	1.57	0.12	ND	ND	ND

Note: ND = Not Detected

Table 11
Strontium-90 in Pasteurized Milk
July - September 2002

Location	Date Collected	⁹⁰ Sr pCi/L ± 2 <i>u</i>	
AZ: Phoenix	07/31/02	0.20	0.42
FL: Tampa	07/16/02	0.77	0.55
MI: Detroit	07/16/02	0.65	0.50
MO: Jefferson City	07/05/02	1.81	0.61
NM: Albuquerque	07/11/02	0.88	0.56
NY: Buffalo	07/11/02	0.54	0.49
WA: Spokane	07/15/02	1.17	0.41
WV: Charleston	07/05/02	2.1	1.3

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For More Information

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