

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
July 2000

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	0.006	0.006	0.006
AL: Montgomery/408	9	0.1	0.0	0.0	0.027	0.011	0.018
AL: Montgomery/411	9	0.1	0.0	0.0	0.013	0.008	0.010
AR: Little Rock	6	0.8	0.0	0.2	0.020	0.010	0.017
CA: Berkeley	8	0.1	0.0	0.0	0.005	0.001	0.003
CA: Los Angeles	8	0.2	0.0	0.1	0.010	0.005	0.008
CO: Denver	6	0.8	0.2	0.5	0.011	0.007	0.008
CT: Hartford	9	0.2	0.0	0.1	0.010	0.002	0.005
DE: Wilmington	9	0.2	0.0	0.1	0.014	0.005	0.008
FL: Jacksonville	7	0.5	0.0	0.1	0.016	0.006	0.011
FL: Miami	5	0.0	0.0	0.0	0.011	0.005	0.008
HI: Honolulu	8	0.2	0.1	0.1	0.003	0.001	0.002
IA: Iowa City	9	0.5	0.1	0.3	0.013	0.004	0.010
ID: Boise	11	2.6	0.3	0.8	0.041	0.003	0.012
ID: Idaho Falls	13				0.032	0.005	0.011
IL: Chicago	7	0.5	0.0	0.1	0.015	0.003	0.009
IN: Indianapolis	8	0.7	0.1	0.4	0.014	0.005	0.008
KS: Topeka	9	1.2	0.2	0.6	0.019	0.009	0.014
ME: Augusta	7	0.2	0.1	0.1	0.007	0.003	0.005
MI: Lansing	9	0.5	0.1	0.2	0.009	0.003	0.007
MN: Minneapolis	5	0.3	0.1	0.2	0.011	0.007	0.009
MS: Jackson	7	0.3	0.1	0.2	0.029	0.017	0.022
NC: Charlotte	1				0.012	0.012	0.012
NC: Wilmington	4				0.010	0.007	0.009
ND: Bismarck	3	0.2	0.1	0.2	0.011	0.006	0.008
NH: Concord	8	0.2	0.0	0.1	0.007	0.004	0.006
NV: Las Vegas	9	0.2	0.1	0.1	0.010	0.005	0.007
NY: Albany	4	0.1	0.0	0.0	0.009	0.005	0.007
NY: New York City	9	0.1	0.0	0.0	0.009	0.003	0.006
NY: Syracuse	1				0.007	0.007	0.007
NY: Yaphank	8	0.1	0.0	0.1	0.010	0.002	0.005
OH: Painesville	7	0.3	0.1	0.2	0.009	0.003	0.007
OH: Ross	8				0.018	0.009	0.012
OR: Portland	7	0.2	0.1	0.1	0.025	0.002	0.005
PA: Harrisburg	9	0.6	0.1	0.3	0.009	0.005	0.007
PA: Pittsburgh	9				0.013	0.005	0.008
SC: Barnwell	2	0.0	0.0	0.0	0.011	0.011	0.011
SC: Columbia	6	0.4	0.0	0.1	0.017	0.007	0.013

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2000

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	9	0.9	0.3	0.5	0.021	0.014	0.018
TN: Nashville	7	0.5	0.0	0.3	0.020	0.010	0.016
TN: Oak Ridge/Bethel	9	0.9	0.2	0.5	0.018	0.010	0.014
TN: Oak Ridge/K25	9	1.0	0.2	0.5	0.017	0.010	0.013
TN: Oak Ridge/Melton	9	0.9	0.3	0.6	0.021	0.010	0.013
TN: Oak Ridge/Y12 E	9	1.0	0.2	0.5	0.016	0.009	0.013
TN: Oak Ridge/Y12 W	9	0.3	0.2	0.3	0.021	0.009	0.014
TX: Austin	7	0.2	0.1	0.1	0.015	0.010	0.013
TX: El Paso	9	0.7	0.3	0.5	0.017	0.009	0.011
UT: Salt Lake City	4	0.2	0.1	0.1	0.016	0.008	0.011
VA: Lynchburg	8	0.9	0.3	0.4	0.011	0.006	0.009
WA: Olympia	5	0.1	0.1	0.1	0.003	0.002	0.002
WA: Spokane	13	0.6	0.1	0.3	0.046	0.002	0.009

Table 3
Gross Beta in Airborne Particulates
August 2000

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	0.003	0.003	0.003
AL: Montgomery/408	9	0.1	0.0	0.1	0.032	0.008	0.017
AL: Montgomery/411	9	0.1	0.0	0.1	0.015	0.005	0.011
AR: Little Rock	6	0.2	0.0	0.1	0.030	0.012	0.019
CA: Berkeley	9	0.1	0.0	0.1	0.005	0.001	0.004
CA: Los Angeles	8	0.3	0.0	0.1	0.011	0.007	0.009
CO: Denver	9	1.0	0.3	0.5	0.016	0.008	0.010
CT: Hartford	9	0.2	0.0	0.1	0.010	0.003	0.006
DE: Wilmington	8	0.3	0.1	0.1	0.015	0.006	0.009
FL: Jacksonville	9	0.1	0.0	0.1	0.015	0.004	0.009
FL: Miami	3	0.0	0.0	0.0	0.009	0.006	0.008
HI: Honolulu	7	0.2	0.1	0.1	0.004	0.002	0.003
IA: Iowa City	9	0.7	0.2	0.3	0.025	0.007	0.014
ID: Boise	5	0.7	0.1	0.4	0.012	0.009	0.011
ID: Idaho Falls	9				0.027	0.008	0.013
IL: Chicago	8	0.6	0.0	0.2	0.029	0.009	0.015
IN: Indianapolis	9	0.3	0.0	0.2	0.017	0.006	0.010
KS: Topeka	9	1.7	0.5	1.0	0.020	0.009	0.015
ME: Augusta	9	0.3	0.1	0.2	0.007	0.003	0.005
MI: Lansing	9	0.4	0.1	0.2	0.014	0.006	0.009
MN: Minneapolis	4	0.3	0.0	0.1	0.021	0.002	0.010
MN: Welch/510	2	0.3	0.3	0.3	0.015	0.011	0.013
MS: Jackson	8	0.4	0.1	0.2	0.036	0.010	0.021
NC: Wilmington	5				0.011	0.007	0.009
ND: Bismarck	9	1.3	0.5	0.8	0.021	0.007	0.012
NH: Concord	8	0.3	0.0	0.2	0.009	0.004	0.006
NV: Las Vegas	9	0.2	0.1	0.1	0.015	0.008	0.011
NY: Albany	5	0.1	0.0	0.0	0.011	0.004	0.007
NY: New York City	9	0.1	0.0	0.1	0.012	0.004	0.007
NY: Syracuse	3				0.010	0.007	0.009
NY: Yaphank	9	0.1	0.0	0.1	0.015	0.003	0.007
OH: Painesville	8	0.5	0.1	0.2	0.019	0.004	0.010
OH: Ross	9				0.023	0.002	0.012
OR: Portland	8	0.2	0.0	0.1	0.005	0.002	0.004
PA: Harrisburg	8	0.8	0.1	0.3	0.015	0.006	0.010
PA: Pittsburgh	9				0.014	0.006	0.010
SC: Barnwell	2	0.0	0.0	0.0	0.016	0.008	0.012
SC: Columbia	8	0.6	0.1	0.2	0.022	0.006	0.014

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2000

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	9	1.1	0.2	0.5	0.025	0.010	0.018
TN: Nashville	9	0.3	0.0	0.2	0.024	0.007	0.015
TN: Oak Ridge/Bethel	9	1.3	0.3	0.6	0.019	0.009	0.015
TN: Oak Ridge/K25	9	1.3	0.3	0.6	0.019	0.007	0.013
TN: Oak Ridge/Melton	9	1.6	0.4	0.8	0.018	0.008	0.014
TN: Oak Ridge/Y12 E	9	1.4	0.3	0.6	0.023	0.008	0.015
TN: Oak Ridge/Y12 W	9	0.6	0.2	0.3	0.020	0.008	0.013
TX: Austin	9	0.3	0.1	0.2	0.014	0.007	0.009
TX: El Paso	9	0.8	0.3	0.5	0.017	0.007	0.011
UT: Salt Lake City	5	0.3	0.0	0.1	0.018	0.010	0.013
VA: Lynchburg	8	0.8	0.4	0.6	0.012	0.006	0.010
WA: Olympia	9	0.1	0.0	0.1	0.005	0.002	0.003
WA: Spokane	9	0.2	0.1	0.2	0.009	0.005	0.007

Table 4
Gross Beta in Airborne Particulates
September 2000

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	0.003	0.003	0.003
AL: Montgomery/408	6	0.1	0.0	0.1	0.017	0.007	0.014
AL: Montgomery/411	8	0.1	0.0	0.0	0.007	0.003	0.006
AR: Little Rock	6	0.2	0.0	0.1	0.018	0.006	0.011
CA: Berkeley	9	0.1	0.0	0.1	0.012	0.004	0.008
CA: Los Angeles	9	0.3	0.1	0.2	0.015	0.006	0.010
CO: Denver	8	0.8	0.2	0.5	0.012	0.004	0.008
CT: Hartford	8	0.1	0.0	0.1	0.010	0.003	0.006
DE: Wilmington	9	0.3	0.1	0.1	0.011	0.004	0.008
FL: Jacksonville	9	0.1	0.0	0.1	0.012	0.004	0.007
FL: Miami	5	0.0	0.0	0.0	0.007	0.003	0.005
HI: Honolulu	9	0.2	0.1	0.1	0.004	0.002	0.002
IA: Iowa City	8	0.7	0.1	0.3	0.015	0.006	0.009
ID: Boise	6	0.5	0.1	0.3	0.014	0.006	0.009
ID: Idaho Falls	8				0.012	0.005	0.007
IL: Chicago	8	0.3	0.0	0.1	0.015	0.006	0.010
IN: Indianapolis	9	0.5	0.1	0.2	0.013	0.006	0.008
KS: Topeka	8	2.1	0.3	1.1	0.014	0.007	0.010
ME: Augusta	8	0.3	0.0	0.2	0.009	0.003	0.006
MI: Lansing	7	0.3	0.1	0.1	0.009	0.003	0.006
MN: Minneapolis	4	0.2	0.1	0.2	0.009	0.007	0.008
MN: Welch/510	1				0.007	0.007	0.007
MS: Jackson	8	0.4	0.1	0.2	0.028	0.005	0.012
NC: Charlotte	3	0.2	0.1	0.1	0.014	0.006	0.010
NC: Wilmington	4				0.007	0.005	0.006
ND: Bismarck	7	1.4	0.4	0.7	0.014	0.005	0.008
NH: Concord	8	0.3	0.1	0.2	0.012	0.004	0.007
NJ: Trenton	2				0.021	0.010	0.015
NV: Las Vegas	8	0.3	0.1	0.2	0.021	0.006	0.011
NY: Albany	4	0.1	0.0	0.0	0.013	0.005	0.008
NY: New York City	8	0.1	0.0	0.0	0.012	0.003	0.007
NY: Syracuse	3				0.012	0.007	0.008
NY: Yaphank	6	0.2	0.0	0.1	0.011	0.003	0.007
OH: Painesville	8	0.3	0.1	0.2	0.012	0.006	0.008
OH: Ross	9				0.013	0.003	0.008
OR: Portland	9	0.2	0.0	0.1	0.016	0.002	0.006
PA: Harrisburg	9	0.4	0.0	0.2	0.016	0.005	0.009
PA: Pittsburgh	8				0.013	0.004	0.008

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2000

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
SC: Barnwell	1	0.1	0.1	0.1	0.009	0.009	0.009
SC: Columbia	8	0.5	0.1	0.2	0.016	0.005	0.010
TN: Knoxville	8	0.5	0.0	0.1	0.021	0.008	0.013
TN: Nashville	6	0.2	0.0	0.1	0.014	0.008	0.011
TN: Oak Ridge/Bethel	8	0.8	0.2	0.5	0.014	0.007	0.010
TN: Oak Ridge/K25	8	0.7	0.2	0.5	0.014	0.007	0.009
TN: Oak Ridge/Melton	8	0.9	0.2	0.6	0.013	0.007	0.010
TN: Oak Ridge/Y12 E	8	0.8	0.2	0.5	0.014	0.007	0.010
TN: Oak Ridge/Y12 W	8	0.6	0.1	0.3	0.013	0.007	0.009
TX: Austin	8	0.3	0.1	0.2	0.017	0.005	0.010
TX: El Paso	7	0.9	0.2	0.6	0.020	0.012	0.016
UT: Salt Lake City	5	0.4	0.0	0.2	0.014	0.006	0.010
VA: Lynchburg	9	1.1	0.2	0.5	0.012	0.003	0.007
WA: Olympia	9	0.1	0.0	0.1	0.013	0.003	0.005
WA: Spokane	8	0.4	0.1	0.2	0.018	0.003	0.008

Table 5
Gross Beta and Specific Gamma in Precipitation
July 2000

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	2.64	0.45	Be7	51 35
CO: Denver	0.43	0.38	Pb212	6.7 6.7
			K40	23 36
			Pb212	3.3 5.9
CT: Hartford	1.99	0.41	Tl208	2.1 3.7
			Be7	27 28
DE: Wilmington	6.37	0.62	Be7	66 39
FL: Jacksonville	4.38	0.54	Be7	55 38
			K40	36 35
FL: Miami	0.73	0.34		ND
HI: Honolulu	10.39	0.80	K40	29 35
IA: Iowa City	0.60	0.32		ND
ID: Idaho Falls	10.6	1.3	Be7	95 40
KS: Topeka	1.43	0.43	K40	21 36
			Pb212	3.9 6.2
			K40	46 36
ME: Augusta	2.22	0.42	Tl208	2.4 3.7
				ND
MI: Lansing	0.83	0.34		ND
MN: Minneapolis	0.77	0.41		ND
NC: Wilmington	2.22	0.43	Be7	52 39
ND: Bismarck	1.38	0.42	Bi212	32 43
NH: Concord	3.59	0.50	Be7	82 40
			Bi212	43 43
			K40	41 35
			Pb212	4.3 6.1
NM: Santa Fe	1.71	0.47		ND
NY: Albany	0.60	0.32	K40	32 39
			Pb212	3.6 6.1
NY: Syracuse	0.15	0.29	K40	18 34
			Tl208	2.2 3.7
NY: Yaphank	10.06	0.75	K40	71 38
			Pb212	6.1 6.0
OH: Painesville	2.48	0.43		ND
OR: Portland	0.14	0.34		ND
PA: Harrisburg	4.69	0.55	Be7	68 35
SC: Barnwell	3.70	0.50	Be7	43 35
SC: Columbia	1.55	0.38	Be7	45 35

Note: ND = Not Detected

Table 5 (continued)
Gross Beta and Specific Gamma in Precipitation
July 2000

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
TN: Knoxville	4.96	0.57	Tl208	1.9 3.6
TN: Nashville	2.13	0.43	Be7	34 36
TX: Austin	0.82	0.40	Pb212	4.1 6.2
TX: El Paso	0.60	0.38	Pb212	5.6 6.8
UT: Salt Lake City	4.59	0.62		ND
VA: Lynchburg	5.88	0.60		ND

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
August 2000

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	2.47	0.44	Be7	74 33
AZ: Phoenix	3.17	0.48	Tl208	3.1 4.4
CO: Denver	2.23	0.43	Be7	89 35
CT: Hartford	2.74	0.46	Be7	68 21
DE: Wilmington	4.73	0.54	Be7	79 20
FL: Jacksonville	2.85	0.46	Be7	80 30
FL: Miami	0.82	0.34	K40	11 14
HI: Honolulu	1.22	0.37		ND
IA: Iowa City	0.50	0.32	Tl208	2.7 3.7
ID: Idaho Falls	4.70	0.56	Be7	145 35
KS: Topeka	0.64	0.33		ND
ME: Augusta	3.13	0.47	Be7	58 20
MI: Lansing	1.01	0.35	Tl208	3.0 4.1
MN: Minneapolis	0.39	0.32		ND
NC: Wilmington	2.97	0.47	Be7	51 19
ND: Bismarck	1.18	0.36	K40	21 38
NH: Concord	1.77	0.40		ND
NM: Santa Fe	0.85	0.33		ND
NY: Albany	1.34	0.37	Be7	32 21
NY: Syracuse	0.97	0.35	Tl208	1.3 1.5
NY: Yaphank	6.03	0.60		ND
OH: Painesville	3.57	0.50	Be7	77 37
			Pb212	4.7 5.7
			Ra224	48 62
PA: Harrisburg	2.38	0.43	Be7	29 30
SC: Barnwell	2.75	0.46	Be7	30 21
SC: Columbia	1.60	0.39		ND
TN: Knoxville	7.88	0.68	K40	16 13
TN: Nashville	1.31	0.38	Be7	62 19
TX: Austin	1.33	0.38		ND
TX: El Paso	0.99	0.35	Tl208	2.7 4.0
VA: Lynchburg	4.52	0.54	K40	23 38
WA: Olympia	3.07	0.49		ND

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
September 2000

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.73	0.40		ND
AR: Little Rock	0.62	0.40		ND
CO: Denver	0.54	0.37	Tl208	4.5 5.2
CT: Hartford	1.20	0.44		ND
DE: Wilmington	1.32	0.44		ND
FL: Jacksonville	0.25	0.37		ND
FL: Miami	0.04	0.37		ND
HI: Honolulu	2.39	0.48		ND
IA: Iowa City	0.50	0.40		ND
ID: Boise	4.31	0.57		ND
ID: Idaho Falls	9.6	7.4		ND
KS: Topeka	2.15	0.50		ND
MI: Lansing	0.58	0.40		ND
MN: Minneapolis	0.39	0.39		ND
MN: Welch	2.1	1.4		ND
NC: Charlotte	0.92	0.42	Tl208	1.8 2.8
NC: Wilmington	0.06	0.38		ND
ND: Bismarck	1.31	0.42		ND
NH: Concord	1.45	0.44		ND
NV: Las Vegas	46.6	6.0	K40	40 43
NY: Albany	0.84	0.43		ND
NY: Syracuse	0.33	0.39	Pb212	4.5 6.4
NY: Yaphank	4.82	0.60		ND
OH: Painesville	0.82	0.40		ND
OR: Portland	0.49	0.39	Be7	66 40
SC: Barnwell	3.35	0.54		ND
SC: Columbia	0.61	0.41		ND
TN: Knoxville	3.83	0.58	K40	35 49
TN: Nashville	1.14	0.43		ND
TX: Austin	0.40	0.37		ND
UT: Salt Lake City	1.15	0.43	Be7	71 54
VA: Lynchburg	4.96	0.61		ND
WA: Olympia	0.30	0.36		ND

Note: ND = Not Detected

Table 8
Tritium in Precipitation
July - September 2000

Location	July 2000		August 2000		September 2000	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery	20	79	-2	76	47	76
AR: Little Rock	NS		NS		43	78
AZ: Phoenix	NS		0	76	NS	
CO: Denver	72	75	49	78	62	78
CT: Hartford	81	82	99	82	-39	78
DE: Wilmington	5	79	66	78	-61	77
FL: Jacksonville	-8	79	8	77	-61	77
FL: Miami	58	81	-24	74	96	79
HI: Honolulu	68	75	-74	72	-10	74
IA: Iowa City	0	78	46	78	54	77
ID: Boise	NS		NS		-22	78
ID: Idaho Falls	63	75	-9	75	65	79
KS: Topeka	69	76	-55	74	16	76
ME: Augusta	-10	78	36	77	NS	
MI: Lansing	40	80	-3	76	58	77
MN: Minneapolis	137	79	8	77	64	78
MN: Welch	NS		NS		66	78
NC: Charlotte	NS		NS		-42	78
NC: Wilmington	17	80	37	77	-65	78
ND: Bismarck	85	76	4	76	70	79
NH: Concord	42	81	-59	73	-55	78
NM: Santa Fe	37	74	-58	73	NS	
NV: Las Vegas	NS		NS		64	78
NY: Albany	20	79	26	78	18	81
NY: Syracuse	65	80	10	76	-36	79
NY: Yaphank	21	79	-7	75	-29	79
OH: Painesville	58	81	39	77	34	76
OR: Portland	98	77	NS		-35	74
PA: Harrisburg	35	81	39	78	NS	
SC: Barnwell	66	81	249	86	75	78
SC: Columbia	67	81	145	82	-93	76
TN: Knoxville	15	79	8	76	79	78
TN: Nashville	40	81	24	76	29	75
TX: Austin	10	73	-68	72	42	76
TX: El Paso	46	74	-17	74	NS	
UT: Salt Lake City	61	76	NS		29	76
VA: Lynchburg	21	79	92	79	25	80
WA: Olympia	NS		-18	75	-57	77

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 2000

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	07/31/00	94	78
AL: Dothan	07/11/00	-26	72
AL: Montgomery	07/12/00	61	77
AL: Muscle Shoals	07/18/00	78	81
AL: Scottsboro	07/19/00	240	87
AR: Little Rock	07/11/00	7	74
CA: Berkeley	07/12/00	-12	77
CA: Los Angeles	07/12/00	-35	75
CO: Denver	07/31/00	50	84
CT: Hartford	07/07/00	38	77
DE: Dover	07/10/00	-12	72
FL: Miami	07/25/00	-30	80
GA: Baxley	07/11/00	-35	75
GA: Savannah	07/13/00	-43	75
HI: Honolulu	07/10/00	-39	72
IA: Cedar Rapids	07/07/00	30	76
ID: Idaho Falls	07/13/00	-4	78
IL: Morris	09/08/00	-28	71
IL: W. Chicago	08/10/00	-7	81
KS: Topeka	07/05/00	41	77
LA: New Orleans	07/11/00	-16	76
MA: Lawrence	07/10/00	-49	76
MD: Baltimore	07/17/00	4	77
MD: Conowingo	08/01/00	10	83
ME: Augusta	07/11/00	-41	74
MI: Detroit	08/16/00	103	85
MI: Grand Rapids	08/08/00	11	82
MN: Minneapolis	07/31/00	28	83
MN: Red Wing	07/10/00	-21	73
MO: Jefferson City	07/05/00	52	78
MS: Jackson	07/12/00	-42	75
MS: Port Gibson	07/11/00	-62	74
MT: Helena	08/09/00	41	83
NC: Charlotte	07/25/00	89	85
NC: Wilmington	07/17/00	-37	76
ND: Bismarck	07/05/00	90	78
NE: Lincoln	07/05/00	22	76
NH: Concord	07/07/00	11	74
NJ: Trenton	09/05/00	75	75
NJ: Waretown	09/06/00	63	75

Table 9 (continued)
Tritium in Drinking Water
July - September 2000

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NM: Santa Fe	07/11/00	-12	77
NV: Las Vegas	07/12/00	2	77
NY: Albany	07/07/00	21	78
NY: Niagara Falls	08/24/00	177	80
NY: Syracuse	09/27/00	-14	75
OH: Cincinnati	09/15/00	10	75
OH: Columbus	09/20/00	12	78
OH: E. Liverpool	08/02/00	25	83
OH: Painesville	07/06/00	153	81
OH: Toledo	07/07/00	150	79
OK: Oklahoma City	07/07/00	30	76
OR: Portland	07/11/00	-18	73
PA: Columbia	08/03/00	55	83
PA: Harrisburg	08/03/00	-20	81
PA: Philadelphia/Baxter	07/26/00	27	83
PA: Philadelphia/Queen	07/26/00	28	83
PA: Pittsburgh	08/02/00	3	81
RI: Providence	07/07/00	-35	71
SC: Barnwell	07/26/00	-23	80
SC: Columbia	07/14/00	364	94
SC: Jenkinsville	07/14/00	-12	77
SC: Seneca	07/17/00	2	76
TN: Chattanooga	07/06/00	399	92
TN: Knoxville	07/20/00	183	89
TN: Oak Ridge - Anderson Co. #768	09/26/00	-69	73
TN: Oak Ridge - Anderson Co. #772	09/25/00	-14	75
TN: Oak Ridge - Knox Co. #371	09/25/00	-30	74
TN: Oak Ridge - Roane Co. #360	09/25/00	-41	73
TN: Oak Ridge - Roane Co. #4442	09/28/00	266	87
TX: Austin	07/10/00	45	75
VA: Ashland	07/24/00	96	86
VA: Lynchburg	07/11/00	-5	78
WA: Richland	07/21/00	296	93
WI: Genoa	08/21/00	-7	72

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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 2000

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	08/08/00	1.63	0.10	ND	ND	ND
AR: Little Rock	09/26/00	1.67	0.11	ND	ND	ND
AZ: Phoenix	08/08/00	1.67	0.11	ND	ND	ND
CA: Los Angeles	08/02/00	1.67	0.12	ND	ND	ND
CA: Sacramento	08/15/00	1.60	0.12	ND	ND	ND
CA: San Francisco	08/10/00	1.69	0.11	ND	ND	ND
CT: Hartford	08/14/00	1.67	0.13	ND	ND	ND
DE: Wilmington	08/08/00	1.70	0.11	ND	ND	ND
FL: Tampa	08/02/00	1.55	0.12	ND	ND	ND
GA: Atlanta	08/02/00	1.64	0.13	ND	ND	ND
HI: Honolulu	08/15/00	1.66	0.13	ND	ND	ND
IA: Des Moines	07/31/00	1.62	0.13	ND	ND	ND
IL: Chicago	09/07/00	1.66	0.13	ND	ND	ND
IN: Indianapolis	08/17/00	1.55	0.12	ND	ND	ND
KS: Wichita	08/08/00	1.72	0.11	ND	ND	ND
KY: Louisville	08/07/00	1.70	0.11	ND	ND	ND
MA: Boston	08/07/00	1.64	0.11	ND	ND	ND
MD: Baltimore	08/04/00	1.63	0.10	ND	ND	ND
MI: Detroit	08/09/00	1.72	0.11	ND	ND	ND
MI: Grand Rapids	08/02/00	1.51	0.12	ND	ND	ND
MO: Jefferson City	08/16/00	1.57	0.12	ND	ND	ND
MS: Jackson	08/01/00	1.50	0.16	ND	ND	ND
NM: Albuquerque	08/10/00	1.76	0.11	ND	ND	ND
NV: Las Vegas	08/08/00	1.70	0.11	ND	ND	ND
NY: Buffalo	08/03/00	1.72	0.11	ND	ND	ND
NY: Syracuse	08/03/00	1.53	0.12	ND	ND	ND
OH: Cincinnati	08/14/00	1.62	0.10	ND	ND	ND
OH: Cleveland	08/01/00	1.45	0.12	ND	ND	ND
OR: Portland	08/02/00	1.68	0.12	ND	ND	ND
PA: Philadelphia	08/07/00	1.70	0.11	ND	ND	ND
PA: Pittsburgh	08/08/00	1.56	0.12	ND	ND	ND
PR: San Juan	08/08/00	1.67	0.11	ND	ND	ND
SD: Rapid City	08/09/00	1.72	0.11	ND	ND	ND
TN: Chattanooga	08/07/00	1.70	0.11	ND	ND	ND
TN: Knoxville	08/16/00	1.58	0.13	ND	ND	ND
TN: Memphis	08/30/00	1.58	0.12	ND	ND	ND
TX: Ft. Worth	08/01/00	1.58	0.12	ND	ND	ND
TX: San Antonio	08/02/00	1.50	0.12	ND	ND	ND
VA: Norfolk	08/09/00	1.70	0.11	ND	ND	ND

Note: ND = Not Detected

Table 10 (continued)
Radionuclides in Pasteurized Milk
July - September 2000

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	08/15/00	1.60	0.12	ND	ND	ND
WA: Spokane	08/01/00	1.69	0.11	ND	ND	ND
WA: Tacoma	09/14/00	1.61	0.13	ND	ND	ND
WV: Charleston	08/02/00	1.53	0.12	ND	ND	ND

Note: ND = Not Detected

Table 11
Strontium-90 in Pasteurized Milk
July - September 2000

Location	Date Collected	⁹⁰ Sr pCi/L ± 2 <i>u</i>	
CA: Sacramento	08/15/00	-0.06	0.39
HI: Honolulu	08/15/00	0.37	0.43
KS: Wichita	08/08/00	0.57	0.45
KY: Louisville	08/07/00	0.89	0.50
MA: Boston	08/07/00	0.79	0.51
MI: Grand Rapids	08/02/00	0.81	0.50
NY: Syracuse	08/03/00	0.71	0.45
OH: Cincinnati	08/14/00	1.10	0.60
PA: Pittsburgh	08/08/00	1.08	0.55
TN: Knoxville	08/16/00	1.34	0.51
TX: San Antonio	08/02/00	0.03	0.39
WA: Tacoma	09/14/00	0.32	0.40

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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