

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 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	0.010	0.010	0.010
AL: Montgomery/408	10	0.0	0.0	0.0	0.034	0.011	0.022
AL: Montgomery/411	9	0.0	0.0	0.0	0.016	0.008	0.011
AR: Little Rock	7	0.1	0.0	0.0	0.025	0.014	0.021
AZ: Phoenix	1	0.3	0.3	0.3	0.011	0.011	0.011
CA: Berkeley	9	0.3	0.0	0.1	0.040	0.003	0.017
CA: Los Angeles	9	0.4	0.0	0.2	0.027	0.004	0.014
CO: Denver	9	0.8	0.2	0.5	0.029	0.007	0.014
CT: Hartford	9	0.1	0.0	0.1	0.011	0.003	0.008
DE: Wilmington	9	0.2	0.0	0.1	0.021	0.005	0.012
FL: Jacksonville	9	0.2	0.0	0.1	0.015	0.006	0.011
FL: Miami	4	0.0	0.0	0.0	0.013	0.006	0.010
HI: Honolulu	8	0.1	0.1	0.1	0.005	0.002	0.003
IA: Iowa City	9	0.1	0.0	0.0	0.032	0.013	0.021
ID: Boise	2	0.3	0.2	0.2	0.052	0.049	0.050
ID: Idaho Falls	9				0.046	0.006	0.024
IN: Indianapolis	9	0.7	0.1	0.2	0.021	0.007	0.014
KS: Topeka	8	1.4	0.2	0.5	0.037	0.008	0.020
ME: Augusta	7	0.1	0.0	0.0	0.018	0.002	0.011
MI: Lansing	9	0.1	0.0	0.0	0.021	0.008	0.014
MN: Minneapolis	5	0.1	0.0	0.1	0.022	0.012	0.016
MN: Welch/510	3				0.022	0.015	0.018
MS: Jackson	9	0.3	0.0	0.1	0.022	0.011	0.017
NC: Charlotte	2				0.014	0.014	0.014
NC: Wilmington	5				0.028	0.008	0.015
ND: Bismarck	7	0.3	0.0	0.1	0.027	0.006	0.017
NH: Concord	9	0.0	0.0	0.0	0.015	0.002	0.010
NV: Las Vegas	9	0.3	0.1	0.2	0.027	0.005	0.014
NY: Albany	5	0.0	0.0	0.0	0.012	0.006	0.010
NY: New York City	9	0.1	0.0	0.0	0.015	0.004	0.009
NY: Syracuse	5				0.015	0.008	0.012
NY: Yaphank	8	0.1	0.0	0.1	0.019	0.004	0.010
OH: Painesville	9	0.1	0.0	0.1	0.017	0.008	0.013
OH: Ross	9				0.022	0.008	0.014
OR: Portland	8	0.1	0.0	0.1	0.018	0.004	0.011
PA: Harrisburg	9	0.2	0.0	0.1	0.025	0.009	0.014
PA: Pittsburgh	9				0.020	0.007	0.013
SC: Barnwell	1	0.0	0.0	0.0	0.013	0.013	0.013

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

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
SC: Columbia	8	0.5	0.0	0.1	0.028	0.008	0.014
TN: Knoxville	8	0.6	0.1	0.3	0.024	0.011	0.018
TN: Nashville	5	0.2	0.1	0.1	0.020	0.014	0.017
TN: Oak Ridge/Bethel	7	0.4	0.1	0.2	0.018	0.010	0.013
TN: Oak Ridge/K25	7	0.4	0.1	0.3	0.018	0.009	0.013
TN: Oak Ridge/Melton	7	0.3	0.1	0.2	0.016	0.008	0.012
TN: Oak Ridge/Y12 E	7	0.4	0.1	0.3	0.017	0.010	0.013
TN: Oak Ridge/Y12 W	7	0.3	0.1	0.2	0.022	0.012	0.016
TX: Austin	9	0.2	0.0	0.1	0.022	0.005	0.013
TX: El Paso	6	1.3	0.5	0.7	0.024	0.009	0.016
UT: Salt Lake City	5	0.1	0.0	0.0	0.033	0.013	0.021
VA: Lynchburg	8	0.4	0.0	0.2	0.012	0.008	0.009
WA: Olympia	8	0.1	0.0	0.1	0.015	0.003	0.008
WA: Spokane	2	0.1	0.1	0.1	0.049	0.011	0.030

Table 3
Gross Beta in Airborne Particulates
February 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	8	0.0	0.0	0.0	0.017	0.006	0.010
AR: Little Rock	7	0.1	0.0	0.1	0.041	0.007	0.014
AZ: Phoenix	4	0.7	0.3	0.5	0.012	0.008	0.010
CA: Berkeley	8	0.3	0.0	0.1	0.009	0.002	0.005
CA: Los Angeles	8	0.5	0.0	0.2	0.021	0.003	0.008
CO: Denver	8	0.8	0.1	0.3	0.028	0.007	0.015
CT: Hartford	8	0.1	0.0	0.0	0.012	0.006	0.008
DE: Wilmington	8	0.2	0.0	0.1	0.016	0.008	0.012
FL: Jacksonville	7	0.1	0.0	0.1	0.011	0.006	0.009
FL: Miami	4	0.0	0.0	0.0	0.010	0.005	0.007
HI: Honolulu	7	0.2	0.0	0.1	0.005	0.002	0.003
IA: Iowa City	8				0.032	0.013	0.020
ID: Boise	2	0.1	0.1	0.1	0.020	0.009	0.015
ID: Idaho Falls	8				0.030	0.008	0.017
IN: Indianapolis	8	0.2	0.1	0.1	0.017	0.010	0.013
KS: Topeka	7	0.3	0.0	0.1	0.023	0.011	0.015
ME: Augusta	7	0.1	0.0	0.1	0.015	0.008	0.011
MI: Lansing	8	0.1	0.0	0.0	0.018	0.009	0.013
MN: Minneapolis	4	0.1	0.0	0.1	0.022	0.013	0.017
MN: Welch/510	1				0.019	0.019	0.019
MS: Jackson	8	0.2	0.1	0.1	0.016	0.007	0.011
NC: Charlotte	2	0.0	0.0	0.0	0.016	0.012	0.014
NC: Wilmington	4				0.012	0.009	0.010
ND: Bismarck	6	0.1	0.0	0.0	0.029	0.010	0.018
NH: Concord	8	0.0	0.0	0.0	0.013	0.006	0.010
NV: Las Vegas	8	0.3	0.1	0.1	0.010	0.003	0.006
NY: Albany	4	0.0	0.0	0.0	0.028	0.007	0.014
NY: New York City	7	0.0	0.0	0.0	0.013	0.009	0.011
NY: Syracuse	4				0.012	0.007	0.010
NY: Yaphank	7	0.1	0.0	0.0	0.013	0.006	0.010
OH: Painesville	8	0.1	0.1	0.1	0.016	0.011	0.013
OH: Ross	9				0.023	0.007	0.013
OR: Portland	7	0.4	0.0	0.1	0.014	0.004	0.009
PA: Harrisburg	8	0.2	0.0	0.1	0.017	0.011	0.013
PA: Pittsburgh	8				0.018	0.010	0.014
SC: Barnwell	2	0.2	0.1	0.1	0.032	0.008	0.020
SC: Columbia	7	0.6	0.0	0.2	0.014	0.007	0.010
TN: Knoxville	7	0.5	0.1	0.2	0.018	0.009	0.015

Table 3 (continued)
Gross Beta in Airborne Particulates
February 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	0.2	0.1	0.1	0.019	0.005	0.012
TN: Oak Ridge/Bethel	7	0.6	0.1	0.2	0.014	0.008	0.011
TN: Oak Ridge/K25	7	0.5	0.1	0.2	0.015	0.007	0.011
TN: Oak Ridge/Melton	7	0.5	0.1	0.2	0.015	0.007	0.010
TN: Oak Ridge/Y12 E	7	0.9	0.1	0.3	0.016	0.007	0.011
TN: Oak Ridge/Y12 W	7	0.4	0.1	0.2	0.018	0.008	0.013
TX: Austin	8	0.2	0.1	0.1	0.021	0.006	0.011
TX: El Paso	8	1.2	0.1	0.8	0.021	0.007	0.014
UT: Salt Lake City	4	0.1	0.0	0.0	0.014	0.006	0.011
VA: Lynchburg	7	0.4	0.2	0.2	0.013	0.007	0.010
WA: Olympia	7	0.2	0.0	0.1	0.009	0.002	0.005
WA: Spokane	7	0.1	0.1	0.1	0.029	0.006	0.014

Table 4
Gross Beta in Airborne Particulates
March 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	0.012	0.012	0.012
AL: Montgomery/408	2	0.0	0.0	0.0	0.004	0.004	0.004
AL: Montgomery/411	9	0.0	0.0	0.0	0.015	0.005	0.009
AR: Little Rock	9	0.1	0.0	0.0	0.017	0.007	0.013
AZ: Phoenix	4	0.5	0.1	0.3	0.014	0.006	0.010
CA: Berkeley	9	0.1	0.0	0.1	0.010	0.003	0.005
CA: Los Angeles	9	0.2	0.0	0.1	0.012	0.005	0.008
CO: Denver	9	0.9	0.2	0.6	0.021	0.005	0.011
CT: Hartford	8	0.1	0.0	0.0	0.006	0.002	0.005
DE: Wilmington	9	0.2	0.0	0.1	0.012	0.005	0.008
FL: Jacksonville	9	0.1	0.0	0.1	0.011	0.005	0.008
FL: Miami	8	0.0	0.0	0.0	0.014	0.005	0.008
HI: Honolulu	7	0.1	0.1	0.1	0.005	0.003	0.004
IA: Iowa City	9				0.017	0.009	0.013
ID: Boise	7	0.4	0.2	0.3	0.015	0.005	0.009
ID: Idaho Falls	9				0.021	0.006	0.011
IN: Indianapolis	9	0.7	0.1	0.3	0.015	0.007	0.011
KS: Topeka	9	0.4	0.1	0.2	0.019	0.007	0.013
ME: Augusta	7	0.1	0.0	0.0	0.014	0.007	0.009
MI: Lansing	9	0.5	0.0	0.1	0.017	0.008	0.012
MN: Minneapolis	4	0.1	0.0	0.1	0.013	0.010	0.012
MN: Welch/510	2				0.012	0.012	0.012
MS: Jackson	9	0.2	0.1	0.1	0.014	0.006	0.010
NC: Wilmington	4				0.010	0.007	0.009
ND: Bismarck	8	0.3	0.0	0.1	0.018	0.007	0.012
NH: Concord	8	0.0	0.0	0.0	0.011	0.002	0.007
NV: Las Vegas	9	0.2	0.0	0.1	0.011	0.002	0.008
NY: Albany	4	0.0	0.0	0.0	0.009	0.006	0.007
NY: New York City	9	0.0	0.0	0.0	0.011	0.003	0.008
NY: Syracuse	2				0.011	0.006	0.009
NY: Yaphank	8	0.1	0.0	0.1	0.013	0.001	0.007
OH: Painesville	7	0.2	0.1	0.1	0.017	0.007	0.011
OH: Ross	8				0.016	0.006	0.011
OR: Portland	8	0.1	0.0	0.1	0.009	0.003	0.006
PA: Harrisburg	9	0.5	0.1	0.1	0.013	0.006	0.009
PA: Pittsburgh	9				0.016	0.005	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	0.011	0.006	0.008

Table 4 (continued)
Gross Beta in Airborne Particulates
March 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	9	0.7	0.1	0.3	0.021	0.007	0.013
TN: Nashville	9	0.2	0.0	0.1	0.018	0.005	0.012
TN: Oak Ridge/Bethel	9	0.3	0.1	0.2	0.012	0.004	0.009
TN: Oak Ridge/K25	9	0.4	0.1	0.2	0.012	0.004	0.009
TN: Oak Ridge/Melton	9	0.3	0.1	0.2	0.012	0.003	0.009
TN: Oak Ridge/Y12 E	9	0.4	0.1	0.2	0.013	0.004	0.009
TN: Oak Ridge/Y12 W	9	0.3	0.1	0.2	0.015	0.005	0.011
TX: Austin	8	0.1	0.0	0.1	0.014	0.007	0.010
TX: El Paso	9	1.0	0.4	0.7	0.017	0.007	0.011
UT: Salt Lake City	6	0.2	0.0	0.1	0.015	0.006	0.009
VA: Lynchburg	9	0.3	0.1	0.2	0.010	0.003	0.006
WA: Olympia	7	0.1	0.0	0.1	0.007	0.002	0.004
WA: Spokane	9	0.2	0.1	0.1	0.014	0.005	0.009

Table 5
Gross Beta and Specific Gamma in Precipitation
January 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	1.66	0.40	Be7	57 29
			Bi214	6.6 3.0
			Tl208	1.8 1.6
AR: Little Rock	0.55	0.31		ND
AZ: Phoenix	1.09	0.37		ND
CA: Berkeley	0.08	0.27	Bi214	6.1 2.6
			K40	11 13
CO: Denver	0.89	0.35		ND
CT: Hartford	1.34	0.38	Be7	54 26
			Bi214	9.0 2.8
			Pb214	5.7 3.3
FL: Jacksonville	0.86	0.34	Pb212	3.6 5.7
FL: Miami	1.72	0.43	K40	44 67
HI: Honolulu	4.14	0.54		ND
IA: Iowa City	0.92	0.35		ND
ID: Boise	1.54	0.38	K40	23 40
ID: Idaho Falls	1.98	0.41		ND
KS: Topeka	8.85	0.73	Bi214	8.3 7.1
			Pb212	5.5 6.5
MN: Minneapolis	1.51	0.41		ND
MN: Welch	0.47	0.32		ND
MS: Jackson	2.2	1.1		ND
NC: Charlotte	3.44	0.50	Be7	73 54
			Pb212	4.9 6.7
NC: Wilmington	0.77	0.33		ND
ND: Bismarck	1.89	0.41	Be7	82 57
			K40	19 36
NV: Las Vegas	1.45	0.38		ND
NY: Albany	0.45	0.33	Be7	45 26
OH: Painesville	8.92	0.72	Be7	112 62
OR: Portland	1.24	0.37	K40	40 63
PA: Harrisburg	0.39	0.31		ND
SC: Barnwell	1.74	0.40	Tl208	3.1 3.7
SC: Columbia	2.90	0.47	K40	27 40
TN: Knoxville	0.49	0.32		ND
TN: Nashville	0.73	0.34		ND
TX: Austin	0.71	0.32	Pb212	6.5 6.1

Note: ND = Not Detected

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

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
UT: Salt Lake City	1.03	0.36		ND
VA: Lynchburg	0.23	0.30	Pb212	4.6 6.0
WA: Olympia	0.67	0.32	Be7	51 35

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
February 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	0.99	0.35	Be7	46 46
			Pb212	5.0 6.7
AR: Little Rock	1.25	0.35	Be7	44 24
AZ: Phoenix	1.99	0.42	Pb212	5.6 5.8
CA: Berkeley	0.31	0.29		ND
CO: Denver	0.92	0.35	Tl208	2.3 3.6
CT: Hartford	1.62	0.39	Be7	66 38
			Pb212	7.2 5.9
			Be7	44 38
FL: Jacksonville	0.98	0.35		
HI: Honolulu	1.67	0.41		ND
IA: Iowa City	0.09	0.27		ND
ID: Idaho Falls	0.45	0.32		ND
KS: Topeka	0.33	0.29		ND
MN: Minneapolis	0.77	0.33		ND
MS: Jackson	0.22	0.28		ND
NC: Wilmington	1.11	0.35		ND
ND: Bismarck	1.41	0.39		ND
NV: Las Vegas	0.51	0.31	Tl208	2.4 3.4
NY: Albany	2.78	0.45	Be7	76 43
			Pb212	5.2 6.6
NY: Yaphank	2.24	0.42	Be7	60 41
			Bi214	15.6 7.5
			Pb212	5.9 6.7
			Tl208	2.8 3.8
OH: Painesville	2.79	0.45	Be7	73 29
OR: Portland	0.79	0.32	K40	33 65
PA: Harrisburg	1.14	0.36	Be7	59 40
			Pb212	5.2 6.1
			Tl208	2.7 3.6
SC: Barnwell	1.91	0.40	Pb212	7.3 5.9
			Tl208	3.4 3.5
SC: Columbia	1.77	0.39		ND
TN: Knoxville	0.70	0.32	K40	20 36
TN: Nashville	0.60	0.31		ND
UT: Salt Lake City	1.71	0.40		ND
VA: Lynchburg	4.09	0.51		ND
WA: Olympia	0.40	0.30		ND

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
March 2001

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
AL: Montgomery	1.12	0.36	Be7	85 55
AR: Little Rock	1.35	0.36		ND
AZ: Phoenix	0.44	0.30		ND
CA: Berkeley	0.13	0.28	Pb212	5.3 7.3
CO: Denver	1.09	0.36		ND
CT: Hartford	1.09	0.35		ND
FL: Jacksonville	0.64	0.31		ND
FL: Miami	0.77	0.35	Pb212	7.3 6.8
HI: Honolulu	2.80	0.46	Bi214	24.1 7.8
			Tl208	3.6 3.8
IA: Iowa City	0.34	0.30		ND
ID: Boise	0.79	0.34		ND
ID: Idaho Falls	0.62	0.32		ND
KS: Topeka	0.41	0.29		ND
MN: Minneapolis	1.26	0.38	K40	21 29
MN: Welch	0.16	0.29	Bi212	26 25
MS: Jackson	0.33	0.28	Tl208	2.8 3.5
NC: Wilmington	1.17	0.36	K40	48 30
ND: Bismarck	2.25	0.46	Be7	47 49
			Pb212	4.8 7.1
NV: Las Vegas	0.08	0.28	K40	34 36
			Pb212	5.2 6.8
NY: Albany	1.11	0.36	Be7	58 61
NY: Yaphank	0.81	0.33		ND
OH: Painesville	4.89	0.55	Be7	57 50
OR: Portland	0.52	0.30	Pb212	9.0 5.7
			Tl208	2.7 3.9
PA: Harrisburg	0.87	0.33		ND
SC: Barnwell	0.64	0.32		ND
SC: Columbia	1.31	0.37	Be7	29 25
			Pb212	3.1 3.3
TN: Knoxville	6.18	0.61		ND
TN: Nashville	0.61	0.32	Pb212	6.2 6.7
TX: Austin	0.55	0.32	Pb212	3.2 5.2
TX: El Paso	1.12	0.37	K40	16 29
UT: Salt Lake City	2.53	0.44	Pb212	4.7 6.2
VA: Lynchburg	3.11	0.48	Tl208	3.3 3.4

Note: ND = Not Detected

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

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L $\pm 2u$		Nuclide	pCi/L $\pm 2u$
WA: Olympia	0.62	0.32	Pb212	5.2 7.0

Note: ND = Not Detected

Table 8
Tritium in Precipitation
January - March 2001

Location	January 2001		February 2001		March 2001	
	pCi/L	$\pm 2u$	pCi/L	$\pm 2u$	pCi/L	$\pm 2u$
AL: Montgomery	-15	75	19	73	20	75
AR: Little Rock	-13	76	-28	70	-2	75
AZ: Phoenix	52	79	-28	69	-39	73
CA: Berkeley	2	75	-7	71	-16	74
CO: Denver	-45	74	-37	69	-4	75
CT: Hartford	48	80	810	100	70	77
FL: Jacksonville	-56	74	-39	73	63	76
FL: Miami	-18	76	NS		8	74
HI: Honolulu	7	77	-44	69	-2	75
IA: Iowa City	56	80	-62	68	5	75
ID: Boise	43	78	NS		-39	73
ID: Idaho Falls	25	76	58	74	-26	73
KS: Topeka	60	80	-41	70	-21	74
MN: Minneapolis	-10	76	12	72	-40	73
MN: Welch	-13	75	NS		21	76
MS: Jackson	-20	76	-62	69	41	76
NC: Charlotte	21	78	NS		NS	
NC: Wilmington	-7	77	29	76	68	77
ND: Bismarck	11	77	41	74	-72	71
NV: Las Vegas	30	77	21	71	-35	74
NY: Albany	26	78	63	78	51	76
NY: Yaphank	NS		-12	75	84	78
OH: Painesville	24	77	-2	70	64	77
OR: Portland	23	77	-21	69	-60	72
PA: Harrisburg	69	80	52	78	13	76
SC: Barnwell	113	83	246	83	123	79
SC: Columbia	-2	77	4	71	50	77
TN: Knoxville	-34	75	-39	70	118	79
TN: Nashville	-16	76	-60	69	106	79
TX: Austin	-2	77	NS		-24	73
TX: El Paso	NS		NS		-39	73
UT: Salt Lake City	30	77	30	73	-23	73
VA: Lynchburg	-41	75	76	79	68	78
WA: Olympia	-3	75	75	86	-75	71

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 2001

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	01/18/01	-23	76
AL: Dothan	01/17/01	5	74
AL: Muscle Shoals	01/11/01	102	81
AL: Scottsboro	01/12/01	35	78
AR: Little Rock	01/09/01	-5	79
CA: Berkeley	02/07/01	-32	72
CA: Los Angeles	01/16/01	-2	73
CT: Hartford	01/12/01	-10	73
DE: Dover	01/16/01	-9	73
FL: Miami	01/23/01	47	78
FL: Tampa	02/15/01	48	78
GA: Baxley	01/16/01	-38	72
GA: Savannah	01/17/01	-2	77
HI: Honolulu	01/31/01	-13	76
IA: Cedar Rapids	01/12/01	-24	73
ID: Idaho Falls	01/22/01	11	78
IL: W. Chicago	02/09/01	-13	77
KS: Topeka	01/08/01	-64	74
LA: New Orleans	01/16/01	33	76
MA: Lawrence	01/09/01	50	78
MD: Baltimore	01/10/01	36	78
MD: Conowingo	02/08/01	60	80
ME: Augusta	01/11/01	-20	78
MI: Detroit	01/17/01	125	79
MI: Grand Rapids	03/02/01	16	73
MN: Minneapolis	01/29/01	104	82
MN: Red Wing	01/22/01	-6	77
MO: Jefferson City	01/16/01	31	75
MS: Jackson	01/10/01	-39	75
MS: Port Gibson	01/09/01	-11	76
MT: Helena	01/24/01	89	81
NC: Charlotte	01/17/01	740	100
NC: Wilmington	01/16/01	-42	72
ND: Bismarck	01/10/01	16	77
NE: Lincoln	01/10/01	-5	76
NH: Manchester	01/09/01	-23	76
NJ: Trenton	01/17/01	-17	73
NJ: Waretown	01/17/01	-57	71
NM: Santa Fe	02/20/01	-32	72
NY: Albany	01/11/01	-48	71

Table 9 (continued)
Tritium in Drinking Water
January - March 2001

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NY: Syracuse	01/25/01	28	78
OH: Cincinnati	03/05/01	-24	71
OH: E. Liverpool	03/02/01	-4	73
OH: Painesville	01/08/01	110	81
OH: Toledo	01/11/01	41	79
OK: Oklahoma City	01/10/01	-35	74
OR: Portland	01/11/01	-28	73
PA: Columbia	02/08/01	92	81
PA: Harrisburg	02/08/01	65	80
PA: Philadelphia/Baxter	01/23/01	18	78
PA: Philadelphia/Queen	01/23/01	84	81
PA: Pittsburgh	03/02/01	-5	72
RI: Providence	01/09/01	-14	76
SC: Barnwell	01/09/01	3	74
SC: Columbia	01/09/01	168	84
SC: Jenkinsville	01/18/01	-23	73
SC: Seneca	01/16/01	9	73
TN: Chattanooga	01/07/01	87	80
TN: Knoxville	01/08/01	-31	76
TN: Oak Ridge - Anderson Co. #768	03/08/01	30	73
TN: Oak Ridge - Anderson Co. #772	02/22/01	-17	72
TN: Oak Ridge - Knox Co. #371	02/22/01	-5	72
TN: Oak Ridge - Roane Co. #360	02/26/01	16	73
TN: Oak Ridge - Roane Co. #4442	02/26/01	658	99
TX: Austin	01/09/01	-8	78
VA: Ashland	01/16/01	59	80
VA: Lynchburg	01/08/01	64	79
WA: Richland	02/05/01	127	83
WA: Seattle	01/15/01	-29	76

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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 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	01/22/01	1.67	0.11	ND	ND	ND
AR: Little Rock	03/20/01	1.64	0.11	ND	ND	ND
AZ: Phoenix	01/29/01	1.66	0.11	ND	ND	ND
CA: Los Angeles	01/11/01	1.70	0.11	ND	ND	ND
CA: Sacramento	02/15/01	1.68	0.11	ND	ND	ND
CA: San Francisco	01/16/01	1.68	0.11	ND	ND	ND
CT: Hartford	01/18/01	1.72	0.11	ND	ND	ND
DE: Wilmington	01/17/01	1.70	0.11	ND	ND	ND
FL: Tampa	01/11/01	1.73	0.11	ND	ND	ND
GA: Atlanta	01/18/01	1.69	0.11	ND	ND	ND
HI: Honolulu	01/22/01	1.72	0.11	ND	ND	ND
IA: Des Moines	01/08/01	1.69	0.11	ND	ND	ND
IL: Chicago	02/05/01	1.63	0.10	ND	ND	ND
IN: Indianapolis	01/18/01	1.66	0.11	ND	ND	ND
KS: Wichita	01/22/01	1.69	0.11	ND	ND	ND
KY: Louisville	01/17/01	1.72	0.11	ND	ND	ND
MA: Boston	01/29/01	1.69	0.11	ND	ND	ND
MD: Baltimore	01/12/01	1.75	0.11	ND	ND	ND
ME: Portland	03/16/01	1.74	0.11	ND	ND	ND
MI: Detroit	01/23/01	1.76	0.11	ND	ND	ND
MI: Grand Rapids	01/19/01	1.68	0.11	ND	ND	ND
MO: Jefferson City	02/14/01	1.70	0.11	ND	ND	ND
MS: Jackson	01/16/01	1.68	0.11	ND	ND	ND
NC: Charlotte	01/22/01	1.70	0.11	ND	ND	ND
NJ: Trenton	03/08/01	1.70	0.11	ND	ND	ND
NM: Albuquerque	01/11/01	1.64	0.11	ND	ND	ND
NV: Las Vegas	01/23/01	1.69	0.11	ND	ND	ND
NY: Buffalo	01/18/01	1.69	0.11	ND	ND	ND
NY: Syracuse	01/11/01	1.70	0.11	ND	ND	ND
OH: Cincinnati	02/05/01	1.67	0.11	ND	ND	ND
OH: Cleveland	01/29/01	1.72	0.11	ND	ND	ND
OR: Portland	01/09/01	1.74	0.11	ND	ND	ND
PA: Philadelphia	01/09/01	1.76	0.11	ND	ND	ND
PA: Pittsburgh	01/09/01	1.68	0.11	ND	ND	ND
SD: Rapid City	01/18/01	1.67	0.11	ND	ND	ND
TN: Chattanooga	01/09/01	1.67	0.11	ND	ND	ND
TN: Knoxville	01/16/01	1.69	0.11	ND	ND	ND
TN: Memphis	01/17/01	1.67	0.11	ND	ND	ND
TX: Ft. Worth	01/30/01	1.64	0.11	ND	ND	ND

Note: ND = Not Detected

Table 10 (continued)
Radionuclides in Pasteurized Milk
January - March 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 $\pm 2u$
TX: San Antonio	01/23/01	1.57	0.10	ND	ND	ND
VA: Norfolk	01/23/01	1.74	0.11	ND	ND	ND
VT: Montpelier	02/23/01	1.60	0.13	ND	ND	ND
WA: Spokane	01/17/01	1.67	0.11	ND	ND	ND
WA: Tacoma	03/19/01	1.67	0.12	ND	ND	ND
WV: Charleston	01/10/01	1.66	0.13	ND	ND	ND

Note: ND = Not Detected

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Rhonda Sears
National Air and Radiation Environmental
Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
e-mail: sears.rhonda@epa.gov

For Analytical Information and Data—

John Griggs
National Air and Radiation Environmental
Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
e-mail: griggs.john@epa.gov

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Radiation Protection Division (MC66085)
501 Third Street, N.W.
Washington, DC 20001
e-mail: marcinowski.frank@epa.gov

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