

ENVIRONMENTAL

RADIATION

DATA

REPORT 101

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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, precipitation, drinking water, and milk samples.

Sampling locations are selected to provide optimal population coverage while functioning to monitor fallout from nuclear devices and other forms of radioactive contamination of the environment. The radiation analyses performed on these samples include gross alpha and gross beta analyses, 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 *Eastern Environmental Radiation Facility Radiochemistry Procedures Manual* (EPA 520/5-84-006). 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 the 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, including present and potential sources of environmental radioactivity. Sampling sites are located 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 at 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 analyses in a low background beta counter. Gamma scans are performed on all filters showing gross beta counts greater than 1 pCi/m³. The laboratory obtained values are usually lower than the field estimates due to the decay of naturally occurring radionuclides between the times of the two measurements.

Precipitation samples are collected at most field stations collecting 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 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	0.013	0.013	0.013
AL: Montgomery	18	0.1	0.0	0.0	0.023	0.006	0.013
AR: Little Rock	7	0.1	0.0	0.0	0.022	0.008	0.017
AZ: Phoenix	4	0.6	0.5	0.5	0.030	0.018	0.025
CA: Berkeley	8	0.5	0.0	0.1	0.010	0.002	0.004
CA: Los Angeles	8	0.3	0.1	0.2	0.019	0.007	0.013
CO: Denver	7	1.6	0.0	0.7	0.017	0.005	0.011
CT: Hartford	9	0.1	0.0	0.0	0.015	0.007	0.011
DE: Wilmington	9	0.2	0.0	0.1	0.026	0.008	0.014
FL: Jacksonville	8	0.1	0.0	0.1	0.014	0.007	0.010
FL: Miami	4	0.0	0.0	0.0	0.010	0.005	0.008
HI: Honolulu	8	0.2	0.1	0.1	0.008	0.001	0.003
IA: Iowa City	9	0.4	0.0	0.2	0.030	0.013	0.019
ID: Boise	7	0.8	0.1	0.3	0.062	0.005	0.016
ID: Idaho Falls	9				0.038	0.003	0.013
IL: Chicago	8	0.3	0.0	0.1	0.027	0.009	0.017
IN: Indianapolis	8	0.4	0.0	0.2	0.023	0.009	0.014
KS: Topeka	8	1.7	0.3	0.7	0.028	0.008	0.016
ME: Augusta	8	0.1	0.0	0.1	0.018	0.007	0.012
MI: Lansing	9	0.2	0.0	0.1	0.019	0.009	0.014
MN: Minneapolis	5	0.4	0.1	0.2	0.039	0.010	0.022
MN: Welch/510	1				0.018	0.018	0.018
MS: Jackson	8	0.2	0.0	0.1	0.016	0.007	0.013
NC: Charlotte	7	0.1	0.0	0.0	0.020	0.009	0.014
ND: Bismarck	6	1.6	0.2	0.5	0.040	0.012	0.021
NH: Concord	9	0.2	0.0	0.1	0.018	0.007	0.012
NV: Las Vegas	9	0.4	0.0	0.2	0.030	0.005	0.015
NY: Albany	4	0.0	0.0	0.0	0.020	0.012	0.017
NY: New York City	9	0.1	0.0	0.0	0.020	0.009	0.014
NY: Syracuse	4				0.016	0.010	0.012
NY: Yaphank	9	0.3	0.0	0.1	0.018	0.005	0.011
OH: Painesville	8	0.1	0.0	0.1	0.027	0.009	0.015
OH: Ross	8				0.025	0.010	0.015
OR: Portland	7	0.1	0.0	0.0	0.012	0.001	0.004
PA: Harrisburg	9	0.4	0.0	0.2	0.026	0.007	0.017
PA: Pittsburgh	9				0.028	0.008	0.015
SC: Barnwell	2	0.0	0.0	0.0	0.011	0.010	0.010
SC: Columbia	8	0.2	0.0	0.1	0.015	0.009	0.011

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

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	5	0.2	0.1	0.1	0.038	0.000	0.019
TN: Knoxville	7	0.6	0.0	0.2	0.024	0.011	0.018
TN: Nashville	7	0.7	0.0	0.2	0.027	0.011	0.016
TN: Oak Ridge/Bethel	9	0.5	0.1	0.2	0.019	0.007	0.013
TN: Oak Ridge/K25	9	0.5	0.1	0.2	0.019	0.008	0.013
TN: Oak Ridge/Melton	9	0.6	0.1	0.2	0.020	0.007	0.013
TN: Oak Ridge/Y12 E	9	0.3	0.0	0.2	0.019	0.008	0.014
TN: Oak Ridge/Y12 W	9	0.3	0.0	0.1	0.019	0.009	0.013
TX: Austin	7	0.2	0.1	0.1	0.016	0.010	0.012
TX: El Paso	8	1.2	0.5	0.8	0.043	0.010	0.021
UT: Salt Lake City	4	0.1	0.0	0.1	0.030	0.006	0.014
VA: Lynchburg	9	0.4	0.1	0.2	0.018	0.004	0.010
WA: Olympia	9	0.1	0.0	0.1	0.008	0.001	0.004
WA: Spokane	9	0.1	0.0	0.0	0.016	0.003	0.008
WI: Madison	8	0.3	0.0	0.1	0.028	0.010	0.016

Table 3
Gross Beta in Airborne Particulates
February 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	0.015	0.015	0.015
AL: Montgomery	16	0.1	0.0	0.1	0.035	0.004	0.017
AR: Little Rock	5	0.1	0.0	0.0	0.028	0.012	0.022
AZ: Phoenix	5	0.8	0.3	0.6	0.028	0.006	0.014
CA: Berkeley	9	0.1	0.0	0.0	0.007	0.002	0.004
CA: Los Angeles	9	0.2	0.0	0.1	0.011	0.003	0.006
CO: Denver	7	1.5	0.2	0.6	0.016	0.005	0.010
CT: Hartford	8	0.1	0.0	0.0	0.015	0.006	0.010
DE: Wilmington	8	0.1	0.0	0.0	0.018	0.007	0.013
FL: Jacksonville	8	0.1	0.0	0.1	0.021	0.005	0.014
FL: Miami	5	0.0	0.0	0.0	0.017	0.004	0.010
HI: Honolulu	9	0.2	0.1	0.1	0.005	0.002	0.004
IA: Iowa City	8	0.4	0.0	0.2	0.027	0.008	0.019
ID: Boise	9	0.7	0.1	0.3	0.023	0.003	0.009
ID: Idaho Falls	7				0.019	0.004	0.011
IL: Chicago	7	0.2	0.0	0.1	0.024	0.010	0.018
IN: Indianapolis	9	0.3	0.1	0.1	0.021	0.006	0.013
KS: Topeka	8	1.1	0.2	0.6	0.028	0.006	0.019
ME: Augusta	8	0.1	0.1	0.1	0.016	0.010	0.012
MI: Lansing	8	0.1	0.0	0.1	0.020	0.009	0.014
MN: Minneapolis	4	0.2	0.1	0.1	0.017	0.010	0.015
MN: Welch/510	4	0.0	0.0	0.0	0.022	0.011	0.017
MS: Jackson	10	0.2	0.1	0.2	0.030	0.006	0.017
NC: Charlotte	7	0.1	0.0	0.1	0.030	0.008	0.016
ND: Bismarck	5	0.2	0.1	0.1	0.031	0.016	0.021
NH: Concord	8	0.1	0.0	0.0	0.017	0.008	0.012
NJ: Trenton	1				0.017	0.017	0.017
NV: Las Vegas	8	0.3	0.0	0.1	0.021	0.002	0.007
NY: Albany	4	0.0	0.0	0.0	0.018	0.009	0.013
NY: New York City	8	0.2	0.0	0.0	0.021	0.009	0.013
NY: Syracuse	4				0.014	0.009	0.012
NY: Yaphank	8	0.1	0.0	0.0	0.018	0.006	0.012
OH: Painesville	9	0.1	0.0	0.1	0.017	0.010	0.012
OH: Ross	9				0.024	0.007	0.015
OR: Portland	7	0.1	0.0	0.1	0.016	0.002	0.007
PA: Harrisburg	8	0.4	0.1	0.1	0.025	0.009	0.015
PA: Pittsburgh	8				0.017	0.010	0.013
SC: Barnwell	2	0.1	0.0	0.1	0.015	0.012	0.014

Table 3 (continued)
Gross Beta in Airborne Particulates
February 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: Columbia	8	0.3	0.1	0.1	0.024	0.008	0.015
SD: Pierre	4	0.3	0.1	0.2	0.024	0.013	0.018
TN: Knoxville	8	1.1	0.1	0.4	0.030	0.012	0.021
TN: Nashville	9	0.2	0.0	0.1	0.027	0.007	0.016
TN: Oak Ridge/Bethel	8	0.7	0.1	0.3	0.021	0.008	0.014
TN: Oak Ridge/K25	8	0.7	0.1	0.3	0.021	0.008	0.015
TN: Oak Ridge/Melton	8	0.6	0.1	0.2	0.021	0.007	0.014
TN: Oak Ridge/Y12 E	8	0.8	0.1	0.3	0.020	0.008	0.015
TN: Oak Ridge/Y12 W	8	0.3	0.1	0.1	0.021	0.008	0.015
TX: Austin	8	0.2	0.1	0.1	0.024	0.006	0.014
TX: El Paso	8	1.2	0.3	0.8	0.026	0.007	0.016
UT: Salt Lake City	5	0.0	0.0	0.0	0.033	0.005	0.016
VA: Lynchburg	8	0.5	0.1	0.2	0.018	0.007	0.012
WA: Olympia	6	0.1	0.0	0.1	0.008	0.002	0.004
WA: Spokane	8	0.1	0.0	0.1	0.019	0.005	0.010
WI: Madison	1	0.1	0.1	0.1	0.016	0.016	0.016

Table 4
Gross Beta in Airborne Particulates
March 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	2	0.0	0.0	0.0	0.017	0.012	0.015
AL: Montgomery	18	0.1	0.0	0.0	0.030	0.005	0.012
AR: Little Rock	8	0.2	0.0	0.1	0.012	0.008	0.010
AZ: Phoenix	4	0.7	0.1	0.4	0.011	0.006	0.008
CA: Berkeley	8	0.1	0.0	0.0	0.006	0.003	0.004
CA: Los Angeles	9	0.3	0.0	0.1	0.013	0.004	0.008
CO: Denver	9	1.0	0.1	0.5	0.013	0.004	0.009
CT: Hartford	9	0.1	0.0	0.0	0.008	0.004	0.006
DE: Wilmington	9	0.2	0.0	0.1	0.013	0.003	0.008
FL: Jacksonville	9	0.6	0.1	0.1	0.013	0.006	0.009
FL: Miami	4	0.0	0.0	0.0	0.008	0.006	0.007
HI: Honolulu	9	0.1	0.1	0.1	0.007	0.002	0.004
IA: Iowa City	9	0.6	0.0	0.4	0.017	0.007	0.011
ID: Boise	8	0.4	0.0	0.2	0.009	0.003	0.005
ID: Idaho Falls	9				0.010	0.004	0.006
IL: Chicago	8	0.6	0.1	0.3	0.019	0.008	0.012
IN: Indianapolis	9	0.4	0.1	0.3	0.012	0.005	0.008
KS: Topeka	9	0.7	0.2	0.4	0.016	0.007	0.010
ME: Augusta	9	0.2	0.0	0.1	0.012	0.003	0.009
MI: Lansing	9	0.6	0.1	0.2	0.013	0.005	0.009
MN: Minneapolis	4	0.4	0.1	0.2	0.014	0.013	0.013
MN: Welch	2				0.007	0.006	0.007
MN: Welch/510	1				0.014	0.014	0.014
MS: Jackson	8	0.3	0.0	0.1	0.012	0.005	0.009
NC: Charlotte	8	0.1	0.0	0.0	0.017	0.005	0.010
ND: Bismarck	7	0.8	0.2	0.5	0.017	0.005	0.010
NH: Concord	9	0.2	0.0	0.1	0.012	0.004	0.008
NJ: Trenton	1				0.011	0.011	0.011
NV: Las Vegas	9	0.2	0.1	0.1	0.012	0.003	0.007
NY: Albany	5	0.1	0.0	0.0	0.010	0.008	0.009
NY: New York City	9	0.1	0.0	0.0	0.011	0.006	0.008
NY: Syracuse	3				0.010	0.008	0.009
NY: Yaphank	9	0.1	0.0	0.0	0.008	0.005	0.006
OH: Painesville	9	0.4	0.1	0.2	0.013	0.006	0.009
OH: Ross	9				0.012	0.005	0.009
OR: Portland	9	0.1	0.0	0.0	0.004	0.002	0.003
PA: Harrisburg	9	0.6	0.1	0.2	0.013	0.005	0.009
PA: Pittsburgh	8				0.012	0.005	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
March 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	0.0	0.0	0.0	0.010	0.010	0.010
SC: Columbia	9	0.3	0.0	0.2	0.016	0.006	0.010
TN: Knoxville	9	0.6	0.1	0.4	0.023	0.007	0.013
TN: Nashville	9	0.3	0.0	0.1	0.014	0.007	0.010
TN: Oak Ridge/Bethel	9	0.7	0.1	0.3	0.016	0.006	0.009
TN: Oak Ridge/K25	9	0.5	0.1	0.2	0.015	0.005	0.009
TN: Oak Ridge/Melton	9	0.3	0.1	0.2	0.014	0.006	0.009
TN: Oak Ridge/Y12 E	9	0.5	0.1	0.2	0.015	0.005	0.009
TN: Oak Ridge/Y12 W	9	0.3	0.1	0.1	0.016	0.006	0.009
TX: Austin	5	0.1	0.0	0.1	0.010	0.006	0.008
TX: El Paso	9	0.7	0.0	0.5	0.019	0.007	0.013
UT: Salt Lake City	4	0.2	0.0	0.1	0.014	0.008	0.010
VA: Lynchburg	9	0.7	0.1	0.4	0.013	0.003	0.007
WA: Olympia	8	0.1	0.0	0.0	0.004	0.001	0.003
WA: Spokane	9	0.2	0.1	0.1	0.008	0.003	0.005

Table 5
Gross Beta and Specific Gamma in Precipitation
January 2000

Location	Gross Beta Activity		Specific Gamma Activity	
	pCi/L $\pm 2\sigma$		Nuclide	pCi/L $\pm 2\sigma$
AL: Montgomery	1.83	0.34	Be7	66 33
CA: Berkeley	0.49	0.32		ND
CO: Denver	1.37	0.32		ND
CT: Hartford	3.75	0.45	Be7	46 39
FL: Jacksonville	0.89	0.29		ND
FL: Miami	1.62	0.37		ND
HI: Honolulu	1.17	0.38		ND
IA: Iowa City	2.11	0.37		ND
ID: Boise	2.05	0.39		ND
ID: Idaho Falls	2.15	0.41		ND
MN: Minneapolis	2.28	0.39		ND
NC: Charlotte	2.45	0.39	Be7	42 29
ND: Bismarck	13.01	0.84	Be7	100 35
			K40	26 40
NY: Albany	1.03	0.30	Be7	46 30
NY: Yaphank	1.01	0.30	Tl208	2.5 4.1
OH: Painesville	2.63	0.39		ND
OR: Portland	1.82	0.36		ND
SC: Barnwell	0.92	0.28		ND
SC: Columbia	1.80	0.34		ND
TN: Knoxville	1.23	0.30	Tl208	1.5 1.8
TN: Nashville	3.95	0.46	Be7	105 55
TX: Austin	0.40	0.24		ND
TX: El Paso	0.94	0.28		ND
UT: Salt Lake City	1.70	0.42		ND
VA: Lynchburg	2.83	0.40	K40	16 26
			Pb212	3.1 4.0
WA: Olympia	0.45	0.32		ND
WI: Madison	1.22	0.30		ND

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
February 2000

Location	Gross Beta Activity		Specific Gamma Activity	
	pCi/L $\pm 2\sigma$		Nuclide	pCi/L $\pm 2\sigma$
AL: Montgomery	1.66	0.39	Be7	36 23
AR: Little Rock	0.93	0.33		ND
CA: Berkeley	0.35	0.29	K40	15 21
CT: Hartford	3.95	0.51	Be7	87 26
FL: Jacksonville	0.54	0.31	Be7	61 24
			Tl208	2.0 1.8
FL: Miami	1.10	0.36		ND
HI: Honolulu	1.21	0.37		ND
IA: Iowa City	0.92	0.35	K40	11 14
ID: Boise	0.58	0.32		ND
ID: Idaho Falls	0.30	0.28		ND
KS: Topeka	1.20	0.37	K40	14 22
			Pb212	3.3 7.1
MN: Minneapolis	5.53	0.61	Be7	50 23
			K40	18 18
MN: Welch	0.49	0.32		ND
NC: Charlotte	1.52	0.37	Be7	23 23
			Pb212	4.5 4.4
NC: Wilmington	1.04	0.35		ND
ND: Bismarck	1.18	0.37	K40	12 22
NV: Las Vegas	6.42	0.65	K40	20 19
NY: Albany	0.96	0.34		ND
OH: Painesville	5.83	0.61	Be7	104 26
			Pb212	4.5 4.3
			Ra224	54 51
OR: Portland	1.19	0.36	K40	25 26
PA: Harrisburg	1.30	0.36		ND
SC: Columbia	2.14	0.41	Pb212	3.2 3.8
TN: Knoxville	0.65	0.31	K40	16 14
TN: Nashville	1.58	0.38	Be7	36 21
TX: Austin	0.46	0.31		ND
UT: Salt Lake City	0.69	0.33		ND
VA: Lynchburg	4.82	0.56		ND
WA: Olympia	0.58	0.32	Be7	38 27
			K40	18 23
WI: Madison	1.28	0.38		ND

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
March 2000

Location	Gross Beta Activity		Specific Gamma Activity	
	pCi/L $\pm 2\sigma$		Nuclide	pCi/L $\pm 2\sigma$
AL: Montgomery	1.46	0.38	Be7	44 23
AR: Little Rock	1.47	0.38		ND
AZ: Phoenix	0.40	0.31	Tl208	2.2 3.7
CA: Berkeley	0.34	0.29	Pb212	7.5 4.1
CO: Denver	2.13	0.42	Pb212	5.1 6.2
CT: Hartford	1.63	0.39	Be7	55 25
FL: Jacksonville	1.75	0.40		ND
FL: Miami	0.99	0.36		ND
HI: Honolulu	1.19	0.37		ND
	2.92	0.42		ND
IA: Iowa City	0.65	0.34	Pb212	7.6 6.7
ID: Boise	1.09	0.35		ND
ID: Idaho Falls	0.84	0.35		ND
KS: Topeka	0.85	0.34		ND
MN: Minneapolis	1.41	0.38	Be7	38 24
			Pb212	4.7 3.8
MN: Welch	1.54	0.39	Pb212	6.1 6.3
			Tl208	2.4 3.8
NC: Charlotte	1.42	0.37	Be7	35 24
			Pb212	4.1 3.9
NC: Wilmington	0.94	0.35	Be7	34 23
NM: Santa Fe	3.71	0.51	Be7	78 68
NY: Albany	0.74	0.33		ND
NY: Yaphank	2.21	0.42	Be7	71 25
OH: Painesville	1.91	0.41	Be7	46 25
OR: Portland	2.14	0.41	Tl208	2.7 3.8
PA: Harrisburg	0.70	0.33		ND
SC: Columbia	1.15	0.36		ND
TN: Knoxville	6.65	0.63		ND
TN: Nashville	1.82	0.40	Be7	30 23
UT: Salt Lake City	1.77	0.40	Tl208	1.7 1.8
VA: Lynchburg	2.72	0.46	Pb212	5.1 6.7
WA: Olympia	0.84	0.33	Be7	27 24

Note: ND = Not Detected

Table 8
Tritium in Precipitation
January - March 2000

Location	January 2000		February 2000		March 2000	
	pCi/L $\pm 2u$		pCi/L $\pm 2u$		pCi/L $\pm 2u$	
AL: Montgomery	-70	73	36	77	-27	79
AR: Little Rock	NS		17	80	-20	79
AZ: Phoenix	NS		NS		2	80
CA: Berkeley	-77	72	-2	78	-3	79
CO: Denver	-61	73	NS		35	81
CT: Hartford	10	76	68	77	-27	74
FL: Jacksonville	2	76	71	79	11	75
FL: Miami	-65	73	63	77	-28	72
HI: Honolulu	-12	76	-23	77	13	81
IA: Iowa City	-33	75	59	77	-3	80
ID: Boise	-54	73	-33	77	40	81
ID: Idaho Falls	-11	76	7	79	-15	79
KS: Topeka	NS		-10	74	-7	79
MN: Minneapolis	-33	74	15	76	25	81
MN: Welch	NS		46	77	47	82
NC: Charlotte	49	78	83	79	-27	74
NC: Wilmington	NS		21	76	0	75
ND: Bismarck	32	78	52	77	NS	
NM: Santa Fe	NS		NS		13	81
NV: Las Vegas	NS		57	81	NS	
NY: Albany	-26	74	69	78	-12	74
NY: Yaphank	38	78	NS		5	75
OH: Painesville	-9	75	20	76	18	81
OR: Portland	-47	74	15	79	17	81
PA: Harrisburg	NS		41	77	-20	74
SC: Barnwell	-5	76	NS		NS	
SC: Columbia	-13	76	60	77	3	74
TN: Knoxville	-62	74	50	77	-15	79
TN: Nashville	-12	76	40	77	26	75
TX: Austin	-44	74	-24	74	NS	
TX: El Paso	-11	76	NS		NS	
UT: Salt Lake City	-10	75	-18	78	42	82
VA: Lynchburg	15	77	49	78	-5	74
WA: Olympia	-35	74	7	78	22	81
WI: Madison	-9	75	64	78	NS	

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 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.

The program monitors ambient radiation levels in drinking water in as many as 78 sites. These data serve 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.

Grab samples are taken at the 78 sites which are either major population centers or selected nuclear facility environs.

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 2000

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
AK: Fairbanks	02/10/00	41	80
AL: Dothan	01/06/00	-5	77
AL: Montgomery	01/03/00	-40	74
AL: Muscle Shoals	01/12/00	21	78
AL: Scottsboro	01/11/00	93	80
AR: Little Rock	01/06/00	-44	79
CA: Berkeley	01/12/00	18	78
CA: Los Angeles	01/06/00	-66	69
CO: Denver	01/13/00	10	79
CT: Hartford	01/06/00	-21	75
DE: Dover	01/13/00	-85	76
FL: Miami	01/14/00	16	78
GA: Baxley	01/12/00	-47	77
GA: Savannah	02/02/00	140	81
HI: Honolulu	01/11/00	-8	77
IA: Cedar Rapids	01/10/00	-33	76
ID: Idaho Falls	01/24/00	62	78
IL: Morris	01/18/00	-31	78
IL: W. Chicago	03/02/00	16	78
KS: Topeka	01/06/00	46	79
LA: New Orleans	01/12/00	46	80
MA: Lawrence	01/10/00	-24	78
MD: Baltimore	01/05/00	-49	74
MD: Conowingo	02/29/00	71	82
ME: Augusta	01/11/00	-22	77
MI: Detroit	01/13/00	46	78
MI: Grand Rapids	01/18/00	21	80
MN: Minneapolis	01/31/00	59	78
MN: Red Wing	01/10/00	-16	79
MO: Jefferson City	01/07/00	25	79
MS: Jackson	01/11/00	-36	76
MS: Port Gibson	01/11/00	-10	77
NC: Charlotte	01/12/00	427	93
NC: Wilmington	01/19/00	35	78
ND: Bismarck	01/11/00	-12	78
NE: Lincoln	01/11/00	-45	76
NH: Concord	01/06/00	-10	77
NM: Santa Fe	01/20/00	29	77
NV: Las Vegas	01/06/00	-45	76
NY: Albany	01/06/00	86	81

Table 9 (continued)
Tritium in Drinking Water
January - March 2000

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>	
NY: Niagara Falls	03/31/00	114	85
NY: Syracuse	02/28/00	96	82
OH: Cincinnati	03/10/00	3	79
OH: Columbus	01/12/00	31	78
OH: E. Liverpool	03/01/00	18	79
OH: Painesville	01/06/00	105	82
OH: Toledo	03/30/00	64	80
OK: Oklahoma City	01/06/00	36	79
OR: Portland	01/05/00	64	81
PA: Columbia	03/02/00	12	79
PA: Harrisburg	03/02/00	88	83
PA: Philadelphia - Queen	02/02/00	62	79
PA: Philadelphia - Baxter	02/02/00	80	79
PA: Pittsburgh	03/01/00	53	80
RI: Providence	01/06/00	10	78
SC: Barnwell	01/26/00	127	81
SC: Columbia	01/06/00	385	92
SC: Jenkinsville	01/14/00	39	81
SC: Seneca	01/05/00	9	77
TN: Chattanooga	01/10/00	232	87
TN: Knoxville	01/05/00	-12	75
TN: Oak Ridge - Anderson Co #768	03/29/00	10	79
TN: Oak Ridge - Anderson Co #772	03/29/00	38	80
TN: Oak Ridge - Knox Co #371	03/29/00	18	74
TN: Oak Ridge - Roane Co #360	03/29/00	96	82
TN: Oak Ridge - Roane Co #4442	01/30/00	990	110
TX: Austin	01/17/00	500	98
VA: Ashland	03/02/00	38	81
VA: Lynchburg	02/12/00	97	80
WA: Richland	01/10/00	41	79
WA: Seattle	03/13/00	-27	78
WI: Genoa	01/10/00	-68	78

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3. Milk Program

Pasteurized Milk

Milk is a reliable indicator of the general population's intake of 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. All samples collected in July are analyzed for strontium-90.

Iodine-131, barium-140, cesium-137, and potassium-40 are determined by gamma spectral analysis. Strontium-90 is determined by beta counting a total strontium precipitate that has been chemically separated by ion exchange.

Table 10
Radionuclides in Pasteurized Milk
January - March 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	01/10/00	1.632	0.092	ND	ND	ND
AZ: Phoenix	01/10/00	1.56	0.12	ND	ND	ND
CA: Los Angeles	01/14/00	1.585	0.078	ND	ND	ND
CA: Sacramento	02/28/00	1.668	0.054	ND	ND	ND
CA: San Francisco	01/12/00	1.644	0.067	ND	ND	ND
DE: Wilmington	01/05/00	1.609	0.091	ND	ND	ND
FL: Tampa	01/11/00	1.537	0.077	ND	ND	ND
GA: Atlanta	01/11/00	1.489	0.089	ND	ND	ND
HI: Honolulu	01/11/00	1.609	0.091	ND	ND	ND
IA: Des Moines	01/24/00	1.597	0.091	ND	ND	ND
IL: Chicago	01/11/00	1.489	0.078	ND	ND	ND
IN: Indianapolis	01/04/00	1.621	0.092	ND	ND	ND
KS: Wichita	01/11/00	1.668	0.095	ND	ND	ND
KY: Louisville	01/18/00	1.656	0.082	ND	ND	ND
MA: Boston	01/19/00	1.489	0.088	ND	ND	ND
MD: Baltimore	01/07/00	1.597	0.082	ND	ND	ND
ME: Portland	01/12/00	1.513	0.077	ND	ND	ND
MI: Detroit	01/18/00	1.668	0.068	ND	ND	ND
MI: Grand Rapids	01/11/00	1.585	0.081	ND	ND	ND
MO: Kansas City	01/18/00	1.525	0.088	ND	ND	ND
MS: Jackson	01/06/00	1.621	0.081	ND	ND	ND
NC: Charlotte	03/16/00	1.704	0.055	ND	ND	ND
NJ: Trenton	02/04/00	1.573	0.090	ND	ND	ND
NV: Las Vegas	02/15/00	1.50	0.14	ND	ND	ND
NY: Buffalo	01/11/00	1.656	0.093	ND	ND	ND
NY: Syracuse	01/11/00	1.56	0.12	ND	ND	ND
OH: Cincinnati	03/06/00	1.668	0.054	ND	ND	ND
OH: Cleveland	01/27/00	1.68	0.18	ND	ND	ND
OR: Portland	01/05/00	1.680	0.084	ND	ND	ND
PA: Philadelphia	01/10/00	1.621	0.092	ND	ND	ND
PA: Pittsburgh	02/07/00	1.53	0.12	ND	ND	ND
PR: San Juan	01/12/00	1.585	0.088	ND	ND	ND
SD: Rapid City	01/10/00	1.621	0.092	ND	ND	ND
TN: Chattanooga	01/13/00	1.668	0.092	ND	ND	ND
TN: Knoxville	01/13/00	1.561	0.091	ND	ND	ND
TX: Ft. Worth	01/25/00	1.609	0.082	ND	ND	ND
TX: San Antonio	02/28/00	1.609	0.053	ND	ND	ND
VA: Norfolk	03/21/00	1.704	0.054	ND	ND	ND
VT: Montpelier	01/28/00	1.632	0.067	ND	ND	ND

Note: ND = Not Detected

Table 10 (continued)
Radionuclides in Pasteurized Milk
January - March 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 $\pm 2u$
WA: Spokane	01/19/00	1.609 0.081	ND	ND	ND
WV: Charleston	01/10/00	1.573 0.066	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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