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ENVIRONMENTAL RADIATION DATA

REPORT 119

July - September 2004

United States Environmental Protection Agency

Office of Radiation and Indoor Air

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Contents

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List of Tables

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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/m³	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/m³	0.75
	Water	pCi/L	0.1
† Uranium-234,235,238	Air	aCi/m³	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 ^{239}Pu and ^{240}Pu, 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 natural radon isotopes and their progeny to decay. 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/m^3. 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 2004

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
AK: Anchorage	1	0.0	0.0	0.0	0.004	0.004	0.004
AL: Montgomery	9	0.1	0.0	0.1	0.019	0.007	0.011
AL: Montgomery/411	9	0.1	0.0	0.0	0.022	0.007	0.011
AR: Little Rock	8	0.1	0.0	0.0	0.017	0.006	0.012
AZ: Phoenix	4	0.3	0.1	0.2	0.013	0.007	0.010
CA: Los Angeles	9	0.3	0.0	0.2	0.010	0.004	0.007
CA: Richmond	7	0.1	0.0	0.0	0.006	0.002	0.003
CO: Denver	3	0.6	0.3	0.4	0.011	0.006	0.009
CT: Hartford	9	0.1	0.0	0.1	0.011	0.004	0.007
DC: Washington	9	0.1	0.0	0.0	0.013	0.007	0.010
DE: Wilmington	8	0.2	0.0	0.1	0.014	0.006	0.009
FL: Jacksonville	9	0.1	0.0	0.1	0.020	0.006	0.010
GA: Atlanta	7	0.3	0.0	0.1	0.022	0.010	0.014
HI: Honolulu	9	0.1	0.0	0.1	0.004	0.002	0.003
IA: Iowa City	9	1.1	0.1	0.5	0.019	0.002	0.011
ID: Idaho Falls	9				0.008	0.005	0.007
IN: Indianapolis	9	0.5	0.1	0.3	0.012	0.005	0.007
KS: Kansas City	6	1.9	0.4	1.0	0.015	0.008	0.011
KS: Topeka	6	1.6	0.5	0.8	0.024	0.009	0.013
ME: Augusta	4	0.1	0.0	0.0	0.007	0.004	0.006
MI: Lansing	9	0.3	0.1	0.2	0.014	0.004	0.009
MN: Minneapolis	4	0.3	0.1	0.1	0.012	0.009	0.011
MS: Jackson	8	0.1	0.0	0.1	0.017	0.007	0.013
NC: Charlotte	9	0.1	0.0	0.1	0.019	0.008	0.013
NC: Wilmington	4				0.015	0.009	0.011
ND: Bismarck	5	1.2	0.1	0.4	0.016	0.009	0.012
NH: Concord	8	0.5	0.1	0.2	0.011	0.005	0.006
NJ: Trenton	7	0.5	0.1	0.2	0.011	0.004	0.008
NV: Las Vegas	7	0.2	0.0	0.1	0.012	0.006	0.010
NV: Las Vegas/913	6	0.2	0.0	0.1	0.014	0.005	0.009
NY: Albany	4	0.1	0.0	0.0	0.008	0.005	0.007
NY: New York City	9	0.0	0.0	0.0	0.019	0.004	0.010
NY: Yaphank	9	0.1	0.0	0.1	0.011	0.004	0.007
OH: Painesville	8	0.7	0.1	0.3	0.014	0.005	0.009
OH: Ross	9				0.023	0.007	0.013
OR: Portland	9	0.1	0.0	0.0	0.005	0.002	0.003
PA: Harrisburg	8	0.9	0.2	0.3	0.014	0.007	0.011
PA: Pittsburgh	9	0.3	0.1	0.2	0.014	0.006	0.010

Table 2 (continued)

Gross Beta in Airborne Particulates
July 2004

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
SC: Barnwell	1	0.0	0.0	0.0	0.007	0.007	0.007
SC: Columbia	3	0.2	0.1	0.1	0.016	0.012	0.014
SD: Pierre	8	0.6	0.1	0.3	0.015	0.005	0.009
TN: Knoxville	8	0.2	0.0	0.0	0.020	0.009	0.013
TN: Nashville	9	1.1	0.0	0.3	0.019	0.007	0.012
TN: Oak Ridge/Bethel	8	1.1	0.1	0.4	0.015	0.008	0.012
TN: Oak Ridge/K25	8	1.4	0.2	0.6	0.014	0.007	0.011
TN: Oak Ridge/Melton	8	1.4	0.1	0.6	0.015	0.007	0.011
TN: Oak Ridge/Y12 E	8	1.0	0.1	0.4	0.017	0.007	0.013
TN: Oak Ridge/Y12 W	8	0.7	0.1	0.3	0.019	0.008	0.013
TX: Austin	8	0.3	0.0	0.2	0.017	0.007	0.011
TX: Dallas	6	0.9	0.0	0.2	0.021	0.004	0.010
TX: El Paso	9	1.1	0.3	0.6	0.015	0.006	0.011
UT: Salt Lake City	9	0.4	0.0	0.2	0.019	0.005	0.010
VA: Lynchburg	7	1.9	0.5	0.9	0.015	0.009	0.012
WA: Olympia	9	0.1	0.0	0.0	0.004	0.001	0.003
WA: Spokane	9	0.8	0.2	0.4	0.016	0.005	0.009

Table 3

Gross Beta in Airborne Particulates
August 2004

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
AL: Montgomery	9	0.5	0.0	0.1	0.020	0.006	0.012
AL: Montgomery/411	9	0.5	0.0	0.1	0.021	0.007	0.013
AR: Little Rock	5	0.1	0.0	0.1	0.021	0.011	0.014
AZ: Phoenix	5	0.5	0.2	0.3	0.017	0.006	0.012
CA: Los Angeles	9	0.3	0.0	0.2	0.011	0.007	0.009
CA: Richmond	5	0.0	0.0	0.0	0.005	0.002	0.003
CO: Denver	5	0.9	0.3	0.6	0.016	0.010	0.013
CT: Hartford	9	0.1	0.1	0.1	0.013	0.003	0.008
DC: Washington	14	0.2	0.0	0.1	0.026	0.006	0.013
DE: Wilmington	9	0.2	0.0	0.1	0.016	0.003	0.010
FL: Jacksonville	9	0.1	0.1	0.1	0.013	0.004	0.007
GA: Atlanta	3	0.1	0.0	0.0	0.017	0.006	0.013
HI: Honolulu	8	0.1	0.0	0.0	0.004	0.001	0.002
IA: Iowa City	9	0.6	0.1	0.3	0.018	0.005	0.011
ID: Idaho Falls	9				0.012	0.003	0.008
IN: Indianapolis	9	0.5	0.1	0.3	0.016	0.004	0.009
KS: Kansas City	3	1.8	0.5	1.1	0.011	0.004	0.008
KS: Topeka	8	1.4	0.6	0.9	0.017	0.009	0.012
ME: Augusta	4	0.1	0.1	0.1	0.009	0.006	0.007
MI: Detroit	4	1.9	0.2	1.1	0.023	0.007	0.013
MI: Lansing	9	0.5	0.1	0.2	0.021	0.005	0.011
MN: Minneapolis	4	0.2	0.0	0.1	0.012	0.007	0.010
MS: Jackson	5	0.7	0.1	0.3	0.042	0.008	0.017
NC: Charlotte	9	0.1	0.0	0.0	0.022	0.006	0.014
NC: Wilmington	5				0.008	0.003	0.006
ND: Bismarck	7	2.7	0.3	1.1	0.017	0.006	0.011
NH: Concord	9	0.5	0.1	0.2	0.015	0.004	0.008
NJ: Trenton	9	0.4	0.0	0.2	0.016	0.007	0.010
NV: Las Vegas	6	0.1	0.0	0.0	0.013	0.006	0.010
NV: Las Vegas/913	3	0.1	0.0	0.1	0.010	0.005	0.008
NY: Albany	4	0.0	0.0	0.0	0.011	0.007	0.009
NY: New York City	13	0.4	0.0	0.1	0.057	0.007	0.019
NY: Yaphank	9	0.1	0.0	0.1	0.011	0.005	0.007
OH: Painesville	9	0.8	0.2	0.3	0.017	0.007	0.011
OH: Ross	9				0.042	0.006	0.016
OR: Portland	9	0.1	0.0	0.0	0.004	0.002	0.003
PA: Harrisburg	9	0.6	0.1	0.3	0.018	0.007	0.014
PA: Pittsburgh	10	0.7	0.1	0.2	0.020	0.011	0.014

Table 3 (continued)

Gross Beta in Airborne Particulates
August 2004

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
SC: Columbia	2	0.4	0.0	0.2	0.037	0.009	0.023
SD: Pierre	8	0.4	0.2	0.3	0.016	0.005	0.011
TN: Knoxville	7	0.0	0.0	0.0	0.028	0.012	0.016
TN: Nashville	9	0.6	0.1	0.2	0.020	0.007	0.012
TN: Oak Ridge/Bethel	9	1.4	0.4	0.7	0.020	0.009	0.014
TN: Oak Ridge/K25	9	1.7	0.5	0.9	0.020	0.010	0.015
TN: Oak Ridge/Melton	9	1.5	0.5	0.9	0.019	0.010	0.014
TN: Oak Ridge/Y12 E	9	1.1	0.4	0.6	0.021	0.009	0.015
TN: Oak Ridge/Y12 W	9	0.6	0.2	0.4	0.023	0.009	0.015
TX: Austin	8	0.2	0.1	0.1	0.016	0.006	0.011
TX: Dallas	7	0.5	0.0	0.3	0.021	0.007	0.014
TX: El Paso	9	1.2	0.3	0.6	0.015	0.009	0.012
UT: Salt Lake City	9	0.5	0.0	0.2	0.014	0.004	0.010
VA: Lynchburg	8	1.4	0.1	0.6	0.018	0.006	0.012
WA: Olympia	7	0.1	0.0	0.1	0.004	0.002	0.003
WA: Spokane	9	1.1	0.0	0.4	0.021	0.002	0.011

Table 4

Gross Beta in Airborne Particulates
September 2004

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
AL: Montgomery	3	0.0	0.0	0.0	0.008	0.005	0.006
AL: Montgomery/411	2	0.0	0.0	0.0	0.009	0.006	0.007
AR: Little Rock	7	0.1	0.0	0.0	0.016	0.008	0.011
AZ: Phoenix	4	0.7	0.2	0.4	0.015	0.009	0.011
CA: Los Angeles	8	0.4	0.1	0.2	0.017	0.008	0.013
CA: Richmond	4	0.1	0.0	0.1	0.007	0.004	0.005
CO: Denver	5	0.8	0.2	0.5	0.012	0.004	0.007
CT: Hartford	8	0.2	0.0	0.1	0.010	0.004	0.006
DC: Washington	8	0.1	0.0	0.0	0.011	0.003	0.007
DE: Wilmington	8	0.3	0.0	0.1	0.015	0.004	0.008
FL: Jacksonville	1	0.1	0.1	0.1	0.009	0.009	0.009
GA: Atlanta	5	0.7	0.0	0.2	0.012	0.005	0.008
HI: Honolulu	7	0.1	0.0	0.0	0.004	0.002	0.002
IA: Iowa City	9	0.8	0.1	0.4	0.018	0.004	0.010
ID: Idaho Falls	9				0.011	0.004	0.007
IN: Indianapolis	8	0.7	0.1	0.3	0.014	0.004	0.009
KS: Kansas City	6	3.7	0.0	1.9	0.017	0.009	0.014
KS: Topeka	5	1.3	0.9	1.1	0.015	0.011	0.013
ME: Augusta	4	0.2	0.0	0.1	0.008	0.005	0.006
MI: Detroit	9	2.3	0.5	1.3	0.019	0.004	0.011
MI: Lansing	8	1.1	0.1	0.4	0.015	0.007	0.011
MN: Minneapolis	5	0.2	0.1	0.2	0.017	0.008	0.012
MS: Jackson	7	0.8	0.1	0.3	0.022	0.009	0.013
NC: Charlotte	8	0.1	0.0	0.0	0.014	0.004	0.010
NC: Wilmington	3				0.009	0.005	0.006
ND: Bismarck	6	1.3	0.3	0.7	0.016	0.010	0.013
NH: Concord	8	0.7	0.2	0.3	0.010	0.005	0.007
NJ: Trenton	7	0.4	0.1	0.2	0.014	0.004	0.007
NV: Las Vegas	6	0.2	0.0	0.1	0.010	0.005	0.009
NV: Las Vegas/913	6	0.1	0.0	0.1	0.008	0.003	0.006
NY: Albany	5	0.0	0.0	0.0	0.013	0.006	0.009
NY: New York City	8	0.1	0.0	0.0	0.013	0.005	0.008
NY: Syracuse	1	0.2	0.2	0.2	0.012	0.012	0.012
NY: Yaphank	9	0.4	0.0	0.1	0.012	0.005	0.007
OH: Painesville	5	0.3	0.1	0.3	0.017	0.010	0.012
OH: Ross	8				0.041	0.006	0.017
OR: Portland	8	0.1	0.0	0.1	0.012	0.003	0.006
PA: Harrisburg	9	0.7	0.2	0.3	0.018	0.007	0.012

Table 4 (continued)

Gross Beta in Airborne Particulates
September 2004

Location	Number of Samples	5-hour Field Estimate (pCi/m³)			NAREL Lab Measurement (pCi/m³)		
		Max	Min	Avg	Max	Min	Avg
PA: Philadelphia	1	0.0	0.0	0.0	0.017	0.017	0.017
PA: Pittsburgh	7	0.4	0.1	0.2	0.017	0.001	0.010
SC: Columbia	5	0.1	0.0	0.1	0.014	0.007	0.009
SD: Pierre	8	0.5	0.1	0.3	0.013	0.005	0.009
TN: Knoxville	7	0.8	0.0	0.1	0.026	0.006	0.014
TN: Nashville	8	0.3	0.0	0.2	0.021	0.007	0.012
TN: Oak Ridge/Bethel	8	1.2	0.1	0.6	0.021	0.006	0.011
TN: Oak Ridge/K25	8	1.9	0.1	0.9	0.023	0.005	0.012
TN: Oak Ridge/Melton	8	1.3	0.1	0.8	0.022	0.006	0.012
TN: Oak Ridge/Y12 E	8	0.9	0.1	0.5	0.025	0.005	0.012
TN: Oak Ridge/Y12 W	8	0.6	0.1	0.4	0.026	0.006	0.013
TX: Austin	7	0.3	0.0	0.1	0.020	0.007	0.012
TX: Dallas	7	0.5	0.0	0.3	0.017	0.010	0.013
TX: El Paso	7	1.1	0.1	0.7	0.018	0.006	0.013
UT: Salt Lake City	7	0.3	0.0	0.2	0.011	0.007	0.008
VA: Lynchburg	6	1.0	0.3	0.7	0.016	0.008	0.010
WA: Olympia	8	0.2	0.0	0.1	0.007	0.002	0.004
WA: Spokane	9	1.2	0.3	0.5	0.023	0.003	0.010

Table 5

Gross Beta and Specific Gamma in Precipitation
July 2004

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L	± 2*u*	Nuclide	pCi/L ± 2*u*
AL: Montgomery	1.74	0.46	Be7	78 12
AR: Little Rock	2.33	0.41	Be7	36 17
AZ: Phoenix	2.50	0.43	Be7	44 26
CO: Denver	1.31	0.34	Be7	54 13
CT: Hartford	0.96	0.32	Be7	36 14
DE: Wilmington	1.42	0.35	Be7	37 10
			Pb212	1.8 1.3
FL: Jacksonville	1.83	0.37	Be7	79 19
GA: Atlanta	2.59	0.42	Be7	70 17
HI: Honolulu	0.72	0.44	K40	12 10
IA: Iowa City	0.16	0.26		ND
ID: Idaho Falls	0.99	0.33		ND
KS: Kansas City	0.01	0.37		ND
ME: Augusta	1.56	0.35	Be7	25 16
MI: Lansing	0.94	0.32		ND
MN: Minneapolis	1.15	0.34	Be7	29 10
			Pb210	23 33
NC: Charlotte	1.57	0.35	Be7	37 17
NC: Wilmington	4.38	0.50	Be7	92 17
ND: Bismarck	1.38	0.35		ND
NH: Concord	1.49	0.35	Be7	47 18
NY: Albany	1.52	0.35	Be7	45 16
NY: Yaphank	9.73	0.73	Be7	10.4 8.6
			K40	14.4 9.7
OH: Painesville	0.26	0.39	Be7	35 37
PA: Harrisburg	2.53	0.41	Be7	58 33
TN: Knoxville	2.35	0.41		ND
TN: Nashville	1.07	0.33	Be7	20.9 9.8
TX: Austin	0.28	0.39	Be7	66 31
TX: Dallas	0.28	0.26		ND
TX: El Paso	0.88	0.33	K40	10 13
UT: Salt Lake City	4.25	0.56	Be7	78 35
VA: Lynchburg	3.29	0.46	Tl208	2.5 3.3
WA: Olympia	4.42	0.58	K40	22 35
			Tl208	2.4 3.3

Note: ND = Not Detected

Table 6

Gross Beta and Specific Gamma in Precipitation
August 2004

Location	Gross Beta Activity		Gamma-Emitting Radionuclides	
	pCi/L	± 2*u*	Nuclide	pCi/L ± 2*u*
AL: Montgomery	0.70	0.30	Be7	42 19
			Pb212	2.2 2.8
AR: Little Rock	0.89	0.32		ND
AZ: Phoenix	1.11	0.34	Be7	112 37
CO: Denver	0.49	0.28	Be7	38 29
CT: Hartford	1.16	0.34	Be7	29 18
DE: Wilmington	0.94	0.32	Be7	41 12
FL: Jacksonville	0.71	0.30	Be7	42 19
GA: Atlanta	1.95	0.39	Be7	46 12
			Pb212	1.6 1.3
HI: Honolulu	0.55	0.31	K40	18 12
IA: Iowa City	0.71	0.30	Be7	14 10
ID: Idaho Falls	5.96	0.61		ND
ME: Augusta	2.50	0.41	Be7	53 18
MI: Lansing	0.29	0.28		ND
MN: Minneapolis	1.01	0.33	Be7	25 16
NC: Charlotte	1.04	0.32	Be7	39 20
NC: Wilmington	0.24	0.28		ND
ND: Bismarck	1.14	0.35	Tl208	1.0 1.3
NH: Concord	2.36	0.41	Be7	51 18
NY: Albany	1.40	0.35	Be7	52 19
NY: Yaphank	5.09	0.55		ND
OH: Painesville	2.08	0.39	Be7	46 12
			Pb212	1.6 1.3
OR: Portland	0.45	0.28		ND
PA: Harrisburg	0.93	0.33	Be7	38 39
TN: Knoxville	7.08	0.63	K40	9 13
TN: Nashville	1.20	0.34	Be7	14 10
TX: Austin	0.38	0.28		ND
TX: Dallas	0.27	0.28		ND
TX: El Paso	0.41	0.28		ND
UT: Salt Lake City	1.94	0.42	Be7	55 28
VA: Lynchburg	3.44	0.47		ND
WA: Olympia	0.12	0.26	Tl208	0.9 1.2

Note: ND = Not Detected

Table 7

Gross Beta and Specific Gamma in Precipitation
September 2004

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	± 2*u*	Nuclide	pCi/L	± 2*u*
AL: Montgomery	0.18	0.26		ND	
AR: Little Rock	2.00	0.39	Tl208	1.6	3.1
CO: Denver	3.82	0.48	Be7	27	11
			Pb210	31	21
CT: Hartford	0.86	0.32		ND	
DE: Wilmington	0.14	0.25		ND	
FL: Jacksonville	0.87	0.34	Be7	64	20
GA: Atlanta	0.57	0.30		ND	
HI: Honolulu	0.69	0.31		ND	
IA: Iowa City	0.23	0.27	Pb212	4.4	6.7
			Tl208	2.7	4.0
ID: Idaho Falls	1.75	0.38	Be7	33	34
KS: Kansas City	0.44	0.28		ND	
ME: Augusta	0.28	0.26		ND	
MI: Lansing	1.06	0.34		ND	
MN: Minneapolis	0.91	0.32	Be7	17	11
			Pb210	19	19
			Pb212	0.9	1.0
NC: Charlotte	0.81	0.30		ND	
NC: Wilmington	0.32	0.27		ND	
ND: Bismarck	1.09	0.34		ND	
NH: Concord	0.50	0.28		ND	
NY: Albany	0.29	0.27		ND	
NY: Yaphank	4.06	0.50		ND	
OH: Painesville	1.09	0.33	Be7	21	12
OR: Portland	0.57	0.29		ND	
PA: Harrisburg	0.08	0.26	Ra224	49	69
SC: Columbia	1.00	0.32		ND	
TN: Knoxville	4.13	0.50		ND	
TN: Nashville	0.37	0.27	Be7	38	20
TX: Austin	0.26	0.26	Pb210	60	100
TX: Dallas	0.45	0.29		ND	
TX: El Paso	0.90	0.33		ND	
UT: Salt Lake City	4.51	0.56	Be7	69	32
			Pb212	3.5	5.2
VA: Lynchburg	3.47	0.47	K40	30	34
WA: Olympia	0.40	0.27	Pb210	24	17

Note: ND = Not Detected

Table 8

Tritium in Precipitation
July - September 2004

Location	July 2004		August 2004		September 2004	
	pCi/L	± 2*u*	pCi/L	± 2*u*	pCi/L	± 2*u*
AL: Montgomery	40	82	-3	78	6	81
AR: Little Rock	36	79	22	76	58	82
AZ: Phoenix	10	78	90	77	NS	
CO: Denver	-15	77	114	78	111	84
CT: Hartford	-20	81	198	85	95	76
DE: Wilmington	-10	79	57	79	18	82
FL: Jacksonville	30	82	32	78	-36	79
GA: Atlanta	-26	78	-13	76	-56	78
HI: Honolulu	8	77	-34	71	20	78
IA: Iowa City	-32	79	104	81	46	83
ID: Idaho Falls	56	80	66	76	58	81
KS: Kansas City	38	79	NS		37	82
ME: Augusta	26	83	65	79	102	76
MI: Lansing	-36	78	49	79	-81	77
MN: Minneapolis	-8	80	63	80	10	81
NC: Charlotte	87	84	-18	76	-38	79
NC: Wilmington	68	83	-16	76	-48	79
ND: Bismarck	69	83	24	78	-109	75
NH: Concord	141	82	39	79	7	72
NY: Albany	45	83	15	77	-42	79
NY: Yaphank	67	84	138	82	-72	78
OH: Painesville	4	81	83	80	-10	80
OR: Portland	NS		75	77	-20	77
PA: Harrisburg	-20	78	29	79	2	81
SC: Columbia	NS		NS		-14	80
TN: Knoxville	-21	81	46	79	-36	79
TN: Nashville	46	82	11	78	-50	78
TX: Austin	34	81	70	77	-34	79
TX: Dallas	74	80	5	73	92	83
TX: El Paso	-12	79	28	75	-58	78
UT: Salt Lake City	42	79	-7	73	-20	76
VA: Lynchburg	51	83	-21	76	-16	81
WA: Olympia	43	79	77	77	10	81

Note: NS = No Sample

Plutonium and Uranium in Airborne Particulates

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.

Beta Activity in Precipitation

All stations routinely submit precipitation samples as rainfall, snow, or sleet occurs. The precipitation samples are composited at the NAREL into single monthly samples for each station. Each month that precipitation occurs, an aliquant of the composited sample is analyzed for gross beta, tritium, and gamma-emitting nuclides.

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 2004

Location	Date Collected	^{3}H pCi/L	± 2*u*
AK: Fairbanks	07/13/04	29	72
AL: Dothan	07/13/04	80	74
AL: Montgomery	07/12/04	55	85
AL: Muscle Shoals	07/20/04	294	83
AL: Scottsboro	07/21/04	221	80
AR: Little Rock	07/09/04	28	81
CA: Los Angeles	07/07/04	64	83
CA: Richmond	07/26/04	77	85
CO: Denver	07/21/04	18	72
CT: Hartford	07/07/04	40	81
DE: Dover	07/08/04	44	82
FL: Tampa	09/20/04	-58	84
GA: Baxley	07/13/04	121	76
GA: Savannah	09/01/04	93	77
HI: Honolulu	07/09/04	62	74
IA: Cedar Rapids	08/10/04	-25	77
ID: Boise	07/12/04	-83	79
ID: Idaho Falls	07/29/04	6	81
IL: Morris	07/12/04	53	73
KS: Topeka	07/06/04	48	82
LA: New Orleans	08/04/04	10	82
MD: Baltimore	07/06/04	6	80
MD: Conowingo	08/17/04	5	77
ME: Augusta	07/07/04	26	81
MI: Detroit	07/12/04	275	82
MI: Grand Rapids	07/14/04	135	76
MN: Minneapolis	07/28/04	16	82
MN: Red Wing	07/07/04	-40	78
MO: Jefferson City	07/06/04	75	83
MS: Jackson	07/08/04	210	80
MS: Port Gibson	07/07/04	126	76
MT: Helena	07/08/04	0	79
NC: Charlotte	07/28/04	336	96
NC: Raleigh	07/21/04	113	76
ND: Bismarck	07/06/04	-62	76
NE: Lincoln	07/07/04	81	83
NH: Concord	07/08/04	-6	83
NJ: Trenton	07/15/04	85	74
NJ: Waretown	08/18/04	-18	76
NM: Santa Fe	07/08/04	-14	83

Table 9 (continued)

Tritium in Drinking Water
July - September 2004

Location	Date Collected	^{3}H pCi/L	± 2*u*
NV: Las Vegas	08/25/04	68	79
NY: Albany	07/06/04	-76	80
NY: New York City	08/06/04	54	84
NY: Syracuse	07/15/04	132	76
OH: Cincinnati	09/03/04	173	81
OH: E. Liverpool	07/14/04	118	76
OH: Painesville	08/12/04	126	82
OH: Toledo	07/06/04	44	81
OK: Oklahoma City	07/12/04	64	73
OR: Portland	07/28/04	-14	81
PA: Columbia	08/18/04	64	79
PA: Harrisburg	08/18/04	77	80
PA: Philadelphia - Queen Lane	08/19/04	39	79
PA: Philadelphia - Belmont	08/19/04	111	81
PA: Philadelphia - Baxter Control	08/19/04	5	77
PA: Pittsburgh	07/14/04	173	78
RI: Providence	07/09/04	0	83
SC: Barnwell	07/22/04	-84	78
SC: Columbia	07/21/04	-10	81
SC: Jenkinsville	07/20/04	-40	80
SC: Seneca	07/20/04	122	76
TN: Chattanooga	07/07/04	32	81
TN: Knoxville	07/06/04	-34	81
TN: Oak Ridge - Anderson Co.#772	07/06/04	30	81
TN: Oak Ridge - Roane Co. #4442	07/06/04	102	84
TN: Oak Ridge - Knox Co. #371	07/06/04	-2	79
TN: Oak Ridge - Anderson Co. #768	07/07/04	-50	77
TN: Oak Ridge - Roane Co.# 360	07/07/04	133	89
TX: Austin	07/07/04	-77	79
VA: Ashland	08/27/04	970	110
VA: Lynchburg	07/06/04	-12	79
WA: Richland	07/08/04	56	82
WA: Seattle	09/20/04	13	73

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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 2004

Location	Date Collected	K g/L ± 2*u*		^{137}Cs pCi/L ± 2*u*	^{140}Ba pCi/L ± 2*u*	^{131}I pCi/L ± 2*u*
AL: Montgomery	07/02/04	1.68	0.12	ND	ND	ND
AR: Little Rock	07/20/04	1.58	0.13	ND	ND	ND
AZ: Phoenix	09/30/04	1.44	0.13	ND	ND	ND
CA: Los Angeles	07/13/04	1.69	0.11	ND	ND	ND
CA: Sacramento	09/29/04	1.58	0.13	ND	ND	ND
CA: San Francisco	07/08/04	1.63	0.12	ND	ND	ND
DE: Dover	07/12/04	1.47	0.12	ND	ND	ND
FL: Tampa	07/20/04	1.57	0.13	ND	ND	ND
GA: Atlanta	07/13/04	1.58	0.13	ND	ND	ND
HI: Honolulu	08/31/04	1.54	0.12	ND	ND	ND
IA: Des Moines	07/19/04	1.49	0.11	ND	ND	ND
IN: Indianapolis	07/08/04	1.58	0.12	ND	ND	ND
KS: Wichita	07/20/04	1.72	0.14	ND	ND	ND
KY: Louisville	07/12/04	1.62	0.11	ND	ND	ND
MA: Boston	09/29/04	1.61	0.13	ND	ND	ND
MD: Baltimore	07/02/04	1.66	0.12	ND	ND	ND
MO: Jefferson City	07/16/04	1.57	0.12	ND	ND	ND
NJ: Trenton	07/08/04	1.61	0.12	ND	ND	ND
NM: Albuquerque	07/08/04	1.53	0.12	ND	ND	ND
NV: Las Vegas	08/09/04	1.57	0.17	ND	ND	ND
NY: Buffalo	07/08/04	1.63	0.12	ND	ND	ND
NY: Syracuse	07/09/04	1.58	0.17	ND	ND	ND
OH: Cincinnati	07/26/04	1.72	0.12	ND	ND	ND
OH: Cleveland	07/14/04	1.49	0.16	ND	ND	ND
PA: Philadelphia	07/07/04	1.68	0.13	ND	ND	ND
PA: Pittsburgh	07/07/04	1.61	0.12	ND	ND	ND
TN: Chattanooga	07/07/04	1.54	0.12	ND	ND	ND
TN: Knoxville	08/05/04	1.54	0.12	ND	ND	ND
TN: Memphis	07/26/04	1.53	0.13	ND	ND	ND
TX: Ft. Worth	07/27/04	1.63	0.12	ND	ND	ND
TX: San Antonio	07/20/04	1.39	0.11	ND	ND	ND
VA: Norfolk	09/23/04	1.51	0.11	ND	ND	ND
VT: Montpelier	09/30/04	1.56	0.12	ND	ND	ND
WA: Spokane	08/10/04	1.57	0.11	ND	ND	ND
WA: Tacoma	09/29/04	1.67	0.12	ND	ND	ND
WV: Charleston	07/08/04	1.54	0.12	ND	ND	ND

Note: ND = Not Detected

Table 11
Strontium-90 in Pasteurized Milk
July - September 2004

Strontium-90 in pasteurized milk results will be published when they become available.

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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.

Requests for information concerning the operation of ERAMS and the data that are generated should be directed as follows:

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