402-R-06-018

ENVIRONMENTAL RADIATION DATA

REPORT 126

April - June 2006

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 RadNet monitoring system (formerly 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 RadNet in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. RadNet 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 RadNet 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 RadNet monitoring system (formerly 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 RadNet. 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 sample that is analyte-free.

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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 m^3.

‡ 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
April 2006

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
AL: Montgomery/408	8	0.1	0.0	0.1	0.012	0.008	0.010
AR: Little Rock	3	0.0	0.0	0.0	0.014	0.012	0.013
AZ: Phoenix	4	0.2	0.0	0.2	0.010	0.005	0.007
CA: Los Angeles	8	0.3	0.1	0.2	0.011	0.004	0.006
CA: Richmond	4	0.0	0.0	0.0	0.003	0.002	0.003
CA: San Francisco	4	0.0	0.0	0.0	0.003	0.002	0.003
CO: Denver	7	1.0	0.5	0.7	0.010	0.006	0.008
CT: Hartford	8	0.1	0.0	0.0	0.007	0.002	0.005
DC: Washington	8	0.1	0.0	0.0	0.010	0.004	0.006
DE: Wilmington	7	0.1	0.0	0.1	0.010	0.004	0.006
FL: Jacksonville	8	0.1	0.0	0.1	0.010	0.006	0.007
FL: Miami	7	0.0	0.0	0.0	0.015	0.005	0.011
GA: Atlanta	4	0.1	0.0	0.0	0.010	0.009	0.009
IA: Iowa City	8	0.9	0.1	0.4	0.013	0.006	0.009
ID: Idaho Falls	8				0.009	0.004	0.005
IL: Chicago	7	0.3	0.1	0.1	0.011	0.005	0.008
IN: Indianapolis	8	0.2	0.0	0.1	0.010	0.005	0.007
KS: Topeka	6	2.5	0.8	1.2	0.016	0.008	0.011
MA: Boston	8	0.3	0.0	0.1	0.009	0.004	0.006
MI: Detroit	8				0.010	0.003	0.006
MI: Lansing	8	0.2	0.1	0.1	0.014	0.006	0.008
MN: St. Paul	4	0.1	0.0	0.1	0.012	0.006	0.009
MS: Jackson	5	0.0	0.0	0.0	0.013	0.009	0.011
NC: Charlotte	6	0.0	0.0	0.0	0.011	0.008	0.009
NC: Wilmington	4				0.011	0.009	0.010
ND: Bismarck	6	1.4	0.2	0.6	0.015	0.007	0.011
NH: Concord	8	0.9	0.1	0.3	0.009	0.003	0.006
NJ: Trenton	8	0.3	0.1	0.1	0.013	0.003	0.007
NY: Albany	4	0.1	0.0	0.0	0.011	0.005	0.008
NY: New York City	8	0.0	0.0	0.0	0.015	0.007	0.011
NY: Yaphank	8	0.1	0.0	0.1	0.007	0.003	0.005
OH: Painesville	7	0.2	0.1	0.1	0.008	0.004	0.006
OH: Ross	8				0.013	0.006	0.009
ON: Ottawa	1	0.0	0.0	0.0	0.000	0.000	0.000
OR: Portland	8	0.1	0.0	0.0	0.005	0.002	0.004
PA: Harrisburg	8	0.3	0.1	0.2	0.011	0.004	0.008
PA: Philadelphia	7	0.5	0.0	0.1	0.008	0.004	0.006
PA: Pittsburgh	6	0.3	0.0	0.1	0.010	0.005	0.007

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2006

Location	Number of Samples	5-hour Field Estimate Max (pCi/m³)	5-hour Field Estimate Min (pCi/m³)	5-hour Field Estimate Avg (pCi/m³)	NAREL Lab Measurement Max (pCi/m³)	NAREL Lab Measurement Min (pCi/m³)	NAREL Lab Measurement Avg (pCi/m³)
SC: Barnwell	1	0.0	0.0	0.0	0.009	0.009	0.009
SC: Columbia	4	0.1	0.0	0.1	0.023	0.014	0.017
SD: Pierre	8	0.4	0.1	0.3	0.011	0.004	0.008
TN: Knoxville	6	0.3	0.0	0.1	0.017	0.006	0.013
TN: Nashville	7	0.2	0.0	0.1	0.014	0.010	0.012
TN: Oak Ridge/Bethel	8	0.5	0.1	0.3	0.016	0.009	0.011
TN: Oak Ridge/K25	8	0.8	0.2	0.3	0.017	0.008	0.011
TN: Oak Ridge/Melton	8	0.6	0.1	0.3	0.015	0.009	0.011
TN: Oak Ridge/Y12 E	8	0.5	0.1	0.3	0.014	0.010	0.011
TN: Oak Ridge/Y12 W	8	0.3	0.1	0.2	0.012	0.009	0.010
TX: Austin	8	0.3	0.1	0.2	0.013	0.010	0.011
TX: Dallas	6	0.2	0.0	0.1	0.010	0.007	0.008
TX: El Paso	8	1.2	0.3	0.6	0.012	0.009	0.010
UT: Salt Lake City	8	0.3	0.0	0.1	0.011	0.005	0.007
VA: Lynchburg	8	0.7	0.2	0.3	0.012	0.006	0.009
WA: Olympia	4	0.0	0.0	0.0	0.005	0.003	0.004
WA: Spokane	7	0.2	0.1	0.2	0.009	0.003	0.004

Table 3
Gross Beta in Airborne Particulates
May 2006

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
AL: Montgomery/408	9	0.1	0.0	0.1	0.021	0.007	0.014
AR: Little Rock	7	0.1	0.0	0.0	0.018	0.005	0.011
AZ: Phoenix	5	0.5	0.1	0.4	0.015	0.009	0.011
CA: Los Angeles	8	0.4	0.1	0.2	0.013	0.005	0.010
CA: Richmond	5	0.0	0.0	0.0	0.005	0.003	0.004
CA: San Francisco	4	0.0	0.0	0.0	0.005	0.003	0.004
CO: Denver	8	1.1	0.4	0.7	0.013	0.008	0.011
CT: Hartford	9	0.1	0.0	0.0	0.010	0.001	0.004
DC: Washington	9	0.1	0.0	0.0	0.012	0.005	0.007
DE: Wilmington	9	0.5	0.0	0.1	0.015	0.005	0.008
FL: Jacksonville	9	0.1	0.0	0.1	0.011	0.004	0.008
FL: Miami	3	0.0	0.0	0.0	0.022	0.010	0.014
GA: Atlanta	3	0.1	0.0	0.0	0.011	0.008	0.010
IA: Iowa City	9	0.7	0.2	0.4	0.015	0.003	0.009
ID: Idaho Falls	9				0.010	0.004	0.008
IL: Chicago	6	0.3	0.0	0.1	0.011	0.005	0.008
IN: Indianapolis	9	0.2	0.0	0.1	0.010	0.003	0.007
KS: Topeka	8	1.2	0.3	0.8	0.016	0.007	0.011
MA: Boston	9	0.2	0.0	0.1	0.015	0.002	0.006
MI: Detroit	9	0.1	0.0	0.1	0.010	0.003	0.006
MI: Lansing	9	0.2	0.0	0.1	0.012	0.002	0.008
MN: St. Paul	5	0.1	0.0	0.1	0.011	0.004	0.008
MS: Jackson	9	0.1	0.0	0.0	0.019	0.007	0.011
NC: Charlotte	9	0.1	0.0	0.0	0.014	0.005	0.009
NC: Wilmington	5				0.011	0.007	0.009
ND: Bismarck	8	1.6	0.7	1.0	0.011	0.005	0.008
NH: Concord	9	0.3	0.1	0.2	0.010	0.001	0.004
NJ: Trenton	9	0.3	0.1	0.2	0.012	0.004	0.007
NY: Albany	5	0.1	0.0	0.0	0.011	0.002	0.007
NY: New York City	9	0.0	0.0	0.0	0.014	0.004	0.009
NY: Yaphank	9	0.1	0.0	0.0	0.008	0.002	0.004
OH: Painesville	9	0.2	0.1	0.1	0.012	0.003	0.006
OH: Ross	9				0.014	0.004	0.008
OR: Portland	9	0.1	0.0	0.0	0.007	0.002	0.005
PA: Harrisburg	9	0.4	0.1	0.3	0.013	0.005	0.009
PA: Philadelphia	7	0.0	0.0	0.0	0.009	0.004	0.006
PA: Pittsburgh	8	0.2	0.1	0.1	0.011	0.005	0.008
SC: Barnwell	3	0.1	0.0	0.0	0.012	0.008	0.011

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2006

Location	Number of Samples	5-hour Field Estimate Max (pCi/m³)	5-hour Field Estimate Min (pCi/m³)	5-hour Field Estimate Avg (pCi/m³)	NAREL Lab Measurement Max (pCi/m³)	NAREL Lab Measurement Min (pCi/m³)	NAREL Lab Measurement Avg (pCi/m³)
SC: Columbia	3	0.2	0.0	0.1	0.024	0.009	0.014
SD: Pierre	7	0.5	0.1	0.2	0.009	0.005	0.007
TN: Knoxville	8	0.3	0.0	0.1	0.015	0.003	0.010
TN: Nashville	9	0.1	0.0	0.1	0.014	0.007	0.010
TN: Oak Ridge/Bethel	8	0.5	0.1	0.3	0.012	0.006	0.009
TN: Oak Ridge/K25	8	0.6	0.2	0.4	0.015	0.007	0.010
TN: Oak Ridge/Melton	8	0.6	0.1	0.3	0.013	0.005	0.009
TN: Oak Ridge/Y12 E	8	0.5	0.1	0.3	0.012	0.006	0.010
TN: Oak Ridge/Y12 W	8	0.2	0.1	0.1	0.012	0.006	0.009
TX: Austin	9	0.2	0.0	0.1	0.012	0.007	0.010
TX: Dallas	8	0.4	0.1	0.2	0.009	0.006	0.007
TX: El Paso	9	0.9	0.3	0.5	0.016	0.010	0.013
UT: Salt Lake City	9	0.3	0.0	0.2	0.012	0.007	0.010
VA: Lynchburg	8	1.0	0.1	0.4	0.013	0.006	0.009
WA: Olympia	7	0.1	0.0	0.0	0.005	0.001	0.003
WA: Spokane	9	0.5	0.1	0.2	0.015	0.003	0.007

Table 4
Gross Beta in Airborne Particulates
June 2006

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
AL: Montgomery/408	7	0.3	0.0	0.1	0.021	0.013	0.016
AR: Little Rock	4	0.1	0.0	0.0	0.015	0.009	0.012
AZ: Phoenix	4	0.3	0.2	0.2	0.014	0.011	0.012
CA: Los Angeles	9	0.3	0.0	0.2	0.011	0.006	0.008
CA: Richmond	4	0.0	0.0	0.0	0.004	0.002	0.003
CA: San Diego	4	0.3	0.0	0.1	0.023	0.006	0.012
CA: San Francisco	5	0.0	0.0	0.0	0.003	0.002	0.003
CO: Denver	9	1.4	0.6	0.9	0.017	0.008	0.012
CT: Hartford	9	0.1	0.0	0.0	0.010	0.002	0.006
DC: Washington	9	0.4	0.0	0.1	0.015	0.005	0.009
DE: Wilmington	9	0.3	0.0	0.1	0.015	0.005	0.008
FL: Jacksonville	8	0.1	0.0	0.1	0.010	0.004	0.007
GA: Atlanta	4	0.1	0.0	0.0	0.012	0.008	0.011
IA: Iowa City	9	0.7	0.0	0.3	0.011	0.007	0.009
ID: Idaho Falls	9				0.009	0.005	0.007
IL: Chicago	6	0.2	0.0	0.1	0.010	0.004	0.007
IN: Indianapolis	8	0.2	0.0	0.1	0.008	0.005	0.007
KS: Topeka	9	2.2	0.4	1.1	0.014	0.010	0.012
MA: Boston	9	0.5	0.0	0.2	0.012	0.002	0.006
MI: Detroit	9	0.1	0.0	0.1	0.011	0.005	0.007
MI: Lansing	8	0.4	0.1	0.2	0.011	0.006	0.008
MN: St. Paul	4	0.1	0.0	0.1	0.010	0.006	0.008
MS: Jackson	9	0.2	0.0	0.1	0.018	0.009	0.015
NC: Charlotte	9	0.1	0.0	0.1	0.014	0.006	0.010
NC: Wilmington	4				0.009	0.005	0.007
ND: Bismarck	8	1.9	0.4	0.8	0.013	0.007	0.009
NH: Concord	9	0.6	0.1	0.2	0.012	0.001	0.006
NJ: Trenton	9	0.3	0.1	0.2	0.013	0.004	0.008
NV: Las Vegas/913	2				0.009	0.008	0.009
NY: Albany	4	0.1	0.0	0.0	0.010	0.003	0.006
NY: New York City	8	1.0	0.0	0.1	0.018	0.004	0.009
NY: Yaphank	9	0.1	0.0	0.0	0.007	0.002	0.004
OH: Painesville	9	0.3	0.1	0.2	0.010	0.004	0.008
OH: Ross	9				0.013	0.006	0.010
OR: Portland	9	0.1	0.0	0.0	0.006	0.002	0.003
PA: Harrisburg	9	0.7	0.1	0.3	0.016	0.005	0.009
PA: Philadelphia	3	0.0	0.0	0.0	0.013	0.003	0.007
PA: Pittsburgh	9	0.3	0.0	0.1	0.016	0.005	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2006

Location	Number of Samples	5-hour Field Estimate (pCi/m³) Max	Min	Avg	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
SC: Barnwell	1	0.0	0.0	0.0	0.009	0.009	0.009
SC: Columbia	3	0.3	0.0	0.1	0.012	0.010	0.011
SD: Pierre	9	0.8	0.1	0.3	0.023	0.006	0.011
TN: Knoxville	6	0.5	0.0	0.2	0.018	0.013	0.015
TN: Nashville	9	0.2	0.1	0.1	0.015	0.009	0.012
TN: Oak Ridge/Bethel	9	1.1	0.2	0.6	0.014	0.009	0.012
TN: Oak Ridge/K25	8	1.6	0.3	0.8	0.016	0.010	0.013
TN: Oak Ridge/Melton	9	1.3	0.3	0.7	0.014	0.009	0.012
TN: Oak Ridge/Y12 E	8	1.1	0.3	0.6	0.016	0.010	0.013
TN: Oak Ridge/Y12 W	8	0.5	0.1	0.3	0.015	0.010	0.012
TX: Austin	9	0.4	0.1	0.2	0.019	0.009	0.013
TX: Dallas	5	0.5	0.1	0.3	0.013	0.005	0.009
TX: El Paso	9	0.9	0.2	0.5	0.021	0.011	0.017
UT: Salt Lake City	9	0.3	0.1	0.2	0.013	0.008	0.010
VA: Lynchburg	9	1.1	0.2	0.7	0.019	0.006	0.011
WA: Olympia	9	0.1	0.0	0.0	0.005	0.001	0.003
WA: Spokane	9	0.4	0.1	0.2	0.013	0.004	0.007

Table 5
Gross Beta and Specific Gamma in Precipitation
April 2006

Location	Gross Beta Activity pCi/L	± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L	± 2*u*
AL: Montgomery/408	1.90	0.39	Be7	55	32
			Bi212	33	43
AR: Little Rock	2.28	0.41	Be7	33	29
CA: Richmond	0.37	0.27	Pb212	4.5	6.9
DE: Wilmington	2.33	0.43	Be7	121	35
FL: Jacksonville	1.58	0.42		ND	
GA: Atlanta	2.26	0.41	Be7	93	33
IA: Iowa City	1.81	0.39	Pb212	6.4	5.8
MA: Boston	2.68	0.42	Be7	79	11
MI: Lansing	1.34	0.35		ND	
MN: St. Paul	0.91	0.33	Bi212	40	42
NC: Charlotte	1.51	0.36	Be7	44	27
NC: Wilmington	1.17	0.35		ND	
ND: Bismarck	1.69	0.39	Be7	48	32
NH: Concord	0.93	0.31	Pb212	3.4	6.5
			Tl208	5.0	4.5
NY: Albany	1.74	0.38	Be7	57	26
NY: Yaphank	1.78	0.38	Be7	30	24
OH: Painesville	1.05	0.33	Be7	55	32
OR: Portland	1.48	0.37	Be7	24	22
			Pb212	4.7	5.3
TN: Knoxville	9.26	0.72	Be7	26	29
TN: Nashville	1.16	0.34		ND	
TN: Oak Ridge/Melton	1.99	0.39	Be7	36	34
			Pb212	8.4	6.2
TX: Austin	1.50	0.38		ND	
UT: Salt Lake City	0.82	0.31		ND	
VA: Lynchburg	5.86	0.67		ND	
WA: Olympia	0.83	0.32		ND	

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
May 2006

Location	Gross Beta Activity pCi/L	± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L	± 2*u*
AL: Montgomery/408	1.81	0.39	Be7	71	33
			K40	26	35
			Tl208	2.2	3.5
AR: Little Rock	0.89	0.33		ND	
CA: Richmond	1.09	0.39		ND	
CO: Denver	4.38	0.55	Be7	49	26
			Tl208	1.8	3.0
CT: Hartford	0.75	0.31	Be7	42	36
DE: Wilmington	1.87	0.39	Be7	46	32
			Pb212	7.2	6.4
FL: Jacksonville	2.89	0.48	Be7	36	29
FL: Miami	1.82	0.46		ND	
GA: Atlanta	1.32	0.35	Be7	60	32
			Pb212	6.0	6.6
IA: Iowa City	1.30	0.37	Be7	27	23
			K40	25	33
			Ra224	31	52
			Tl208	2.1	3.5
ID: Idaho Falls	0.67	0.31		ND	
MA: Boston	3.62	0.47	Be7	77	13
MI: Lansing	2.85	0.48	Be7	23	21
MN: St. Paul	1.32	0.37		ND	
NC: Charlotte	1.86	0.39	Be7	68	28
NC: Wilmington	0.70	0.32	Be7	19	15
			Tl208	1.2	1.3
ND: Bismarck	1.03	0.36	K40	25	29
NH: Concord	0.69	0.30	Be7	49	28
			Pb212	4.6	6.0
NY: Albany	2.19	0.42	Be7	70	29
NY: Yaphank	1.94	0.39		ND	
OH: Painesville	1.42	0.36	Be7	41	29
OR: Portland	1.23	0.35	Be7	51	38
PA: Harrisburg	1.71	0.38	Be7	49	17
			Tl208	1.9	1.4
TN: Knoxville	6.36	0.64		ND	
TN: Nashville	1.61	0.37	Be7	72	31
TN: Oak Ridge/Melton	4.03	0.52	Be7	42	32

Note: ND = Not Detected

Table 6 (continued)
Gross Beta and Specific Gamma in Precipitation
May 2006

Location	Gross Beta Activity pCi/L	± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L	± 2*u*
TX: Austin	0.63	0.31	Pb212	3.6	6.1
UT: Salt Lake City	3.51	0.52	Be7	51	31
			Pb212	4.2	6.8
VA: Lynchburg	4.67	0.56		ND	
WA: Olympia	0.30	0.28	K40	28	39

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
June 2006

Location	Gross Beta Activity pCi/L	± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L	± 2*u*
AL: Montgomery/408	1.74	0.38	Be7	74	36
AR: Little Rock	2.21	0.43		ND	
CT: Hartford	0.70	0.31		ND	
DE: Wilmington	2.08	0.39	Be7	55	35
FL: Jacksonville	0.58	0.30	Be7	39	32
			Tl208	2.4	3.4
GA: Atlanta	4.86	0.54	Be7	122	32
IA: Iowa City	1.30	0.36	Be7	32	33
			Tl208	3.1	4.3
ID: Idaho Falls	13.6	1.0	Be7	92	34
MA: Boston	3.82	0.48	Be7	85	36
MI: Lansing	1.70	0.39	Be7	29	26
MN: St. Paul	1.37	0.37	Be7	33	29
			K40	18	35
			Tl208	1.7	3.0
NC: Charlotte	2.70	0.44	Be7	66	27
			Tl208	3.8	2.5
NC: Wilmington	1.20	0.34	Be7	57	38
ND: Bismarck	1.32	0.36		ND	
NH: Concord	0.34	0.28		ND	
NY: Albany	0.52	0.30	K40	25	37
NY: Yaphank	9.19	0.72		ND	
OH: Painesville	2.60	0.42	Be7	87	18
OR: Portland	1.07	0.33	Be7	58	32
PA: Harrisburg	1.08	0.34		ND	
TN: Knoxville	6.31	0.65	Pb212	4.3	6.5
TN: Nashville	1.10	0.36	Be7	74	28
TN: Oak Ridge/Melton	4.03	0.51	Be7	135	50
			Pb212	6.2	6.9
TX: Austin	0.74	0.32	Be7	25	25
UT: Salt Lake City	2.80	0.46	Be7	81	28
VA: Lynchburg	7.8	1.0		ND	
WA: Olympia	0.55	0.30		ND	

Note: ND = Not Detected

Table 8
Tritium in Precipitation
April - June 2006

Location	April 2006 pCi/L	± 2*u*	May 2006 pCi/L	± 2*u*	June 2006 pCi/L	± 2*u*
AL: Montgomery/408	0	82	-33	78	-38	83
AR: Little Rock	31	83	-20	82	-20	82
CA: Richmond	14	82	-22	82	NS	
CO: Denver	NS		18	83	NS	
CT: Hartford	NS		68	83	-46	87
DE: Wilmington	62	83	8	80	-24	84
FL: Jacksonville	51	84	-2	80	-62	81
FL: Miami	NS		-49	77	NS	
GA: Atlanta	25	83	33	81	-15	83
IA: Iowa City	9	82	47	85	-35	83
ID: Idaho Falls	NS		54	85	16	84
MA: Boston	-2	80	43	81	-38	83
MI: Lansing	72	85	2	80	-15	84
MN: St. Paul	40	84	14	80	47	86
NC: Charlotte	-14	80	23	81	2	83
NC: Wilmington	23	81	87	84	-4	85
ND: Bismarck	34	83	22	84	20	85
NH: Concord	16	81	47	82	40	87
NY: Albany	10	81	6	80	-38	82
NY: Yaphank	-15	79	-47	77	16	85
OH: Painesville	108	86	59	83	4	85
OR: Portland	11	82	13	84	-22	82
PA: Harrisburg	NS		10	80	14	84
TN: Knoxville	-13	81	49	82	-7	84
TN: Nashville	-14	81	20	81	27	86
TN: Oak Ridge/Melton	106	86	166	88	158	91
TX: Austin	20	83	-45	81	-26	83
UT: Salt Lake City	-18	80	97	87	-4	83
VA: Lynchburg	77	85	21	81	38	86
WA: Olympia	27	84	7	83	-55	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-particle 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 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 radionuclides.

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2. Drinking Water Program

The RadNet 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
April - June 2006

Location	Date Collected	^{3}H pCi/L	± 2*u*
AK: Fairbanks	04/05/06	84	81
AL: Dothan	04/05/06	49	79
AL: Montgomery	04/06/06	92	80
AL: Muscle Shoals	04/04/06	202	84
AL: Scottsboro	04/03/06	147	82
AR: Little Rock	04/10/06	-10	83
CA: Los Angeles	04/20/06	2	80
CA: Richmond	04/04/06	27	78
CO: Denver	04/10/06	37	86
CT: Hartford	04/05/06	99	81
DE: Dover	04/10/06	-30	82
FL: Tampa	05/15/06	0	82
GA: Baxley	04/04/06	64	79
GA: Savannah	06/14/06	42	85
HI: Honolulu	04/07/06	64	80
IA: Cedar Rapids	04/04/06	34	77
ID: Boise	06/15/06	27	83
ID: Idaho Falls	04/17/06	-38	84
IL: W. Chicago	04/25/06	27	81
KS: Topeka	04/03/06	16	76
LA: New Orleans	06/14/06	41	84
MD: Baltimore	04/04/06	112	80
MD: Conowingo	05/23/06	63	84
ME: Augusta	04/03/06	49	77
MI: Detroit	04/06/06	132	83
MI: Grand Rapids	04/20/06	-6	80
MN: Red Wing	04/25/06	39	82
MN: St. Paul	04/24/06	197	89
MO: Jefferson City	04/03/06	68	80
MS: Jackson	04/04/06	65	80
MS: Port Gibson	04/04/06	47	79
MT: Helena	04/10/06	133	90
NC: Charlotte	04/05/06	680	110
NC: Raleigh	04/18/06	-34	84
ND: Bismarck	04/03/06	51	78
NE: Lincoln	04/21/06	-41	78
NH: Concord	04/24/06	47	83
NJ: Trenton	04/06/06	66	80
NJ: Waretown	04/11/06	-4	83
NM: Santa Fe	04/04/06	74	79

Table 9 (continued)
Tritium in Drinking Water
April - June 2006

Location	Date Collected	^{3}H pCi/L	± 2*u*
NV: Las Vegas	04/04/06	22	78
NY: Albany	04/03/06	146	82
NY: New York City	04/14/06	12	84
NY: Syracuse	06/30/06	-8	81
OH: Cincinnati	05/17/06	77	85
OH: E. Liverpool	04/05/06	70	80
OH: Painesville	05/03/06	20	82
OH: Toledo	04/04/06	191	84
OR: Portland	06/26/06	-37	84
PA: Columbia	05/24/06	43	83
PA: Harrisburg	05/24/06	39	83
PA: Philadelphia - Queen Lane Lab.	04/18/06	22	86
PA: Philadelphia - Baxter Lab.	04/18/06	-36	83
PA: Philadelphia – Belmont Lab.	04/18/06	-7	84
PA: Pittsburgh	04/05/06	57	79
RI: Providence	04/07/06	8	84
SC: Barnwell	04/20/06	33	82
SC: Columbia	04/25/06	41	82
SC: Columbia	06/28/06	-27	82
SC: Jenkinsville	04/12/06	23	82
SC: Seneca	04/14/06	37	82
TN: Chattanooga	04/04/06	750	110
TN: Knoxville	04/03/06	65	78
TN: Oak Ridge/#360	04/07/06	129	83
TN: Oak Ridge/#371	04/07/06	66	80
TN: Oak Ridge/#4442	04/07/06	198	93
TN: Oak Ridge/#768	04/07/06	27	78
TN: Oak Ridge/#772	04/07/06	65	80
TX: Austin	05/10/06	-31	79
VA: Ashland	04/04/06	2640	160
VA: Lynchburg	04/03/06	40	77
WA: Richland	04/12/06	12	84
WA: Seattle	06/12/06	-13	82

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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

April - June 2006

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*
AR: Little Rock	06/20/06	1.60 0.14	ND	ND	ND
AZ: Phoenix	05/17/06	1.56 0.12	ND	ND	ND
CA: Los Angeles	04/06/06	1.58 0.13	ND	ND	ND
CA: Sacramento	04/24/06	1.50 0.12	ND	ND	ND
CA: San Francisco	04/04/06	1.74 0.12	ND	ND	ND
DE: Wilmington	04/25/06	1.47 0.12	ND	ND	ND
FL: Tampa	04/12/06	1.63 0.13	ND	ND	ND
IA: Des Moines	04/10/06	1.62 0.13	ND	ND	ND
IN: Indianapolis	05/25/06	1.60 0.17	ND	ND	ND
KS: Wichita	04/24/06	1.67 0.13	ND	ND	ND
KY: Louisville	04/12/06	1.67 0.13	ND	ND	ND
MA: Boston	06/19/06	1.74 0.12	ND	ND	ND
MD: Baltimore	04/09/06	1.61 0.13	ND	ND	ND
MI: Detroit	06/26/06	1.60 0.13	ND	ND	ND
MO: Jefferson City	05/16/06	1.70 0.14	ND	ND	ND
NJ: Trenton	05/25/06	1.57 0.12	ND	ND	ND
NM: Albuquerque	05/08/06	1.70 0.12	ND	ND	ND
NV: Las Vegas	04/10/06	1.62 0.13	ND	ND	ND
NY: Buffalo	04/06/06	1.70 0.13	ND	ND	ND
NY: Syracuse	04/07/06	1.69 0.11	ND	ND	ND
OH: Cincinnati	05/16/06	1.47 0.12	ND	ND	ND
OH: Cleveland	05/09/06	1.67 0.13	ND	ND	ND
OR: Portland	04/10/06	1.69 0.13	ND	ND	ND
PA: Pittsburgh	05/09/06	1.55 0.12	ND	ND	ND
TN: Chattanooga	05/03/06	1.54 0.17	ND	ND	ND
TN: Knoxville	04/10/06	1.58 0.13	ND	ND	ND
TN: Memphis	04/24/06	1.60 0.13	ND	ND	ND
TX: Austin	04/17/06	1.62 0.13	ND	ND	ND
TX: Ft. Worth	04/17/06	1.64 0.13	ND	ND	ND
VA: Norfolk	06/29/06	1.58 0.12	ND	ND	ND
VT: Montpelier	06/09/06	1.50 0.17	ND	ND	ND
WA: Spokane	04/18/06	1.54 0.12	ND	ND	ND
WA: Tacoma	06/21/06	1.55 0.12	ND	ND	ND
WV: Charleston	04/05/06	1.70 0.13	ND	ND	ND

Note: ND = Not Detected

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 RadNet and the data that are generated should be directed as follows:

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