

ENVIRONMENTAL

RADIATION

DATA

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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/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 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/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 2006

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/408	8	0.1	0.0	0.0	0.014	0.004	0.008
AR: Little Rock	4	0.1	0.0	0.0	0.015	0.009	0.013
AZ: Phoenix	5	0.5	0.1	0.3	0.018	0.010	0.014
CA: Los Angeles	6	0.9	0.1	0.5	0.026	0.011	0.016
CA: Richmond	5	0.1	0.0	0.0	0.005	0.002	0.004
CA: San Francisco	4	0.0	0.0	0.0	0.005	0.002	0.004
CO: Denver	4	0.7	0.2	0.5	0.009	0.003	0.006
CT: Hartford	9	0.0	0.0	0.0	0.007	0.005	0.005
DC: Washington	8	0.0	0.0	0.0	0.011	0.002	0.005
DE: Wilmington	9	0.1	0.0	0.0	0.016	0.004	0.008
FL: Jacksonville	9	0.1	0.0	0.1	0.012	0.004	0.007
FL: Miami	4	0.0	0.0	0.0	0.014	0.005	0.009
GA: Atlanta	3	0.0	0.0	0.0	0.010	0.006	0.008
IA: Iowa City	7	0.5	0.1	0.3	0.017	0.007	0.012
ID: Idaho Falls	9				0.013	0.002	0.005
IL: Chicago	4	0.1	0.1	0.1	0.012	0.007	0.010
IN: Indianapolis	9	0.1	0.0	0.1	0.012	0.005	0.009
KS: Topeka	5	1.2	0.5	0.8	0.018	0.010	0.016
MA: Boston	9	0.4	0.0	0.1	0.010	0.005	0.007
ME: Augusta	2	0.1	0.0	0.0	0.008	0.006	0.007
MI: Detroit	9	0.7	0.0	0.2	0.011	0.007	0.009
MI: Lansing	8	0.1	0.0	0.1	0.013	0.004	0.009
MN: St. Paul	5	0.1	0.0	0.1	0.012	0.008	0.011
MS: Jackson	5	0.2	0.0	0.1	0.014	0.005	0.009
NC: Charlotte	9	0.1	0.0	0.0	0.023	0.005	0.011
NC: Wilmington	5				0.011	0.006	0.008
ND: Bismarck	6	0.5	0.1	0.2	0.026	0.012	0.016
NH: Concord	9	0.2	0.0	0.1	0.009	0.006	0.007
NJ: Trenton	8	0.3	0.0	0.1	0.013	0.004	0.008
NM: Santa Fe	3	0.0	0.0	0.0	0.012	0.005	0.007
NY: Albany	4	0.0	0.0	0.0	0.010	0.007	0.008
NY: New York City	9	0.0	0.0	0.0	0.018	0.009	0.014
NY: Yaphank	9	0.1	0.0	0.0	0.007	0.003	0.005
OH: Painesville	8	0.1	0.0	0.1	0.008	0.004	0.007
OH: Ross	8				0.014	0.006	0.010
ON: Ottawa	5	0.0	0.0	0.0	0.007	0.005	0.006
OR: Portland	4	0.0	0.0	0.0	0.003	0.001	0.002
PA: Harrisburg	9	0.2	0.1	0.1	0.013	0.005	0.008

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

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
PA: Philadelphia	8	0.0	0.0	0.0	0.008	0.005	0.007
PA: Pittsburgh	9	0.1	0.0	0.1	0.016	0.006	0.009
SC: Barnwell	1	0.0	0.0	0.0	0.011	0.011	0.011
SC: Columbia	3	0.1	0.0	0.0	0.013	0.007	0.010
SD: Pierre	9	0.3	0.0	0.2	0.013	0.005	0.009
TN: Knoxville	9	0.2	0.0	0.1	0.017	0.008	0.012
TN: Nashville	8	0.2	0.0	0.1	0.018	0.006	0.011
TN: Oak Ridge/Bethel	7	0.5	0.1	0.3	0.012	0.007	0.009
TN: Oak Ridge/K25	7	0.5	0.1	0.3	0.012	0.006	0.009
TN: Oak Ridge/Melton	7	0.3	0.1	0.2	0.012	0.005	0.009
TN: Oak Ridge/Y12 E	7	0.4	0.1	0.2	0.015	0.007	0.010
TN: Oak Ridge/Y12 W	7	0.2	0.0	0.1	0.013	0.007	0.010
TX: Austin	9	0.2	0.0	0.1	0.014	0.004	0.009
TX: Dallas	7	2.2	0.1	0.5	0.012	0.005	0.006
TX: El Paso	8	1.5	0.4	0.8	0.022	0.008	0.013
UT: Salt Lake City	7	0.1	0.0	0.0	0.013	0.003	0.007
VA: Lynchburg	9	0.3	0.1	0.1	0.017	0.004	0.008
WA: Olympia	7	0.0	0.0	0.0	0.003	0.001	0.002
WA: Spokane	9	0.3	0.1	0.1	0.008	0.002	0.004

Table 3
Gross Beta in Airborne Particulates
February 2006

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/408	8	0.0	0.0	0.0	0.010	0.005	0.008
AR: Little Rock	6	0.0	0.0	0.0	0.016	0.012	0.014
AZ: Phoenix	4	0.4	0.1	0.3	0.019	0.009	0.014
CA: Los Angeles	6	0.4	0.0	0.2	0.028	0.006	0.014
CA: Richmond	4	0.1	0.0	0.1	0.012	0.004	0.008
CA: San Francisco	4	0.1	0.0	0.0	0.010	0.003	0.007
CO: Denver	8	1.1	0.4	0.6	0.016	0.005	0.010
CT: Hartford	8	0.1	0.0	0.0	0.014	0.004	0.008
DC: Washington	8	0.0	0.0	0.0	0.011	0.004	0.007
DE: Wilmington	8	0.1	0.0	0.1	0.018	0.008	0.011
FL: Jacksonville	8	0.1	0.0	0.1	0.008	0.004	0.006
FL: Miami	5	0.0	0.0	0.0	0.010	0.006	0.008
GA: Atlanta	3	0.0	0.0	0.0	0.011	0.009	0.010
IA: Iowa City	8	0.7	0.2	0.4	0.017	0.011	0.014
ID: Idaho Falls	8				0.017	0.002	0.010
IL: Chicago	2	0.0	0.0	0.0	0.010	0.010	0.010
IN: Indianapolis	8	0.1	0.0	0.1	0.016	0.004	0.010
KS: Topeka	8	1.7	0.8	1.2	0.027	0.007	0.017
MA: Boston	7	0.2	0.0	0.1	0.018	0.005	0.010
ME: Augusta	3	0.1	0.1	0.1	0.013	0.007	0.010
MI: Detroit	8	0.1	0.0	0.1	0.018	0.006	0.010
MI: Lansing	8	0.1	0.0	0.0	0.017	0.009	0.011
MN: St. Paul	4	0.0	0.0	0.0	0.015	0.011	0.014
MS: Jackson	8	0.0	0.0	0.0	0.011	0.005	0.008
NC: Charlotte	8	0.0	0.0	0.0	0.013	0.008	0.010
NC: Wilmington	4				0.011	0.008	0.010
ND: Bismarck	7	0.2	0.0	0.1	0.017	0.010	0.014
NH: Concord	8	0.2	0.0	0.1	0.015	0.003	0.008
NJ: Trenton	8	0.3	0.0	0.2	0.019	0.007	0.011
NM: Santa Fe	1	0.1	0.1	0.1	0.004	0.004	0.004
NY: Albany	4	0.0	0.0	0.0	0.014	0.007	0.010
NY: New York City	8	0.0	0.0	0.0	0.031	0.010	0.018
NY: Yaphank	7	0.1	0.0	0.0	0.012	0.004	0.007
OH: Painesville	8	0.2	0.0	0.1	0.013	0.006	0.008
OH: Ross	8				0.017	0.009	0.011
ON: Ottawa	4	0.0	0.0	0.0	0.008	0.005	0.006
OR: Portland	8	0.1	0.0	0.0	0.009	0.002	0.005
PA: Harrisburg	8	0.4	0.0	0.2	0.017	0.007	0.012

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

Location	Number of Samples	5-hour Field Estimate			NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg	Max	Min (pCi/m ³)	Avg
PA: Philadelphia	5	0.0	0.0	0.0	0.013	0.008	0.010
PA: Pittsburgh	8	0.2	0.0	0.1	0.018	0.009	0.012
SC: Columbia	3	0.1	0.0	0.0	0.009	0.007	0.008
SD: Pierre	6	0.3	0.1	0.2	0.014	0.009	0.011
TN: Knoxville	6	0.2	0.0	0.1	0.018	0.012	0.015
TN: Nashville	8	0.1	0.0	0.1	0.015	0.010	0.013
TN: Oak Ridge/Bethel	7	0.4	0.1	0.2	0.014	0.009	0.012
TN: Oak Ridge/K25	7	0.7	0.2	0.3	0.014	0.009	0.012
TN: Oak Ridge/Melton	7	0.5	0.1	0.2	0.015	0.009	0.012
TN: Oak Ridge/Y12 E	7	0.5	0.1	0.2	0.015	0.010	0.012
TN: Oak Ridge/Y12 W	7	0.3	0.1	0.1	0.017	0.011	0.013
TX: Austin	8	0.3	0.1	0.1	0.015	0.007	0.010
TX: Dallas	8	0.3	0.1	0.2	0.011	0.008	0.009
TX: El Paso	7	1.6	0.3	0.8	0.023	0.010	0.012
UT: Salt Lake City	8	0.3	0.0	0.1	0.016	0.004	0.011
VA: Lynchburg	8	0.7	0.0	0.2	0.013	0.007	0.010
WA: Olympia	3	0.1	0.0	0.0	0.008	0.003	0.006
WA: Spokane	5	0.3	0.1	0.2	0.011	0.002	0.007

Table 4
Gross Beta in Airborne Particulates
March 2006

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/408	9	0.1	0.0	0.1	0.013	0.005	0.009
AR: Little Rock	7	0.1	0.0	0.0	0.019	0.007	0.011
AZ: Phoenix	4	0.4	0.1	0.3	0.011	0.007	0.009
CA: Los Angeles	8	0.2	0.1	0.2	0.007	0.004	0.005
CA: Richmond	4	0.0	0.0	0.0	0.003	0.002	0.002
CA: San Francisco	5	0.0	0.0	0.0	0.011	0.002	0.004
CO: Denver	8	1.1	0.1	0.6	0.015	0.005	0.008
CT: Hartford	9	0.1	0.0	0.0	0.010	0.002	0.006
DC: Washington	9	0.1	0.0	0.1	0.010	0.004	0.008
DE: Wilmington	8	0.2	0.0	0.1	0.014	0.002	0.008
FL: Jacksonville	9	0.1	0.0	0.1	0.010	0.006	0.007
GA: Atlanta	3	0.1	0.0	0.0	0.011	0.005	0.008
IA: Iowa City	9	0.6	0.1	0.3	0.014	0.005	0.009
ID: Idaho Falls	9				0.008	0.004	0.006
IL: Chicago	6	0.4	0.0	0.1	0.013	0.003	0.008
IN: Indianapolis	9	0.2	0.0	0.1	0.013	0.004	0.008
KS: Topeka	7	1.3	0.3	0.8	0.025	0.008	0.015
MA: Boston	7	0.1	0.0	0.1	0.010	0.005	0.007
ME: Augusta	2	0.0	0.0	0.0	0.009	0.008	0.009
MI: Detroit	9				0.009	0.002	0.007
MI: Lansing	9	0.3	0.0	0.1	0.013	0.003	0.009
MN: St. Paul	3	0.0	0.0	0.0	0.012	0.009	0.010
MS: Jackson	8	0.1	0.0	0.1	0.022	0.007	0.011
NC: Charlotte	9	0.1	0.0	0.0	0.014	0.005	0.009
NC: Wilmington	3				0.009	0.007	0.009
ND: Bismarck	9	0.9	0.1	0.3	0.018	0.008	0.011
NH: Concord	9	0.2	0.1	0.1	0.012	0.003	0.007
NJ: Trenton	9	0.5	0.1	0.2	0.015	0.002	0.009
NY: Albany	3	0.0	0.0	0.0	0.012	0.006	0.008
NY: New York City	8	0.0	0.0	0.0	0.028	0.005	0.015
NY: Yaphank	9	0.1	0.0	0.1	0.010	0.004	0.006
OH: Painesville	8	0.2	0.0	0.1	0.008	0.003	0.006
OH: Ross	9				0.016	0.005	0.010
ON: Ottawa	4	0.0	0.0	0.0	0.006	0.003	0.004
OR: Portland	9	0.0	0.0	0.0	0.004	0.002	0.003
PA: Harrisburg	9	1.0	0.0	0.2	0.015	0.004	0.009
PA: Philadelphia	9	0.1	0.0	0.0	0.013	0.002	0.007
PA: Pittsburgh	7	0.2	0.0	0.1	0.012	0.003	0.008

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

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	3	0.0	0.0	0.0	0.011	0.010	0.010
SD: Pierre	8	0.4	0.0	0.2	0.017	0.006	0.011
TN: Knoxville	9	0.2	0.0	0.1	0.016	0.008	0.013
TN: Nashville	9	0.2	0.0	0.1	0.015	0.005	0.011
TN: Oak Ridge/Bethel	9	0.5	0.1	0.3	0.014	0.005	0.010
TN: Oak Ridge/K25	9	0.7	0.2	0.4	0.014	0.005	0.010
TN: Oak Ridge/Melton	9	0.3	0.1	0.2	0.013	0.005	0.010
TN: Oak Ridge/Y12 E	9	0.6	0.1	0.3	0.015	0.005	0.011
TN: Oak Ridge/Y12 W	9	0.3	0.1	0.2	0.014	0.005	0.010
TX: Austin	9	0.2	0.1	0.1	0.014	0.007	0.011
TX: Dallas	5	0.5	0.0	0.2	0.013	0.008	0.010
TX: El Paso	9	1.0	0.1	0.5	0.015	0.009	0.012
UT: Salt Lake City	8	0.2	0.0	0.1	0.007	0.005	0.006
VA: Lynchburg	9	0.9	0.2	0.4	0.019	0.003	0.009
WA: Olympia	7	0.1	0.0	0.0	0.005	0.002	0.004
WA: Spokane	2	0.2	0.1	0.2	0.009	0.006	0.007

Table 5
Gross Beta and Specific Gamma in Precipitation
January 2006

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	± 2u	Nuclide	pCi/L	± 2u
AL: Montgomery/408	0.59	0.29	Be7	47	21
			Tl208	1.2	1.3
AR: Little Rock	2.21	0.42		ND	
CA: Richmond	0.53	0.29		ND	
CT: Hartford	1.80	0.39	Be7	59	19
DE: Wilmington	2.68	0.45	Be7	58	21
FL: Jacksonville	0.98	0.35		ND	
GA: Atlanta	0.74	0.32	Be7	61	24
			Pb212	4.1	5.5
IA: Iowa City	1.40	0.38		ND	
ID: Idaho Falls	4.63	0.57	Be7	93	34
MA: Boston	2.56	0.42	Be7	73	21
MN: St. Paul	2.05	0.42		ND	
NC: Charlotte	0.81	0.31	Be7	44	37
NC: Wilmington	1.65	0.39	Be7	39	26
			Bi212	47	30
			K40	27	40
NY: Albany	1.14	0.35	Be7	43	21
			K40	32	11
NY: Yaphank	0.63	0.32		ND	
OH: Painesville	1.44	0.36	Be7	30	27
			Tl208	3.1	3.4
PA: Harrisburg	1.41	0.36	Be7	29	26
			K40	33	28
TN: Knoxville	2.36	0.43	Bi212	41	28
			K40	28	39
TN: Nashville	0.32	0.29		ND	
TN: Oak Ridge/Melton	0.93	0.33	Be7	43	20
TX: Austin	1.12	0.37		ND	
UT: Salt Lake City	3.14	0.49	Be7	24	26
VA: Lynchburg	2.58	0.43	Ra224	25	24
WA: Olympia	0.05	0.26	K40	27	47

Note: ND = Not Detected

Table 6
Gross Beta and Specific Gamma in Precipitation
February 2006

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	± 2u	Nuclide	pCi/L	± 2u
AL: Montgomery/408	1.11	0.33	Be7	45	35
			Pb212	5.3	6.3
AR: Little Rock	1.75	0.39	Be7	67	28
CA: Richmond	0.36	0.27		ND	
CT: Hartford	1.49	0.35	Be7	32	23
DE: Wilmington	1.08	0.34	Be7	71	29
FL: Jacksonville	0.66	0.30	Be7	45	26
GA: Atlanta	1.44	0.36	Be7	79	29
ID: Idaho Falls	0.79	0.32	Be7	27	25
			Tl208	1.7	3.1
MA: Boston	4.14	0.50	Be7	93	25
MN: St. Paul	1.36	0.37		ND	
NC: Charlotte	1.66	0.37	Be7	81	30
			K40	31	36
			Pb212	7.2	6.3
NC: Wilmington	2.57	0.43	Be7	104	27
			Pb212	3.5	5.5
NY: Albany	1.65	0.38	Be7	50	28
			K40	24	30
NY: Yaphank	1.07	0.33	Tl208	3.1	3.7
OH: Painesville	3.13	0.45	Be7	49	34
OR: Portland	1.80	0.39	Be7	54	21
PA: Harrisburg	0.81	0.31	Be7	45	24
			Pb212	2.9	5.0
TN: Knoxville	1.81	0.39		ND	
TN: Nashville	1.92	0.40	Be7	70	31
TN: Oak Ridge/Melton	2.17	0.39	Be7	80	34
TX: Austin	0.57	0.31	Pb212	4.5	4.0
TX: Dallas	0.53	0.29		ND	
UT: Salt Lake City	1.74	0.40		ND	
VA: Lynchburg	1.72	0.38	Pb212	5.1	6.2
WA: Olympia	1.08	0.35	Be7	61	30
			Bi212	31	47

Note: ND = Not Detected

Table 7
Gross Beta and Specific Gamma in Precipitation
March 2006

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	± 2u	Nuclide	pCi/L	± 2u
AL: Montgomery/408	1.19	0.34	K40	57	31
			Pb212	5.0	5.9
			Ra228	21.1	8.6
AR: Little Rock	1.04	0.33		ND	
CA: Richmond	0.27	0.28	Be7	20	15
CO: Denver	7.72	0.73	Be7	52	26
CT: Hartford	2.91	0.46	Be7	69	44
DE: Wilmington	7.80	0.73	Be7	146	27
			K40	41	22
FL: Jacksonville	3.76	0.55	Be7	53	44
GA: Atlanta	0.33	0.28	Be7	24	15
			Pb212	3.3	3.2
IA: Iowa City	1.53	0.39	Be7	19	16
ID: Idaho Falls	1.65	0.38	K40	76	35
MA: Boston	5.78	0.57	Be7	76	46
MN: St. Paul	4.24	0.55	K40	72	27
			Ra228	9.2	8.7
NC: Charlotte	1.79	0.38	Be7	54	29
			K40	99	33
NC: Wilmington	0.90	0.33	Pb212	6.6	6.7
			Tl208	3.6	3.8
ND: Bismarck	14.6	1.1		ND	
	26.0	2.5		ND	
NY: Albany	2.09	0.42	Be7	64	26
OH: Painesville	2.27	0.40	Be7	72	31
			K40	53	26
OR: Portland	1.08	0.33	Be7	53	25
PA: Harrisburg	1.07	0.36	Be7	28	29
			Pb212	4.1	5.1
TN: Knoxville	21.4	1.1	Be7	37	31
			K40	85	32
			Pb212	5.0	6.6
			Ra228	12.6	9.1
TN: Nashville	0.53	0.31	Be7	21	13
TN: Oak Ridge/Melton	1.62	0.37	Be7	48	29
			K40	58	29
			Ra228	16.5	9.1

Note: ND = Not Detected

Table 7 (continued)
Gross Beta and Specific Gamma in Precipitation
March 2006

Location	Gross Beta Activity		Gamma-Emitting Radionuclides		
	pCi/L	$\pm 2u$	Nuclide	pCi/L $\pm 2u$	
TX: Austin	0.61	0.31		ND	
TX: Dallas	2.21	0.44		ND	
UT: Salt Lake City	2.34	0.46	Be7	26	24
VA: Lynchburg	1.39	0.37	K40	28	33
			Pb212	3.8	5.6
WA: Olympia	0.87	0.32	Be7	59	27

Note: ND = Not Detected

Table 8
Tritium in Precipitation
January - March 2006

Location	January 2006 pCi/L $\pm 2u$	February 2006 pCi/L $\pm 2u$	March 2006 pCi/L $\pm 2u$
AL: Montgomery/408	61 82	-23 82	-23 83
AR: Little Rock	69 83	-61 80	-43 84
CA: Richmond	44 82	-27 82	-31 84
CO: Denver	NS	NS	-29 84
CT: Hartford	43 82	-28 80	-31 83
DE: Wilmington	8 80	27 80	33 85
FL: Jacksonville	-6 80	-14 82	-10 83
GA: Atlanta	32 80	4 82	-33 82
IA: Iowa City	361 95	NS	4 85
ID: Idaho Falls	51 81	-45 81	-36 84
MA: Boston	65 83	60 82	40 86
MN: St. Paul	-14 78	-33 81	7 86
NC: Charlotte	72 84	-24 82	-62 81
NC: Wilmington	45 82	34 80	-12 83
ND: Bismarck	NS	NS	-11 85
NY: Albany	283 94	24 80	6 84
NY: Yaphank	-16 79	-59 80	NS
OH: Painesville	48 81	-41 81	22 87
OR: Portland	NS	-54 80	5 85
PA: Harrisburg	37 82	18 80	-45 84
TN: Knoxville	48 81	-36 80	-10 84
TN: Nashville	24 80	18 83	-27 83
TN: Oak Ridge/Melton	620 110	-4 83	29 87
TX: Austin	20 79	-50 80	-40 84
TX: Dallas	NS	-41 81	25 86
UT: Salt Lake City	74 83	-13 81	14 86
VA: Lynchburg	-14 79	-14 82	0 84
WA: Olympia	51 82	-67 80	4 85

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
January - March 2006

Location	Date Collected	³ H	
		pCi/L	± 2u
AK: Fairbanks	03/02/06	50	81
AL: Dothan	01/05/06	-68	80
AL: Montgomery	01/05/06	73	77
AL: Muscle Shoals	01/10/06	62	85
AL: Scottsboro	01/10/06	-30	82
AR: Little Rock	01/05/06	36	80
CA: Los Angeles	01/04/06	31	85
CA: Richmond	01/10/06	-7	78
CO: Denver	01/17/06	30	79
CT: Hartford	01/06/06	930	120
DE: Dover	01/06/06	-4	79
FL: Tampa	01/05/06	32	79
GA: Baxley	01/24/06	10	82
GA: Savannah	03/15/06	16	76
HI: Honolulu	01/06/06	600	110
IA: Cedar Rapids	01/10/06	-57	80
ID: Boise	03/07/06	9	79
ID: Idaho Falls	01/17/06	730	110
IL: Morris	01/06/06	-24	77
IL: W. Chicago	01/10/06	-32	81
KS: Topeka	01/03/06	63	82
LA: New Orleans	03/22/06	58	78
MA: Lawrence	01/11/06	-9	78
MD: Baltimore	01/05/06	32	80
MD: Conowingo	03/28/06	89	79
ME: Augusta	01/03/06	81	77
MI: Detroit	01/04/06	118	85
MI: Grand Rapids	01/05/06	180	86
MN: Red Wing	01/17/06	16	78
MN: St. Paul	01/31/06	-12	80
MO: Jefferson City	01/05/06	100	83
MS: Jackson	01/11/06	59	81
MS: Port Gibson	01/10/06	44	80
MT: Helena	01/05/06	-4	82
NC: Charlotte	01/10/06	560	100
NC: Raleigh	01/25/06	48	83
ND: Bismarck	01/10/06	-16	82
NE: Lincoln	01/03/06	22	80
NH: Concord	01/04/06	18	80
NJ: Trenton	01/04/06	-2	79

Table 9 (continued)
Tritium in Drinking Water
January - March 2006

Location	Date Collected	³ H	
		pCi/L	± 2u
NJ: Waretown	01/17/06	37	79
NM: Santa Fe	01/10/06	80	82
NY: Albany	01/04/06	10	79
NY: New York City	01/27/06	26	82
NY: Niagara Falls	02/28/06	95	83
NY: Syracuse	03/21/06	67	79
OH: Cincinnati	02/08/06	119	84
OH: E. Liverpool	01/10/06	12	82
OH: Painesville	02/07/06	103	83
OH: Toledo	01/04/06	38	80
OK: Oklahoma City	01/10/06	21	79
OR: Portland	02/28/06	2	79
PA: Columbia	03/29/06	73	79
PA: Harrisburg	03/30/06	51	78
PA: Philadelphia - Belmont	02/08/06	9	79
PA: Philadelphia - Baxter	02/08/06	9	80
PA: Philadelphia - Queen Lane	02/08/06	-18	80
PA: Pittsburgh	01/10/06	-48	81
RI: Providence	01/18/06	16	82
SC: Barnwell	01/30/06	-11	83
SC: Columbia	01/13/06	20	79
SC: Jenkinsville	01/09/06	24	79
SC: Seneca	01/03/06	35	81
TN: Chattanooga	01/05/06	221	90
TN: Knoxville	01/03/06	37	75
TN: Oak Ridge/#360	01/13/06	99	82
TN: Oak Ridge/#371	01/13/06	-11	78
TN: Oak Ridge/#4442	01/13/06	532	99
TN: Oak Ridge/#768	01/13/06	0	78
TN: Oak Ridge/#772	01/13/06	18	79
TX: Austin	01/04/06	-16	78
VA: Ashland	01/04/06	1190	130
VA: Lynchburg	01/04/06	22	79
WA: Richland	01/18/06	7	78
WA: Seattle	02/21/06	-35	79

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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 2006

Location	Date Collected	K g/L $\pm 2u$	^{137}Cs pCi/L $\pm 2u$	^{140}Ba pCi/L $\pm 2u$	^{131}I pCi/L $\pm 2u$
AR: Little Rock	03/06/06	1.54 0.13	ND	ND	ND
AZ: Phoenix	03/08/06	1.58 0.12	ND	ND	ND
CA: Los Angeles	01/06/06	1.64 0.13	ND	ND	ND
CA: Sacramento	02/02/06	1.56 0.12	ND	ND	ND
CA: San Francisco	01/11/06	1.70 0.12	ND	ND	ND
CT: Hartford	01/17/06	1.56 0.13	ND	ND	ND
DE: Wilmington	01/11/06	1.57 0.13	ND	ND	ND
FL: Tampa	01/04/06	1.69 0.13	ND	ND	ND
GA: Atlanta	01/30/06	1.53 0.12	ND	ND	ND
HI: Honolulu	03/24/06	1.58 0.12	ND	ND	ND
IA: Des Moines	01/03/06	1.51 0.13	ND	ND	ND
IN: Indianapolis	01/19/06	1.67 0.13	ND	ND	ND
KS: Wichita	01/23/06	1.72 0.13	ND	ND	ND
KY: Louisville	01/03/06	1.57 0.12	ND	ND	ND
MA: Boston	02/22/06	1.62 0.13	ND	ND	ND
MD: Baltimore	01/10/06	1.58 0.13	ND	ND	ND
ME: Portland	01/04/06	1.72 0.14	ND	ND	ND
MO: Jefferson City	01/06/06	1.78 0.14	ND	ND	ND
NJ: Trenton	02/14/06	1.67 0.13	ND	ND	ND
NM: Albuquerque	01/10/06	1.58 0.12	ND	ND	ND
NV: Las Vegas	01/17/06	1.53 0.12	ND	ND	ND
NY: Buffalo	01/06/06	1.75 0.14	ND	ND	ND
NY: Syracuse	01/12/06	1.60 0.12	ND	ND	ND
OH: Cincinnati	01/23/06	1.63 0.13	ND	ND	ND
OH: Cleveland	02/06/06	1.64 0.13	ND	ND	ND
OR: Portland	01/17/06	1.60 0.12	ND	ND	ND
PA: Philadelphia	01/04/06	1.58 0.13	ND	ND	ND
PA: Pittsburgh	01/03/06	1.55 0.12	ND	ND	ND
TN: Chattanooga	01/05/06	1.63 0.12	ND	ND	ND
TN: Knoxville	02/09/06	1.58 0.12	ND	ND	ND
TN: Memphis	01/07/06	1.53 0.16	ND	ND	ND
TX: Austin	01/10/06	1.41 0.12	ND	ND	ND
TX: Ft. Worth	01/29/06	1.61 0.11	ND	ND	ND
VA: Norfolk	03/30/06	1.57 0.13	ND	ND	ND
VT: Montpelier	01/06/06	1.61 0.17	ND	ND	ND
WA: Spokane	01/05/06	1.68 0.13	ND	ND	ND
WA: Tacoma	03/21/06	1.56 0.12	ND	ND	ND
WV: Charleston	01/13/06	1.55 0.12	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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Requests for information concerning publication and distribution of ERD should be directed to:

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