

ENVIRONMENTAL

RADIATION

DATA

REPORT 150

April–June 2012

United States Environmental Protection Agency

Office of Radiation and Indoor Air

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Preface

Environmental Radiation Data (ERD) contains data from the RadNet monitoring system (formerly ERAMS), which is operated by the Office of Radiation and Indoor Air's National Analytical Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama. ERD is published in both hard-copy and electronic formats. Electronic reports are available online at <http://www.epa.gov/radnet/radnet-data/erd.html> and in a searchable database at:

<http://www.epa.gov/enviro/facts/radnet>

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 RadNet samples may include gross alpha and gross beta analysis, gamma analyses, and radionuclide-specific analyses for isotopes of uranium, plutonium, strontium, iodine, radium, and tritium. This monitoring effort also provides information on natural background levels and possible accidental releases into the environment.

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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 Analytical 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
* 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. Continuous air samplers collect airborne particulates at field stations representing wide geographic coverage throughout the United States.

Filters (10 cm diameter synthetic fiber) from air samplers are changed routinely, and generally field measurements are made with a dual-phosphor scintillation counter at least 5 hours after collection to allow ^{222}Rn progeny to decay. Field estimates are reported to appropriate EPA officials by telephone or mail depending on the activity levels found; however, as of the first quarter of 2012, NAREL no longer reports field estimates in *Environmental Radiation Data*.

The filters are sent to NAREL for more sensitive analysis in a gas proportional counter. Gamma scans are performed on all filters showing gross beta activity greater than 1 pCi/m³.

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 gamma-emitting radionuclides. NAREL discontinued gross beta analysis of precipitation in January 2010 and discontinued tritium analysis of precipitation in January 2012.

Table 2
Gross Beta in Airborne Particulates
April 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
AK: Anchorage	7	0.004	0.002	0.003
AK: Fairbanks	8	0.011	0.004	0.007
AK: Juneau	6	0.009	0.001	0.003
AL: Birmingham	8	0.017	0.007	0.010
AL: Montgomery/408	9	0.014	0.008	0.011
AR: Fort Smith	4	0.009	0.008	0.009
AR: Little Rock	8	0.012	0.006	0.009
AZ: Phoenix	9	0.017	0.006	0.011
AZ: Phoenix/956	8	0.015	0.006	0.010
AZ: Tucson	9	0.015	0.006	0.011
AZ: Yuma	1	0.011	0.011	0.011
CA: Anaheim	7	0.010	0.004	0.006
CA: Bakersfield	6	0.011	0.002	0.006
CA: Eureka	1	0.001	0.001	0.001
CA: Los Angeles	5	0.008	0.004	0.006
CA: Richmond	4	0.005	0.002	0.004
CA: Riverside	8	0.010	0.003	0.006
CA: Sacramento	9	0.005	0.002	0.003
CA: San Bernardino Cty.	8	0.014	0.003	0.007
CA: San Diego	4	0.008	0.003	0.006
CA: San Francisco	9	0.003	0.001	0.002
CA: San Jose	8	0.005	0.002	0.003
CO: Colorado Springs	1	0.010	0.010	0.010
CO: Denver	5	0.010	0.006	0.008
CO: Grand Junction	6	0.011	0.007	0.009
CT: Hartford	9	0.009	0.003	0.006
DC: Washington	8	0.008	0.004	0.006
DE: Dover	5	0.008	0.004	0.006
FL: Jacksonville	8	0.009	0.005	0.007
FL: Miami	4	0.006	0.004	0.005
FL: Orlando	9	0.010	0.005	0.008
FL: Tallahassee	5	0.015	0.008	0.011
GA: Atlanta	3	0.009	0.008	0.008
GA: Augusta	6	0.011	0.009	0.010
HI: Hilo	9	0.007	0.002	0.004
HI: Honolulu	8	0.006	0.001	0.004
IA: Des Moines	8	0.014	0.006	0.009
IA: Mason City	6	0.010	0.006	0.007

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
ID: Idaho Falls	7	0.011	0.005	0.008
IL: Aurora	8	0.015	0.007	0.009
IL: Chicago	9	0.011	0.005	0.007
IN: Fort Wayne	3	0.009	0.008	0.008
IN: Indianapolis	9	0.013	0.005	0.009
KS: Kansas City	8	0.010	0.005	0.007
KS: Topeka	9	0.013	0.006	0.010
KS: Wichita	7	0.014	0.006	0.010
KY: Lexington	8	0.016	0.009	0.012
KY: Louisville	7	0.010	0.005	0.007
LA: Baton Rouge	9	0.010	0.004	0.006
LA: Shreveport	4	0.009	0.006	0.007
MA: Boston	9	0.007	0.003	0.005
MA: Worcester	7	0.010	0.005	0.008
MD: Baltimore	9	0.012	0.004	0.007
ME: Orono	3	0.008	0.003	0.005
ME: Portland	9	0.009	0.004	0.005
MI: Bay City 48708	9	0.010	0.005	0.008
MI: Detroit	9	0.010	0.005	0.008
MI: Grand Rapids	5	0.010	0.006	0.007
MI: Lansing	8	0.029	0.010	0.019
MN: Duluth	4	0.007	0.004	0.005
MN: St. Paul	4	0.007	0.005	0.006
MO: Jefferson City	9	0.010	0.004	0.007
MO: Springfield	7	0.014	0.006	0.010
MO: St. Louis	4	0.011	0.006	0.008
MS: Jackson/Deq	8	0.012	0.006	0.009
MT: Billings	4	0.008	0.005	0.007
NC: Charlotte	8	0.010	0.007	0.008
NC: Raleigh	4	0.006	0.004	0.005
NC: Wilmington	4	0.006	0.005	0.006
ND: Bismarck	7	0.010	0.007	0.008
NE: Kearney	9	0.010	0.005	0.008
NE: Lincoln	8	0.014	0.005	0.008
NE: Omaha	4	0.014	0.007	0.009
NJ: Edison	8	0.007	0.002	0.005
NM: Albuquerque	4	0.009	0.006	0.007
NM: Carlsbad	5	0.016	0.010	0.013

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
NM: Navajo Lake St Park	3	0.011	0.009	0.010
NV: Las Vegas/913	6	0.011	0.005	0.008
NV: Reno	8	0.021	0.006	0.009
NY: Albany	7	0.012	0.005	0.009
NY: Lockport	9	0.010	0.003	0.007
NY: New York City	4	0.008	0.005	0.006
NY: Rochester	6	0.009	0.003	0.007
NY: Syracuse	2	0.007	0.005	0.006
NY: Yaphank	6	0.005	0.004	0.004
OH: Cincinnati	7	0.014	0.006	0.009
OH: Cleveland	4	0.014	0.006	0.010
OH: Painesville	8	0.010	0.005	0.008
OH: Toledo	8	0.011	0.005	0.008
OK: Oklahoma City	6	0.013	0.006	0.009
OK: Tulsa	1	0.008	0.008	0.008
OR: Corvallis	8	0.004	0.001	0.002
OR: Portland	8	0.004	0.001	0.003
PA: Philadelphia	4	0.007	0.004	0.005
PA: Pittsburgh	6	0.012	0.005	0.007
PR: San Juan	8	0.007	0.003	0.004
RI: Providence	3	0.008	0.004	0.006
SC: Barnwell	1	0.009	0.009	0.009
SC: Columbia	4	0.011	0.006	0.009
SD: Pierre	9	0.009	0.004	0.006
SD: Rapid City	6	0.009	0.005	0.008
TN: Knoxville	5	0.015	0.009	0.012
TN: Memphis	5	0.013	0.008	0.010
TN: Nashville	7	0.010	0.007	0.008
TN: Oak Ridge/Bethel	7	0.012	0.007	0.009
TN: Oak Ridge/K25	7	0.015	0.004	0.010
TN: Oak Ridge/Melton	7	0.017	0.009	0.012
TN: Oak Ridge/Y12 E	7	0.013	0.007	0.010
TN: Oak Ridge/Y12 W	7	0.010	0.007	0.009
TX: Austin	4	0.010	0.008	0.009
TX: Dallas	8	0.014	0.002	0.010
TX: El Paso	6	0.016	0.006	0.013
TX: Ft. Worth	7	0.014	0.007	0.010
TX: Harlingen	5	0.014	0.007	0.010

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
TX: Houston	8	0.015	0.008	0.011
TX: Laredo	7	0.015	0.008	0.011
TX: Lubbock	4	0.011	0.007	0.009
TX: San Angelo	9	0.018	0.006	0.010
TX: San Antonio	9	0.014	0.007	0.010
UT: Salt Lake City	8	0.012	0.007	0.009
VA: Harrisonburg	9	0.013	0.006	0.009
VA: Lynchburg	9	0.012	0.006	0.008
VA: Richmond	9	0.009	0.004	0.007
VA: Virginia Beach	9	0.006	0.003	0.005
VT: Burlington	9	0.008	0.002	0.005
WA: Olympia	8	0.004	0.001	0.002
WA: Richland	9	0.008	0.002	0.004
WA: Seattle	4	0.003	0.001	0.002
WA: Spokane	8	0.010	0.002	0.005
WI: Madison	8	0.012	0.006	0.008
WI: Milwaukee	8	0.009	0.003	0.006
WV: Charleston	5	0.008	0.006	0.007

Table 3
Gross Beta in Airborne Particulates
May 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
AK: Anchorage	6	0.005	0.001	0.002
AK: Fairbanks	10	0.007	0.002	0.004
AK: Juneau	5	0.002	0.001	0.001
AL: Birmingham	10	0.022	0.006	0.010
AL: Montgomery/408	9	0.026	0.006	0.014
AR: Fort Smith	1	0.009	0.009	0.009
AR: Little Rock	7	0.017	0.006	0.010
AZ: Phoenix	8	0.019	0.011	0.015
AZ: Phoenix/956	9	0.022	0.009	0.013
AZ: Tucson	9	0.015	0.009	0.012
AZ: Yuma	2	0.012	0.009	0.010
CA: Anaheim	9	0.011	0.003	0.008
CA: Bakersfield	7	0.013	0.004	0.009
CA: Eureka	5	0.004	0.001	0.002
CA: Fresno	4	0.010	0.006	0.008
CA: Los Angeles	4	0.012	0.005	0.008
CA: Richmond	5	0.006	0.002	0.004
CA: Riverside	9	0.011	0.003	0.008
CA: Sacramento	6	0.008	0.003	0.005
CA: San Bernardino Cty.	9	0.016	0.004	0.011
CA: San Diego	3	0.006	0.003	0.005
CA: San Francisco	8	0.005	0.001	0.003
CA: San Jose	8	0.008	0.002	0.005
CO: Colorado Springs	4	0.014	0.010	0.011
CO: Denver	9	0.014	0.007	0.010
CO: Grand Junction	3	0.015	0.012	0.014
CT: Hartford	8	0.007	0.001	0.004
DC: Washington	9	0.011	0.004	0.007
DE: Dover	4	0.007	0.003	0.005
FL: Jacksonville	9	0.008	0.003	0.005
FL: Miami	4	0.006	0.003	0.004
FL: Orlando	8	0.008	0.005	0.006
FL: Tallahassee	3	0.012	0.008	0.010
FL: Tampa	5	0.013	0.007	0.009
GA: Atlanta	4	0.013	0.007	0.010
GA: Augusta	8	0.013	0.008	0.011
HI: Hilo	9	0.009	0.002	0.005
HI: Honolulu	9	0.006	0.001	0.004

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
IA: Des Moines	8	0.012	0.005	0.008
IA: Mason City	5	0.011	0.004	0.007
ID: Idaho Falls	6	0.018	0.004	0.012
IL: Aurora	3	0.009	0.007	0.008
IL: Chicago	9	0.011	0.002	0.007
IN: Fort Wayne	5	0.013	0.008	0.010
IN: Indianapolis	8	0.018	0.007	0.011
KS: Kansas City	8	0.010	0.005	0.008
KS: Topeka	7	0.011	0.006	0.009
KS: Wichita	9	0.013	0.009	0.011
KY: Lexington	8	0.026	0.009	0.016
KY: Louisville	8	0.013	0.005	0.008
LA: Baton Rouge	7	0.011	0.003	0.007
LA: Shreveport	5	0.014	0.004	0.010
MA: Boston	8	0.007	0.002	0.004
MA: Worcester	9	0.008	0.002	0.006
MD: Baltimore	8	0.010	0.004	0.008
ME: Orono	4	0.005	0.004	0.005
ME: Portland	6	0.005	0.002	0.004
MI: Bay City 48708	8	0.013	0.004	0.007
MI: Detroit	9	0.014	0.004	0.008
MI: Grand Rapids	5	0.012	0.007	0.009
MI: Lansing	8	0.025	0.010	0.018
MN: Duluth	4	0.007	0.004	0.006
MN: St. Paul	5	0.010	0.004	0.007
MO: Jefferson City	8	0.010	0.005	0.007
MO: Springfield	7	0.017	0.006	0.011
MO: St. Louis	5	0.015	0.006	0.010
MS: Jackson/Deq	9	0.021	0.006	0.013
MT: Billings	4	0.015	0.008	0.011
NC: Charlotte	8	0.015	0.008	0.010
NC: Raleigh	4	0.007	0.004	0.006
NC: Wilmington	4	0.008	0.006	0.007
ND: Bismarck	9	0.010	0.002	0.007
NE: Kearney	8	0.013	0.006	0.009
NE: Lincoln	8	0.012	0.003	0.008
NE: Omaha	5	0.011	0.008	0.010
NJ: Edison	8	0.006	0.002	0.004

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
NM: Albuquerque	3	0.010	0.008	0.009
NM: Carlsbad	5	0.021	0.013	0.017
NM: Navajo Lake St Park	4	0.016	0.013	0.014
NV: Las Vegas/913	5	0.015	0.009	0.012
NV: Reno	8	0.018	0.006	0.013
NY: Albany	7	0.013	0.004	0.009
NY: Lockport	8	0.010	0.005	0.007
NY: New York City	5	0.008	0.004	0.006
NY: Rochester	6	0.015	0.005	0.010
NY: Syracuse	4	0.010	0.007	0.009
NY: Yaphank	8	0.007	0.001	0.004
OH: Cincinnati	9	0.021	0.006	0.010
OH: Cleveland	9	0.015	0.007	0.010
OH: Painesville	8	0.012	0.006	0.009
OH: Toledo	10	0.018	0.005	0.010
OK: Oklahoma City	2	0.015	0.011	0.013
OK: Tulsa	7	0.021	0.007	0.011
OR: Corvallis	10	0.005	0.001	0.003
OR: Portland	10	0.005	0.001	0.003
PA: Philadelphia	5	0.007	0.003	0.006
PA: Pittsburgh	5	0.012	0.007	0.009
PR: San Juan	8	0.012	0.002	0.007
RI: Providence	5	0.005	0.002	0.003
SC: Columbia	6	0.018	0.008	0.013
SD: Pierre	9	0.011	0.002	0.007
SD: Rapid City	8	0.018	0.005	0.010
TN: Knoxville	8	0.040	0.009	0.017
TN: Memphis	3	0.015	0.007	0.011
TN: Nashville	7	0.013	0.006	0.009
TN: Oak Ridge/Bethel	8	0.015	0.007	0.011
TN: Oak Ridge/K25	8	0.019	0.008	0.012
TN: Oak Ridge/Melton	8	0.019	0.008	0.013
TN: Oak Ridge/Y12 E	8	0.019	0.008	0.013
TN: Oak Ridge/Y12 W	8	0.016	0.006	0.011
TX: Austin	3	0.014	0.010	0.011
TX: Dallas	9	0.015	0.005	0.011
TX: El Paso	6	0.021	0.011	0.016
TX: Ft. Worth	8	0.014	0.005	0.010

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
TX: Harlingen	7	0.011	0.005	0.008
TX: Houston	9	0.021	0.005	0.013
TX: Lubbock	4	0.016	0.014	0.015
TX: San Angelo	5	0.012	0.008	0.010
TX: San Antonio	5	0.011	0.006	0.009
UT: Salt Lake City	9	0.021	0.009	0.014
VA: Harrisonburg	8	0.011	0.004	0.009
VA: Lynchburg	6	0.011	0.007	0.009
VA: Richmond	8	0.009	0.005	0.007
VA: Virginia Beach	9	0.007	0.002	0.005
VT: Burlington	8	0.008	0.003	0.005
WA: Olympia	8	0.005	0.001	0.003
WA: Richland	8	0.009	0.002	0.006
WA: Seattle	3	0.003	0.001	0.002
WA: Spokane	9	0.011	0.002	0.006
WI: Madison	9	0.013	0.006	0.010
WI: Milwaukee	9	0.011	0.005	0.007
WV: Charleston	7	0.017	0.009	0.011

Table 4
Gross Beta in Airborne Particulates
June 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
AK: Anchorage	6	0.002	0.000	0.001
AK: Fairbanks	5	0.005	0.003	0.004
AK: Juneau	5	0.003	0.000	0.001
AL: Birmingham	8	0.014	0.006	0.008
AL: Montgomery/408	8	0.015	0.006	0.010
AR: Little Rock	8	0.014	0.006	0.009
AZ: Phoenix	8	0.018	0.007	0.011
AZ: Phoenix/956	6	0.011	0.006	0.009
AZ: Tucson	8	0.018	0.006	0.010
CA: Anaheim	8	0.008	0.004	0.007
CA: Bakersfield	9	0.013	0.004	0.008
CA: Eureka	4	0.001	0.001	0.001
CA: Fresno	5	0.006	0.003	0.005
CA: Los Angeles	4	0.009	0.005	0.007
CA: Richmond	4	0.002	0.002	0.002
CA: Riverside	9	0.008	0.004	0.006
CA: Sacramento	9	0.005	0.001	0.003
CA: San Bernardino Cty.	9	0.011	0.006	0.008
CA: San Diego	1	0.003	0.003	0.003
CA: San Francisco	8	0.002	0.001	0.001
CA: San Jose	8	0.004	0.002	0.003
CO: Colorado Springs	2	0.011	0.010	0.010
CO: Denver	7	0.012	0.008	0.009
CO: Grand Junction	6	0.012	0.007	0.009
CT: Hartford	8	0.008	0.002	0.004
DC: Washington	9	0.012	0.002	0.007
DE: Dover	5	0.012	0.003	0.006
FL: Jacksonville	8	0.008	0.004	0.005
FL: Miami	2	0.005	0.003	0.004
FL: Orlando	9	0.009	0.004	0.006
FL: Tallahassee	4	0.009	0.005	0.007
FL: Tampa	6	0.011	0.005	0.007
GA: Atlanta	5	0.009	0.006	0.008
GA: Augusta	8	0.014	0.007	0.009
HI: Hilo	8	0.003	0.001	0.002
HI: Honolulu	9	0.003	0.001	0.002
IA: Des Moines	5	0.009	0.005	0.007
IA: Mason City	6	0.007	0.003	0.006

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
ID: Idaho Falls	3	0.010	0.007	0.009
IL: Aurora	7	0.011	0.004	0.008
IL: Chicago	7	0.009	0.003	0.006
IN: Fort Wayne	4	0.009	0.005	0.008
IN: Indianapolis	9	0.012	0.004	0.007
KS: Kansas City	8	0.010	0.004	0.007
KS: Topeka	6	0.017	0.006	0.009
KS: Wichita	9	0.023	0.006	0.010
KY: Lexington	9	0.019	0.006	0.012
KY: Louisville	8	0.009	0.004	0.006
LA: Baton Rouge	9	0.009	0.003	0.005
LA: Shreveport	8	0.013	0.005	0.007
MA: Boston	9	0.007	0.002	0.004
MA: Worcester	8	0.009	0.003	0.005
MD: Baltimore	9	0.011	0.003	0.007
ME: Orono	4	0.005	0.003	0.004
ME: Portland	9	0.006	0.002	0.004
MI: Bay City 48708	6	0.012	0.004	0.006
MI: Detroit	8	0.008	0.003	0.006
MI: Grand Rapids	4	0.008	0.005	0.006
MI: Lansing	8	0.022	0.007	0.015
MN: Duluth	7	0.004	0.002	0.004
MN: St. Paul	4	0.007	0.005	0.006
MO: Jefferson City	9	0.016	0.004	0.007
MO: Springfield	5	0.015	0.006	0.009
MO: St. Louis	3	0.007	0.006	0.006
MS: Jackson/Deq	8	0.018	0.006	0.010
MT: Billings	4	0.009	0.007	0.008
NC: Charlotte	9	0.010	0.004	0.008
NC: Raleigh	2	0.010	0.003	0.007
NC: Wilmington	3	0.006	0.004	0.005
ND: Bismarck	7	0.012	0.005	0.007
NE: Kearney	6	0.013	0.004	0.008
NE: Lincoln	7	0.011	0.005	0.009
NE: Omaha	4	0.010	0.006	0.008
NH: Concord	5	0.014	0.002	0.007
NJ: Edison	7	0.008	0.003	0.004
NM: Albuquerque	4	0.010	0.006	0.008

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
NM: Carlsbad	2	0.021	0.015	0.018
NM: Navajo Lake St Park	4	0.016	0.010	0.013
NV: Las Vegas/913	3	0.011	0.005	0.008
NV: Reno	9	0.012	0.005	0.009
NY: Albany	8	0.012	0.003	0.007
NY: Lockport	6	0.009	0.004	0.006
NY: New York City	2	0.007	0.004	0.006
NY: Rochester	2	0.006	0.004	0.005
NY: Syracuse	3	0.008	0.004	0.006
NY: Yaphank	6	0.007	0.003	0.004
OH: Cincinnati	7	0.010	0.004	0.008
OH: Cleveland	8	0.013	0.004	0.008
OH: Painesville	9	0.010	0.004	0.007
OH: Toledo	8	0.013	0.004	0.007
OK: Oklahoma City	9	0.024	0.007	0.012
OK: Tulsa	6	0.010	0.005	0.009
OR: Corvallis	8	0.003	0.001	0.002
OR: Portland	8	0.003	0.001	0.002
PA: Philadelphia	3	0.009	0.003	0.006
PA: Pittsburgh	5	0.010	0.006	0.008
PR: San Juan	6	0.017	0.010	0.013
RI: Providence	3	0.005	0.003	0.004
SC: Columbia	7	0.009	0.007	0.008
SD: Pierre	8	0.011	0.005	0.007
SD: Rapid City	7	0.017	0.005	0.009
TN: Knoxville	7	0.017	0.005	0.012
TN: Memphis	5	0.013	0.007	0.009
TN: Nashville	6	0.010	0.004	0.007
TN: Oak Ridge/Bethel	8	0.016	0.005	0.009
TN: Oak Ridge/K25	7	0.021	0.006	0.010
TN: Oak Ridge/Melton	8	0.021	0.007	0.011
TN: Oak Ridge/Y12 E	8	0.020	0.006	0.011
TN: Oak Ridge/Y12 W	8	0.015	0.005	0.009
TX: Austin	1	0.010	0.010	0.010
TX: Dallas	9	0.024	0.006	0.010
TX: El Paso	8	0.024	0.012	0.016
TX: Ft. Worth	7	0.021	0.005	0.009
TX: Harlingen	5	0.012	0.002	0.007

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2012

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
TX: Houston	9	0.022	0.006	0.012
TX: Laredo	1	0.009	0.009	0.009
TX: Lubbock	4	0.016	0.009	0.012
TX: San Angelo	8	0.018	0.007	0.009
TX: San Antonio	9	0.016	0.006	0.008
UT: Salt Lake City	8	0.015	0.006	0.011
VA: Harrisonburg	2	0.010	0.008	0.009
VA: Lynchburg	9	0.013	0.005	0.008
VA: Richmond	8	0.013	0.002	0.006
VA: Virginia Beach	8	0.008	0.001	0.005
VT: Burlington	7	0.008	0.003	0.005
WA: Olympia	8	0.003	0.001	0.002
WA: Richland	8	0.006	0.001	0.003
WA: Seattle	4	0.002	0.001	0.002
WA: Spokane	7	0.006	0.002	0.003
WI: Madison	5	0.010	0.005	0.008
WI: Milwaukee	8	0.007	0.003	0.005
WV: Charleston	5	0.019	0.007	0.012

Table 5
Specific Gamma in Precipitation
April 2012

Location	Nuclide	pCi/L \pm 2u	
AL: Montgomery/408		ND	
AR: Little Rock	Be-7	59	28
CA: Richmond	Be-7	29	19
CO: Denver		ND	
CT: Hartford	Be-7	50	25
FL: Jacksonville	Be-7	26	21
GA: Atlanta	Be-7	40	12
HI: Honolulu	Be-7	28	23
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MA: Boston	Be-7	79	24
	Pb-212	3.1	2.4
MI: Lansing	Be-7	26	22
MN: St. Paul		ND	
MN: Welch/510	Be-7	58	28
NC: Charlotte	Be-7	31	22
NC: Wilmington	Be-7	25	22
	Pb-212	2.5	2.4
NY: Albany	Ra-228	3.5	3.3
NY: Yaphank		ND	
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	59	24
TN: Oak Ridge/Melton	Be-7	64	27
TN: Oak Ridge/Y12 E	Be-7	60	26
UT: Salt Lake City		ND	
VA: Lynchburg		ND	
WA: Olympia	Be-7	31	23

Table 6
Specific Gamma in Precipitation
May 2012

Location	Nuclide	pCi/L \pm 2u	
AL: Montgomery/408	Be-7	29	21
CA: Richmond	Be-7	64	23
	Cs-137	2.2	1.6
CO: Denver	Be-7	35	16
CT: Hartford	Be-7	38	21
FL: Jacksonville	Be-7	59	21
GA: Atlanta	Be-7	44	22
ID: Idaho Falls	Be-7	101	46
KS: Kansas City		ND	
MA: Boston	Be-7	64	21
MI: Lansing		ND	
MN: St. Paul		ND	
MN: Welch/510	Be-7	50	26
NC: Charlotte	Be-7	46	23
NC: Wilmington		ND	
NY: Albany	Be-7	31	20
NY: Yaphank		ND	
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	36	23
TN: Oak Ridge/Melton		ND	
TN: Oak Ridge/Y12 E	Be-7	35	14
UT: Salt Lake City		ND	
VA: Lynchburg		ND	
WA: Olympia		ND	

Table 7
Specific Gamma in Precipitation
June 2012

Location	Nuclide	pCi/L \pm 2u	
AL: Montgomery/408		ND	
AR: Little Rock	Be-7	35	10
CO: Denver	Be-7	25	18
CT: Hartford	Be-7	43	18
FL: Jacksonville		ND	
GA: Atlanta	Be-7	89	16
HI: Honolulu	K-40	21	21
ID: Idaho Falls		ND	
KS: Kansas City	Be-7	41	21
MA: Boston	Be-7	64	12
MI: Lansing		ND	
MN: St. Paul	Be-7	26	18
MN: Welch/510		ND	
NC: Charlotte	Be-7	44	19
NC: Wilmington		ND	
NY: Albany	Be-7	11.9	9.4
NY: Yaphank		ND	
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Knoxville	Be-7	16.2	9.8
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	48	21
TN: Oak Ridge/Melton	Be-7	46	19
TN: Oak Ridge/Y12 E	Be-7	32	16
VA: Lynchburg		ND	
WA: Olympia		ND	

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 airborne particulate samplers. Plutonium and uranium results are published in the ERD for the third quarter of the following year.

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.

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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. Sampling sites are either major population centers or selected nuclear facility environs.

Drinking water data are used to assess trends and anomalies in concentrations. The analysis scheme for RadNet samples is similar to that of EPA's "National Interim Primary Drinking Water Regulations." The analyses include (a) tritium on a quarterly basis; (b) gross alpha, gross beta, 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 on annual composites; (d) iodine-131 on one quarterly sample per year for each station; (e) 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 on annual composites; and (f) strontium-90 on one-fourth of the annual composites on a four year rotating schedule. Composite results are published in the ERD for the third quarter of the following year.

RadNet drinking water data should not be used to monitor compliance with drinking water regulations or for comparisons to those data since different procedures for collection and analysis may be used.

Table 8
Tritium in Drinking Water
April–June 2012

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>
AK: Fairbanks	04/03/12	102 77
AL: Dothan	04/10/12	37 73
AL: Montgomery	05/31/12	0 78
AL: Muscle Shoals	04/05/12	36 74
AL: Scottsboro	04/04/12	92 92
AR: Little Rock	05/03/12	-43 80
CA: Los Angeles	05/07/12	-80 78
CA: Richmond	05/01/12	5 82
CO: Denver	05/02/12	-60 78
CT: Hartford	04/10/12	82 91
DE: Dover	05/08/12	-66 79
FL: Tampa	05/02/12	-17 88
GA: Baxley	06/19/12	14 78
GA: Savannah	05/30/12	-78 75
HI: Honolulu	06/25/12	-16 78
IA: Cedar Rapids	05/30/12	12 79
ID: Boise	04/04/12	110 77
ID: Idaho Falls	04/12/12	2 88
IL: Morris	05/25/12	-81 77
IL: W. Chicago	05/14/12	-36 80
KS: Topeka	04/23/12	68 91
LA: New Orleans	06/22/12	16 79
MD: Baltimore	04/02/12	96 76
MD: Conowingo	04/17/12	26 88
MI: Detroit	04/10/12	82 76
MN: St. Paul	04/03/12	71 75
MN: Welch	04/03/12	11 72
MO: Jefferson City	05/01/12	12 88
MS: Jackson	05/08/12	-57 78
MS: Port Gibson	05/08/12	-37 80
MT: Helena	05/01/12	18 88
ND: Bismarck	05/01/12	69 90
NE: Lincoln	04/11/12	57 90
NJ: Trenton	04/10/12	98 77
NJ: Waretown	04/16/12	55 90
NM: Santa Fe	05/11/12	-23 81
NY: Albany	06/18/12	44 84
NY: New York City	05/01/12	-71 86
NY: Niagara Falls	04/02/12	132 78
NY: Syracuse	05/07/12	62 84

Table 8 (continued)
Tritium in Drinking Water
April–June 2012

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>
OH: Cincinnati	05/02/12	12 88
OH: Columbus	05/15/12	-39 80
OH: E. Liverpool	05/03/12	18 82
OH: Painesville	05/02/12	123 95
OH: Toledo	05/14/12	85 84
OR: Portland	06/28/12	-32 77
PA: Columbia	04/10/12	40 75
PA: Harrisburg	04/04/12	114 77
PA: Philadelphia/Baxter	05/23/12	48 81
PA: Philadelphia/Belmont	05/23/12	-23 78
PA: Philadelphia/Queen	05/23/12	-49 76
PA: Pittsburgh	05/01/12	11 82
RI: Providence	05/01/12	-32 79
SC: Barnwell	04/24/12	36 89
SC: Columbia	04/30/12	63 90
SC: Jenkinsville	04/11/12	35 86
SC: Seneca	04/09/12	18 88
TN: Chattanooga	05/18/12	252 93
TN: Knoxville	05/01/12	57 90
TN: Oak Ridge/#360	04/03/12	30 73
TN: Oak Ridge/#371	04/03/12	79 76
TN: Oak Ridge/#4442	04/03/12	125 78
TN: Oak Ridge/#768	04/03/12	73 75
TN: Oak Ridge/#772	04/03/12	139 79
TX: Austin	05/24/12	-28 79
VA: Ashland	06/12/12	1810 160
VA: Lynchburg	05/02/12	-34 80
WA: Richland	06/28/12	9 79
WI: Madison	04/19/12	10 88

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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.

Milk samples are collected quarterly at each of the sampling sites. 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 9
Radionuclides in Pasteurized Milk
April–June 2012

Location	Date Collected	K g/L ± 2u	¹³⁷ Cs pCi/L ± 2u	¹⁴⁰ Ba pCi/L ± 2u	¹³¹ I pCi/L ± 2u
AR: Fort Smith	05/16/12	1.65 0.19	ND	ND	ND
AZ: Phoenix	06/29/12	1.60 0.19	ND	ND	ND
CA: Los Angeles	04/23/12	1.69 0.20	ND	ND	ND
CA: San Francisco	04/11/12	1.89 0.23	ND	ND	ND
CT: Hartford	05/29/12	1.73 0.20	ND	ND	ND
DE: Wilmington	04/16/12	1.75 0.20	ND	ND	ND
FL: Plant City	04/24/12	1.59 0.20	ND	ND	ND
HI: Hilo	04/17/12	1.74 0.21	ND	ND	ND
IA: Des Moines	05/07/12	1.64 0.19	ND	ND	ND
KS: Wichita	05/07/12	1.68 0.19	ND	ND	ND
KY: Louisville	04/16/12	1.59 0.19	ND	ND	ND
MA: Boston	06/07/12	1.71 0.20	ND	ND	NR
MD: Baltimore	04/09/12	1.65 0.19	ND	ND	ND
MO: St. Louis	05/09/12	1.57 0.19	ND	ND	ND
NJ: Trenton	04/04/12	1.70 0.19	2.1 1.6	ND	ND
NV: Las Vegas	04/23/12	1.69 0.20	ND	ND	ND
NY: Buffalo	04/18/12	1.66 0.20	ND	ND	ND
NY: Syracuse	04/05/12	1.59 0.19	ND	ND	ND
OH: Cincinnati	05/14/12	1.72 0.20	ND	ND	ND
OH: Cleveland	06/25/12	1.68 0.20	ND	ND	ND
PA: Pittsburgh	04/04/12	1.71 0.20	ND	ND	ND
TN: Chattanooga	04/11/12	1.70 0.19	ND	ND	ND
TN: Knoxville	04/10/12	1.71 0.19	ND	ND	ND
TN: Memphis	05/01/12	1.61 0.19	ND	ND	NR
TX: Dallas	04/24/12	1.63 0.19	ND	ND	ND
TX: San Antonio	04/17/12	1.63 0.19	ND	ND	ND
WA: Spokane	04/27/12	1.58 0.19	ND	ND	NR
WV: Charleston	04/10/12	1.64 0.19	ND	ND	ND

Note: ND = Not detected
NR = No result (not analyzed within 5 half-lives of collection)

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:

Requests for information concerning the operation of RadNet, the data that are generated, or publication and distribution of ERD should be directed to:

Charles M. Petko
Office of the Director
National Analytical Radiation Environmental Laboratory
540 South Morris Avenue
Montgomery, Alabama 36115-2601
email: petko.charles@epa.gov

Requests for information concerning policies of the Office of Radiation and Indoor Air should be directed to:

Jonathan Edwards
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Radiation Protection Division (MC6608J)
1200 Pennsylvania Ave. N.W.
Washington, DC 20460
email: edwards.jonathan@epa.gov

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