ENVIRONMENTAL

RADIATION

DATA

REPORT 162

April–June 2015

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) 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 electronic format, which is available online at http://www.epa.gov/narel. RadNet data are also available online 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, and drinking water 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, and radium, and for tritium. This monitoring effort also provides information on natural background levels and possible 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/m³	0.0006
	Water	pCi/L	2
Tritium	Water	pCi/L	150
* Plutonium-238,239/240	Air	aCi/m³	6
	Water	pCi/L	0.3
† Uranium-234,238	Air	aCi/m³	7.5
	Water	pCi/L	0.35
† Uranium-235	Air	aCi/m³	9
	Water	pCi/L	0.4
Radium-226	Water	pCi/L	0.02
Strontium-90	Water	pCi/L	1
‡ Iodine-131	Water (gamma)	pCi/L	4
	Water	pCi/L	0.3
Cesium-137	Water	pCi/L	5
‡ Barium-140	Water	pCi/L	15
Potassium-40	Water	pCi/L	50

* The MDC for air is based on an assumed total sample volume of 10,000 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 MDCs for air are based on an assumed total sample volume of 10,000 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. 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 the exposed filters are sent to NAREL for 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.

Table 2
Gross Beta in Airborne Particulates
April 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
AK: Fairbanks	6	0.014	0.002	0.007
AK: Juneau	5	0.002	0.001	0.001
AL: Birmingham	6	0.008	0.003	0.006
AL: Montgomery/408	7	0.007	0.003	0.006
AR: Fort Smith	3	0.008	0.005	0.007
AR: Little Rock	7	0.009	0.005	0.007
AZ: Phoenix/956	8	0.012	0.006	0.010
AZ: Tucson	8	0.015	0.008	0.010
CA: Anaheim	6	0.009	0.003	0.006
CA: Bakersfield	2	0.006	0.004	0.005
CA: Eureka	4	0.004	0.002	0.003
CA: Fresno	4	0.007	0.003	0.005
CA: Los Angeles	6	0.010	0.006	0.008
CA: Richmond	5	0.006	0.003	0.004
CA: Riverside	7	0.011	0.004	0.008
CA: Sacramento	7	0.005	0.002	0.004
CA: San Bernardino Cty.	7	0.015	0.004	0.010
CA: San Diego	2	0.010	0.007	0.009
CA: San Francisco	9	0.007	0.002	0.004
CA: San Jose	1	0.004	0.004	0.004
CO: Colorado Springs	2	0.009	0.008	0.009
CO: Denver	9	0.011	0.005	0.008
CO: Grand Junction	1	0.012	0.012	0.012
CT: Hartford	7	0.007	0.002	0.004
DC: Washington	9	0.007	0.004	0.005
DE: Dover	2	0.004	0.003	0.004
FL: Jacksonville	6	0.009	0.005	0.006
FL: Miami	4	0.008	0.003	0.005
FL: Orlando	5	0.005	0.003	0.004
FL: Tallahassee	3	0.005	0.005	0.005
FL: Tampa	8	0.013	0.004	0.007
GA: Atlanta	4	0.008	0.004	0.006
GA: Augusta	5	0.007	0.003	0.005
HI: Honolulu	9	0.005	0.002	0.003
IA: Des Moines	7	0.009	0.004	0.006
IA: Mason City	7	0.009	0.004	0.007
ID: Boise	5	0.006	0.003	0.005
ID: Idaho Falls	8	0.014	0.006	0.008

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
IL: Aurora	3	0.009	0.008	0.008
IL: Champaign	6	0.007	0.004	0.006
IL: Chicago	8	0.008	0.004	0.006
IN: Fort Wayne	1	0.006	0.006	0.006
IN: Indianapolis	8	0.008	0.004	0.006
KS: Kansas City	6	0.009	0.007	0.008
KS: Wichita	7	0.010	0.006	0.008
KY: Lexington	6	0.007	0.004	0.005
KY: Louisville	3	0.007	0.005	0.006
KY: Paducah	6	0.010	0.007	0.008
LA: Baton Rouge	9	0.011	0.004	0.006
LA: Shreveport	1	0.009	0.009	0.009
MA: Boston	8	0.007	0.001	0.004
MA: Worcester	3	0.006	0.002	0.003
MD: Baltimore	6	0.008	0.004	0.007
ME: Orono	1	0.002	0.002	0.002
ME: Portland	9	0.010	0.001	0.006
MI: Bay City 48708	9	0.010	0.002	0.005
MI: Detroit	8	0.010	0.003	0.006
MI: Grand Rapids	3	0.009	0.006	0.007
MN: Duluth	8	0.008	0.002	0.005
MN: St. Paul	1	0.012	0.012	0.012
MO: Jefferson City	8	0.009	0.005	0.007
MO: Springfield	8	0.010	0.006	0.008
MO: St. Louis	5	0.007	0.005	0.006
MS: Jackson/Deq	3	0.008	0.004	0.007
MT: Billings	1	0.010	0.010	0.010
NC: Greensboro	2	0.006	0.006	0.006
NC: Raleigh	3	0.004	0.003	0.004
NC: Wilmington	5	0.005	0.003	0.004
ND: Bismarck	4	0.009	0.004	0.007
NE: Kearney	5	0.011	0.006	0.007
NE: Lincoln	8	0.009	0.004	0.006
NE: Omaha	3	0.010	0.008	0.010
NH: Concord	7	0.008	0.003	0.005
NJ: Edison	7	0.006	0.002	0.005
NM: Carlsbad	4	0.008	0.006	0.007
NM: Navajo Lake St Park	4	0.013	0.007	0.010

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
NV: Las Vegas/913	7	0.011	0.004	0.008
NV: Reno	8	0.017	0.003	0.009
NY: Albany	4	0.011	0.003	0.006
NY: Lockport	8	0.007	0.003	0.005
NY: New York City	5	0.007	0.002	0.006
NY: Rochester	4	0.009	0.003	0.006
NY: Yaphank	4	0.005	0.002	0.004
OH: Cincinnati	5	0.006	0.005	0.005
OH: Cleveland	8	0.012	0.005	0.008
OH: Toledo	9	0.009	0.002	0.005
OK: Oklahoma City	8	0.014	0.006	0.009
OK: Tulsa	8	0.011	0.005	0.008
OR: Corvallis	9	0.004	0.001	0.003
OR: Portland	9	0.004	0.001	0.003
PA: Bloomsburg	7	0.005	0.002	0.003
PA: Philadelphia	5	0.007	0.004	0.005
PA: Pittsburgh	4	0.007	0.005	0.006
PR: San Juan	9	0.021	0.002	0.005
RI: Providence	3	0.006	0.004	0.006
SC: Columbia	3	0.008	0.004	0.006
SD: Pierre	9	0.010	0.005	0.007
SD: Rapid City	5	0.009	0.006	0.007
TN: Knoxville	1	0.009	0.009	0.009
TN: Memphis	9	0.011	0.005	0.008
TN: Nashville	7	0.008	0.004	0.005
TN: Oak Ridge/Bethel	8	0.008	0.003	0.006
TN: Oak Ridge/K25	8	0.009	0.004	0.007
TN: Oak Ridge/Melton	8	0.008	0.003	0.006
TN: Oak Ridge/Y12 E	8	0.009	0.004	0.007
TN: Oak Ridge/Y12 W	8	0.010	0.004	0.006
TX: Amarillo	2	0.010	0.010	0.010
TX: Austin	3	0.013	0.009	0.010
TX: Dallas	2	0.009	0.008	0.009
TX: El Paso	7	0.009	0.006	0.007
TX: Ft. Worth	4	0.008	0.005	0.007
TX: Harlingen	3	0.017	0.006	0.010
TX: Houston	8	0.009	0.004	0.007
TX: Laredo	8	0.013	0.005	0.008

Table 2 (continued)
Gross Beta in Airborne Particulates
April 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
TX: Lubbock	6	0.008	0.005	0.006
TX: San Angelo	6	0.012	0.005	0.009
TX: San Antonio	9	0.012	0.004	0.006
UT: Salt Lake City	6	0.010	0.004	0.006
UT: St. George	3	0.007	0.005	0.006
VA: Harrisonburg	9	0.009	0.003	0.006
VA: Richmond	2	0.006	0.005	0.005
VA: Virginia Beach	9	0.009	0.003	0.006
VT: Burlington	9	0.008	0.001	0.004
WA: Olympia	9	0.004	0.002	0.002
WA: Richland	7	0.006	0.002	0.003
WA: Seattle	5	0.005	0.002	0.004
WA: Spokane	9	0.009	0.003	0.005
WI: Lacrosse	1	0.005	0.005	0.005
WI: Madison	8	0.010	0.006	0.008
WI: Milwaukee	1	0.006	0.006	0.006
WI: Shawano	9	0.010	0.002	0.005
WV: Charleston	5	0.009	0.006	0.007
WY: Casper	3	0.008	0.006	0.007

Table 3
Gross Beta in Airborne Particulates
May 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
AK: Anchorage	3	0.004	0.003	0.003
AK: Fairbanks	8	0.008	0.002	0.006
AK: Juneau	6	0.010	0.001	0.007
AL: Birmingham	8	0.015	0.003	0.009
AL: Montgomery/408	8	0.015	0.004	0.009
AR: Fort Smith	4	0.009	0.005	0.007
AR: Little Rock	7	0.013	0.004	0.009
AZ: Phoenix/956	9	0.010	0.005	0.008
AZ: Tucson	6	0.012	0.006	0.010
CA: Anaheim	9	0.011	0.005	0.007
CA: Bakersfield	2	0.009	0.006	0.008
CA: Eureka	4	0.004	0.002	0.003
CA: Fresno	4	0.007	0.004	0.006
CA: Los Angeles	6	0.009	0.006	0.007
CA: Richmond	4	0.005	0.004	0.004
CA: Riverside	9	0.013	0.005	0.008
CA: Sacramento	8	0.011	0.004	0.007
CA: San Bernardino Cty.	9	0.014	0.008	0.010
CA: San Diego	4	0.008	0.005	0.007
CA: San Francisco	8	0.007	0.002	0.005
CA: San Jose	7	0.010	0.003	0.005
CO: Colorado Springs	3	0.007	0.004	0.006
CO: Denver	7	0.014	0.002	0.007
CO: Grand Junction	1	0.013	0.013	0.013
CT: Hartford	8	0.011	0.003	0.007
DC: Washington	7	0.010	0.003	0.007
DE: Dover	4	0.008	0.003	0.006
FL: Jacksonville	7	0.011	0.006	0.008
FL: Miami	4	0.007	0.004	0.005
FL: Orlando	5	0.010	0.005	0.006
FL: Tallahassee	3	0.008	0.005	0.006
FL: Tampa	7	0.010	0.005	0.007
GA: Atlanta	5	0.013	0.006	0.008
GA: Augusta	4	0.009	0.005	0.006
HI: Honolulu	7	0.006	0.002	0.004
IA: Des Moines	9	0.010	0.003	0.006
IA: Mason City	6	0.009	0.003	0.006
ID: Boise	6	0.011	0.004	0.006

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2015

Location	Number of Samples	Measurement Max	Min	Avg
		(pCi/m³)		
ID: Idaho Falls	8	0.013	0.003	0.008
IL: Aurora	3	0.011	0.005	0.007
IL: Champaign	8	0.012	0.002	0.007
IL: Chicago	7	0.009	0.003	0.006
IN: Fort Wayne	1	0.008	0.008	0.008
IN: Indianapolis	5	0.015	0.003	0.008
KS: Kansas City	8	0.012	0.003	0.008
KS: Wichita	8	0.013	0.004	0.007
KY: Lexington	4	0.013	0.003	0.009
KY: Louisville	6	0.012	0.005	0.008
KY: Paducah	8	0.009	0.005	0.007
LA: Baton Rouge	8	0.016	0.005	0.009
LA: Shreveport	2	0.011	0.005	0.008
MA: Boston	9	0.009	0.001	0.006
MA: Worcester	6	0.012	0.005	0.009
MD: Baltimore	5	0.013	0.007	0.010
ME: Orono	1	0.006	0.006	0.006
ME: Portland	7	0.011	0.003	0.007
MI: Bay City 48708	8	0.008	0.004	0.006
MI: Detroit	8	0.010	0.004	0.007
MI: Grand Rapids	4	0.009	0.004	0.007
MN: Duluth	7	0.006	0.001	0.004
MO: Jefferson City	6	0.012	0.005	0.009
MO: Springfield	8	0.013	0.005	0.009
MO: St. Louis	4	0.007	0.005	0.006
MS: Jackson/Deq	4	0.010	0.007	0.008
MT: Billings	4	0.012	0.004	0.008
NC: Charlotte	6	0.012	0.009	0.011
NC: Greensboro	2	0.006	0.004	0.005
NC: Raleigh	4	0.006	0.003	0.005
NC: Wilmington	4	0.006	0.003	0.004
ND: Bismarck	1	0.006	0.006	0.006
NE: Kearney	6	0.010	0.005	0.008
NE: Lincoln	8	0.009	0.005	0.007
NE: Omaha	3	0.008	0.006	0.007
NH: Concord	6	0.008	0.006	0.007
NJ: Edison	5	0.010	0.003	0.008
NM: Albuquerque	1	0.011	0.011	0.011

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2015

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min	Avg
NM: Carlsbad	8	0.011	0.004	0.006
NM: Navajo Lake St Park	4	0.008	0.006	0.007
NV: Las Vegas/913	9	0.014	0.005	0.009
NV: Reno	9	0.017	0.008	0.011
NY: Albany	5	0.009	0.002	0.007
NY: Lockport	8	0.009	0.002	0.007
NY: New York City	4	0.012	0.006	0.010
NY: Rochester	7	0.015	0.003	0.009
NY: Yaphank	6	0.008	0.002	0.005
OH: Cincinnati	9	0.011	0.002	0.007
OH: Cleveland	8	0.016	0.004	0.008
OH: Toledo	8	0.009	0.001	0.006
OK: Oklahoma City	9	0.016	0.004	0.009
OK: Tulsa	8	0.013	0.003	0.007
OR: Corvallis	8	0.004	0.002	0.003
OR: Portland	7	0.004	0.002	0.003
PA: Bloomsburg	7	0.009	0.003	0.005
PA: Philadelphia	1	0.009	0.009	0.009
PA: Pittsburgh	5	0.014	0.004	0.008
PR: San Juan	8	0.015	0.005	0.010
RI: Providence	3	0.009	0.002	0.006
SC: Columbia	6	0.012	0.006	0.008
SD: Pierre	8	0.011	0.003	0.008
SD: Rapid City	6	0.014	0.005	0.008
TN: Knoxville	2	0.008	0.005	0.007
TN: Memphis	8	0.011	0.005	0.008
TN: Nashville	5	0.009	0.004	0.006
TN: Oak Ridge/Bethel	7	0.017	0.007	0.011
TN: Oak Ridge/K25	7	0.019	0.008	0.012
TN: Oak Ridge/Melton	7	0.014	0.005	0.009
TN: Oak Ridge/Y12 E	7	0.017	0.007	0.011
TN: Oak Ridge/Y12 W	7	0.018	0.006	0.011
TX: Amarillo	7	0.015	0.005	0.010
TX: Austin	4	0.012	0.007	0.010
TX: Dallas	4	0.011	0.005	0.008
TX: El Paso	8	0.010	0.007	0.008
TX: Ft. Worth	4	0.008	0.005	0.006
TX: Harlingen	1	0.013	0.013	0.013

Table 3 (continued)
Gross Beta in Airborne Particulates
May 2015

Location	Number of Samples	Measurement Max	Measurement Min	Measurement Avg
		(pCi/m³)		
TX: Houston	7	0.012	0.006	0.009
TX: Laredo	4	0.015	0.007	0.011
TX: Lubbock	9	0.009	0.005	0.007
TX: San Angelo	9	0.018	0.006	0.011
TX: San Antonio	8	0.016	0.004	0.010
UT: Salt Lake City	7	0.011	0.003	0.007
UT: St. George	3	0.009	0.007	0.008
VA: Harrisonburg	8	0.015	0.005	0.010
VA: Richmond	5	0.009	0.004	0.006
VA: Virginia Beach	7	0.010	0.004	0.008
VT: Burlington	8	0.008	0.004	0.006
WA: Olympia	8	0.004	0.001	0.003
WA: Richland	7	0.008	0.002	0.005
WA: Seattle	2	0.005	0.003	0.004
WA: Spokane	7	0.011	0.005	0.008
WI: Lacrosse	3	0.006	0.002	0.004
WI: Madison	9	0.016	0.005	0.009
WI: Milwaukee	1	0.010	0.010	0.010
WI: Shawano	7	0.008	0.003	0.006
WV: Charleston	5	0.017	0.009	0.012
WY: Casper	3	0.009	0.003	0.006

Table 4
Gross Beta in Airborne Particulates
June 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
AK: Anchorage	4	0.007	0.001	0.004
AK: Fairbanks	5	0.008	0.001	0.004
AK: Juneau	4	0.005	0.001	0.003
AL: Birmingham	3	0.012	0.006	0.008
AL: Montgomery/408	9	0.013	0.006	0.009
AR: Fort Smith	4	0.012	0.005	0.009
AR: Little Rock	8	0.016	0.005	0.010
AZ: Phoenix/956	8	0.012	0.009	0.010
AZ: Tucson	4	0.011	0.009	0.010
CA: Anaheim	8	0.011	0.004	0.008
CA: Bakersfield	1	0.008	0.008	0.008
CA: Eureka	4	0.003	0.002	0.002
CA: Fresno	5	0.012	0.007	0.008
CA: Los Angeles	5	0.011	0.005	0.008
CA: Richmond	5	0.004	0.002	0.003
CA: Riverside	8	0.013	0.006	0.009
CA: Sacramento	8	0.013	0.004	0.008
CA: San Bernardino Cty.	7	0.018	0.008	0.012
CA: San Diego	3	0.009	0.005	0.007
CA: San Francisco	9	0.005	0.002	0.004
CA: San Jose	6	0.008	0.004	0.006
CO: Colorado Springs	2	0.008	0.008	0.008
CO: Denver	7	0.015	0.007	0.011
CO: Grand Junction	3	0.012	0.011	0.011
CT: Hartford	9	0.007	0.001	0.004
DC: Washington	5	0.011	0.005	0.007
DE: Dover	1	0.002	0.002	0.002
FL: Jacksonville	9	0.015	0.004	0.007
FL: Miami	5	0.007	0.003	0.005
FL: Orlando	9	0.010	0.002	0.005
FL: Tampa	2	0.005	0.005	0.005
GA: Atlanta	4	0.014	0.004	0.011
GA: Augusta	4	0.011	0.005	0.008
HI: Honolulu	9	0.005	0.002	0.003
IA: Des Moines	8	0.011	0.004	0.007
IA: Mason City	4	0.007	0.004	0.006
ID: Boise	4	0.009	0.005	0.006
ID: Idaho Falls	7	0.012	0.006	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
IL: Aurora	4	0.010	0.007	0.008
IL: Champaign	5	0.014	0.007	0.010
IL: Chicago	8	0.010	0.004	0.007
IN: Fort Wayne	4	0.010	0.009	0.010
IN: Indianapolis	8	0.019	0.007	0.012
KS: Kansas City	9	0.013	0.005	0.010
KS: Wichita	7	0.013	0.006	0.009
KY: Lexington	7	0.015	0.006	0.010
KY: Louisville	4	0.011	0.005	0.008
KY: Paducah	7	0.015	0.004	0.010
LA: Baton Rouge	7	0.013	0.007	0.010
MA: Boston	9	0.007	0.001	0.004
MA: Worcester	9	0.009	0.002	0.005
MD: Baltimore	7	0.013	0.002	0.008
ME: Orono	1	0.003	0.003	0.003
ME: Portland	9	0.034	0.001	0.007
MI: Bay City 48708	9	0.006	0.003	0.004
MI: Detroit	9	0.008	0.004	0.006
MI: Grand Rapids	4	0.009	0.006	0.007
MN: Duluth	9	0.009	0.002	0.006
MN: St. Paul	3	0.009	0.006	0.007
MO: Jefferson City	9	0.010	0.004	0.007
MO: Springfield	8	0.013	0.004	0.010
MO: St. Louis	3	0.009	0.005	0.007
MS: Jackson/Deq	4	0.013	0.006	0.010
MT: Billings	3	0.011	0.006	0.009
NC: Charlotte	9	0.018	0.003	0.011
NC: Greensboro	1	0.005	0.005	0.005
NC: Raleigh	3	0.007	0.003	0.006
NC: Wilmington	4	0.008	0.003	0.005
ND: Bismarck	3	0.007	0.005	0.007
NE: Kearney	8	0.012	0.005	0.008
NE: Lincoln	7	0.009	0.005	0.007
NE: Omaha	4	0.009	0.006	0.008
NH: Concord	6	0.005	0.002	0.004
NJ: Edison	4	0.009	0.003	0.006
NM: Carlsbad	7	0.011	0.006	0.008
NM: Navajo Lake St Park	4	0.011	0.007	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
NV: Las Vegas/913	9	0.014	0.008	0.010
NV: Reno	8	0.012	0.007	0.011
NY: Albany	6	0.007	0.002	0.005
NY: Lockport	4	0.007	0.002	0.005
NY: New York City	2	0.006	0.003	0.004
NY: Rochester	3	0.007	0.003	0.006
NY: Yaphank	6	0.005	0.002	0.004
OH: Cincinnati	8	0.011	0.006	0.008
OH: Cleveland	9	0.012	0.006	0.007
OH: Toledo	9	0.007	0.004	0.005
OK: Oklahoma City	8	0.012	0.005	0.010
OK: Tulsa	7	0.015	0.005	0.009
OR: Corvallis	9	0.004	0.002	0.003
OR: Portland	9	0.003	0.002	0.003
PA: Bloomsburg	8	0.009	0.002	0.005
PA: Philadelphia	3	0.009	0.004	0.006
PA: Pittsburgh	5	0.009	0.006	0.007
PR: San Juan	8	0.011	0.003	0.008
RI: Providence	5	0.007	0.004	0.005
SC: Columbia	6	0.014	0.006	0.010
SD: Pierre	6	0.008	0.005	0.006
SD: Rapid City	8	0.014	0.007	0.009
TN: Knoxville	3	0.016	0.007	0.012
TN: Memphis	9	0.016	0.005	0.010
TN: Nashville	7	0.019	0.009	0.012
TN: Oak Ridge/Bethel	2	0.007	0.006	0.007
TN: Oak Ridge/K25	8	0.014	0.006	0.011
TN: Oak Ridge/Melton	9	0.011	0.004	0.009
TN: Oak Ridge/Y12 E	9	0.012	0.006	0.010
TN: Oak Ridge/Y12 W	9	0.014	0.005	0.011
TX: Amarillo	5	0.015	0.008	0.011
TX: Austin	3	0.008	0.007	0.007
TX: Corpus Christi	3	0.016	0.008	0.012
TX: Dallas	5	0.009	0.006	0.007
TX: El Paso	9	0.009	0.006	0.008
TX: Ft. Worth	4	0.007	0.006	0.007
TX: Harlingen	3	0.014	0.005	0.008
TX: Houston	9	0.015	0.004	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
June 2015

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
TX: Laredo	6	0.013	0.005	0.008
TX: Lubbock	9	0.008	0.005	0.007
TX: San Angelo	8	0.009	0.004	0.007
TX: San Antonio	9	0.013	0.002	0.007
UT: Salt Lake City	9	0.013	0.005	0.009
UT: St. George	3	0.010	0.009	0.009
VA: Harrisonburg	8	0.014	0.002	0.009
VA: Richmond	4	0.009	0.005	0.007
VA: Virginia Beach	8	0.010	0.002	0.007
VT: Burlington	9	0.005	0.002	0.003
WA: Olympia	9	0.004	0.002	0.003
WA: Richland	8	0.009	0.002	0.006
WA: Seattle	4	0.004	0.003	0.004
WA: Spokane	9	0.012	0.003	0.008
WI: Lacrosse	3	0.005	0.004	0.004
WI: Madison	9	0.011	0.005	0.009
WI: Milwaukee	8	0.012	0.004	0.008
WI: Shawano	8	0.007	0.003	0.006
WV: Charleston	4	0.016	0.007	0.012
WY: Casper	3	0.010	0.008	0.009

Table 5
Gamma-Emitters in Precipitation
April 2015

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408		ND	
AR: Little Rock	Be-7	43	24
CA: Richmond		ND	
CT: Hartford	Be-7	61	23
FL: Jacksonville		ND	
GA: Atlanta		ND	
HI: Honolulu		ND	
ID: Idaho Falls	Be-7	80	28
KS: Kansas City		ND	
MA: Boston	Be-7	79	26
MI: Lansing		ND	
MN: St. Paul	Be-7	27	20
MN: Welch/510	Be-7	47	21
	K-40	13	13
NC: Charlotte		ND	
NC: Wilmington	Be-7	26	13
NH: Concord	Be-7	29	19
NY: Albany	Be-7	42	23
NY: Yaphank		ND	
OR: Portland	Ra-228	3.7	2.9
PA: Harrisburg		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	27	13
TN: Oak Ridge/Melton	Be-7	27	20
TN: Oak Ridge/Y12 E	Be-7	33	20
TX: Austin	K-40	12	11
UT: Salt Lake City	Be-7	43	24
VA: Lynchburg		ND	
WA: Olympia	Be-7	63	22

Table 6
Gamma-Emitters in Precipitation
May 2015

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408	Be-7	22	18
AR: Little Rock	Be-7	42	22
	Ra-228	3.5	2.1
AZ: Phoenix		ND	
CT: Hartford	Be-7	43	23
FL: Jacksonville	Be-7	31	12
GA: Atlanta		ND	
HI: Honolulu	Be-7	31	20
ID: Idaho Falls	Be-7	50	23
KS: Kansas City		ND	
MI: Lansing		ND	
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte	Be-7	36	15
	Ra-228	4.2	3.9
NC: Wilmington		ND	
NY: Albany	Be-7	104	28
OR: Portland		ND	
PA: Harrisburg	Be-7	49	16
TN: Nashville	Be-7	22	17
TN: Oak Ridge/K25	Be-7	41	19
TN: Oak Ridge/Melton	Be-7	49	20
TN: Oak Ridge/Y12 E	Be-7	28	18
TX: Austin		ND	
UT: Salt Lake City	Be-7	41	22
VA: Lynchburg		ND	
WA: Olympia	Be-7	61	26

Table 7
Gamma-Emitters in Precipitation
June 2015

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408		ND	
AR: Little Rock	Be-7	34	14
CA: Richmond		ND	
CT: Hartford		ND	
FL: Jacksonville	Be-7	51	24
GA: Atlanta	Be-7	87	23
HI: Honolulu		ND	
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MA: Boston	Be-7	50	22
MI: Lansing	K-40	11	11
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte		ND	
NC: Wilmington		ND	
NH: Concord		ND	
NY: Albany	Be-7	51	15
PA: Harrisburg		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	61	26
TN: Oak Ridge/Melton	Be-7	45	21
TN: Oak Ridge/Y12 E	Be-7	58	21
UT: Salt Lake City	Be-7	47	23
VA: Lynchburg		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 total volume of air represented by all the samples received from one sampling location during a year typically ranges from 120,000 m^3 to 500,000 m^3. The aliquot analyzed is a fraction of the total volume and is typically between 5,000 m^3 and 30,000 m^3.

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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 2015

Location	Date Collected	^{3}H pCi/L	± 2*u*
AK: Fairbanks	04/15/15	20	91
AL: Dothan	04/08/15	−82	91
AL: Montgomery	05/01/15	−37	75
AL: Muscle Shoals	04/02/15	160	100
AL: Scottsboro	04/01/15	110	100
CT: Hartford	04/07/15	−74	92
DE: Dover	04/13/15	−35	88
FL: Miami	06/30/15	48	77
GA: Baxley	05/18/15	28	78
GA: Savannah	06/22/15	4	75
HI: Honolulu	05/14/15	20	77
IA: Cedar Rapids	04/08/15	23	96
ID: Idaho Falls	05/14/15	−28	75
KS: Topeka	04/13/15	27	91
LA: New Orleans	04/02/15	−19	94
MD: Baltimore	04/15/15	53	92
MD: Conowingo	06/30/15	57	78
MI: Detroit	04/20/15	132	96
MN: St. Paul	04/14/15	4	90
MN: Welch	04/14/15	−14	89
MO: Jefferson City	04/27/15	49	79
NC: Raleigh	04/17/15	−6	91
ND: Bismarck	04/27/15	−11	76
NE: Lincoln	04/03/15	−77	92
NJ: Trenton	04/15/15	12	90
NJ: Waretown	04/15/15	0	90
NM: Santa Fe	04/08/15	−79	92
NY: New York City	06/09/15	56	79
NY: Niagara Falls	04/20/15	115	95
OH: Columbus	06/02/15	41	78
OH: E. Liverpool	06/09/15	24	77
OH: Painesville	05/05/15	15	77
OH: Toledo	05/13/15	57	79
PA: Columbia	06/17/15	493	99
PA: Harrisburg	04/22/15	27	91
PA: Harrisburg	06/16/15	−18	75
PA: Pittsburgh	06/08/15	−11	76
RI: Providence	04/13/15	53	92
SC: Barnwell	04/20/15	61	93
SC: Columbia	04/13/15	14	91

Table 8 (continued)
Tritium in Drinking Water
April–June 2015

Location	Date Collected	^{3}H pCi/L	± 2*u*
SC: Jenkinsville	04/17/15	21	91
SC: Seneca	04/07/15	−6	96
TN: Knoxville	04/07/15	−6	95
TN: Oak Ridge/#360	04/07/15	−12	95
TN: Oak Ridge/#371	04/07/15	−31	93
TN: Oak Ridge/#768	04/07/15	−46	94
TN: Oak Ridge/#772	04/07/15	−29	94
TX: Austin	04/13/15	37	92
WA: Richland	05/12/15	69	80
WI: Madison	04/13/15	29	91

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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 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:

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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:

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