

ENVIRONMENTAL

RADIATION

DATA

REPORT 161

January–March 2015

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 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/m ³	0.0006
	Water	pCi/L	2
Tritium	Water	pCi/L	150
* Plutonium-238,239/240	Air	aCi/m ³	6
	Water	pCi/L	0.3
† Uranium-234,238	Air	aCi/m ³	7.5
	Water	pCi/L	0.35
† Uranium-235	Air	aCi/m ³	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 ²³⁹Pu and ²⁴⁰Pu, 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 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 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
January 2015

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
AK: Anchorage	4	0.011	0.002	0.006
AK: Fairbanks	8	0.018	0.005	0.010
AK: Juneau	4	0.006	0.000	0.004
AL: Birmingham	9	0.013	0.006	0.010
AL: Montgomery/408	8	0.012	0.003	0.008
AR: Fort Smith	4	0.012	0.006	0.010
AR: Little Rock	6	0.016	0.005	0.010
AZ: Phoenix/956	8	0.025	0.007	0.015
AZ: Tucson	7	0.020	0.006	0.015
CA: Anaheim	8	0.022	0.006	0.014
CA: Bakersfield	2	0.061	0.038	0.049
CA: Eureka	4	0.007	0.002	0.004
CA: Fresno	4	0.053	0.008	0.029
CA: Los Angeles	4	0.020	0.007	0.013
CA: Richmond	3	0.024	0.020	0.022
CA: Riverside	6	0.021	0.008	0.014
CA: Sacramento	9	0.030	0.013	0.023
CA: San Bernardino Cty.	7	0.024	0.008	0.016
CA: San Diego	2	0.021	0.012	0.016
CA: San Francisco	9	0.034	0.008	0.022
CA: San Jose	5	0.032	0.013	0.020
CO: Colorado Springs	3	0.013	0.009	0.011
CO: Denver	8	0.023	0.004	0.010
CO: Grand Junction	2	0.049	0.031	0.040
CT: Hartford	8	0.009	0.005	0.008
DC: Washington	7	0.010	0.005	0.008
DE: Dover	4	0.008	0.007	0.007
FL: Jacksonville	8	0.009	0.005	0.007
FL: Orlando	7	0.007	0.004	0.006
FL: Tallahassee	3	0.010	0.005	0.007
FL: Tampa	6	0.007	0.003	0.006
GA: Atlanta	4	0.009	0.005	0.008
GA: Augusta	3	0.008	0.006	0.007
HI: Honolulu	9	0.005	0.001	0.004
IA: Des Moines	9	0.018	0.005	0.009
IA: Mason City	4	0.013	0.006	0.009
ID: Boise	5	0.045	0.010	0.031
ID: Idaho Falls	9	0.053	0.008	0.020

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
IL: Aurora	3	0.015	0.008	0.011
IL: Champaign	9	0.011	0.007	0.009
IL: Chicago	6	0.012	0.008	0.010
IN: Fort Wayne	3	0.013	0.010	0.012
IN: Indianapolis	8	0.011	0.006	0.009
KS: Kansas City	7	0.014	0.005	0.010
KS: Wichita	6	0.018	0.005	0.011
KY: Lexington	6	0.014	0.007	0.011
KY: Louisville	5	0.013	0.011	0.012
KY: Paducah	8	0.016	0.007	0.012
LA: Baton Rouge	7	0.013	0.006	0.010
LA: Shreveport	3	0.012	0.007	0.010
MA: Boston	5	0.010	0.004	0.008
MA: Worcester	9	0.013	0.006	0.009
MD: Baltimore	2	0.009	0.008	0.008
ME: Portland	9	0.008	0.004	0.006
MI: Bay City 48708	8	0.014	0.009	0.011
MI: Detroit	7	0.014	0.009	0.011
MI: Grand Rapids	4	0.013	0.008	0.010
MN: Duluth	8	0.017	0.005	0.010
MN: St. Paul	4	0.021	0.013	0.018
MO: Jefferson City	8	0.012	0.006	0.009
MO: Springfield	8	0.017	0.004	0.011
MO: St. Louis	3	0.009	0.006	0.008
MS: Jackson/Deq	4	0.013	0.006	0.011
MT: Billings	2	0.039	0.004	0.021
NC: Charlotte	2	0.015	0.013	0.014
NC: Greensboro	2	0.008	0.007	0.008
NC: Raleigh	4	0.007	0.005	0.006
NC: Wilmington	4	0.006	0.003	0.004
ND: Bismarck	4	0.012	0.004	0.008
NE: Kearney	8	0.013	0.003	0.008
NE: Lincoln	9	0.018	0.005	0.010
NE: Omaha	2	0.016	0.008	0.012
NH: Concord	7	0.010	0.006	0.008
NJ: Edison	4	0.008	0.007	0.008
NM: Albuquerque	2	0.035	0.018	0.026
NM: Carlsbad	7	0.020	0.004	0.008

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
NM: Navajo Lake St Park	3	0.020	0.009	0.015
NV: Las Vegas/913	1	0.006	0.006	0.006
NY: Albany	4	0.012	0.007	0.009
NY: Lockport	8	0.015	0.006	0.010
NY: New York City	4	0.012	0.009	0.010
NY: Rochester	7	0.012	0.007	0.010
NY: Syracuse	1	0.006	0.006	0.006
NY: Yaphank	5	0.008	0.005	0.006
OH: Cincinnati	8	0.011	0.008	0.010
OH: Cleveland	7	0.022	0.008	0.014
OH: Toledo	4	0.011	0.008	0.010
OK: Oklahoma City	8	0.018	0.004	0.011
OK: Tulsa	9	0.017	0.004	0.010
OR: Corvallis	9	0.009	0.002	0.006
OR: Portland	9	0.014	0.003	0.006
PA: Bloomsburg	6	0.008	0.004	0.007
PA: Philadelphia	4	0.011	0.007	0.009
PA: Pittsburgh	4	0.011	0.009	0.010
PR: San Juan	8	0.003	0.001	0.002
RI: Providence	4	0.010	0.006	0.008
SC: Columbia	9	0.012	0.006	0.010
SD: Pierre	9	0.012	0.003	0.008
SD: Rapid City	8	0.016	0.003	0.008
TN: Knoxville	3	0.015	0.008	0.011
TN: Memphis	8	0.012	0.006	0.009
TN: Nashville	8	0.014	0.003	0.009
TN: Oak Ridge/Bethel	7	0.016	0.004	0.011
TN: Oak Ridge/K25	7	0.016	0.009	0.013
TN: Oak Ridge/Melton	7	0.014	0.007	0.011
TN: Oak Ridge/Y12 E	7	0.013	0.008	0.011
TN: Oak Ridge/Y12 W	7	0.014	0.008	0.012
TX: Amarillo	6	0.027	0.006	0.014
TX: Austin	2	0.013	0.013	0.013
TX: Dallas	1	0.013	0.013	0.013
TX: El Paso	6	0.021	0.007	0.014
TX: Ft. Worth	2	0.013	0.010	0.011
TX: Harlingen	4	0.017	0.008	0.011
TX: Houston	8	0.019	0.005	0.011

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
TX: Laredo	7	0.024	0.002	0.013
TX: Lubbock	7	0.023	0.005	0.011
TX: San Angelo	3	0.020	0.008	0.012
TX: San Antonio	9	0.018	0.003	0.010
UT: Salt Lake City	7	0.037	0.008	0.017
VA: Harrisonburg	3	0.011	0.007	0.008
VA: Richmond	4	0.008	0.006	0.007
VA: Virginia Beach	6	0.012	0.008	0.010
VT: Burlington	9	0.018	0.007	0.011
WA: Olympia	8	0.008	0.001	0.005
WA: Richland	8	0.024	0.005	0.014
WA: Seattle	4	0.009	0.002	0.005
WI: Lacrosse	5	0.013	0.007	0.010
WI: Madison	6	0.022	0.010	0.014
WI: Milwaukee	4	0.013	0.010	0.012
WI: Shawano	9	0.015	0.007	0.011
WV: Charleston	5	0.017	0.012	0.015
WY: Casper	4	0.016	0.004	0.010

Table 3
Gross Beta in Airborne Particulates
February 2015

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
AK: Anchorage	1	0.008	0.008	0.008
AK: Fairbanks	8	0.022	0.004	0.012
AK: Juneau	3	0.015	0.001	0.006
AL: Birmingham	8	0.019	0.006	0.012
AL: Montgomery/408	8	0.018	0.005	0.010
AR: Fort Smith	4	0.015	0.012	0.014
AR: Little Rock	5	0.014	0.009	0.012
AZ: Phoenix/956	5	0.017	0.007	0.013
AZ: Tucson	8	0.013	0.003	0.009
CA: Anaheim	8	0.037	0.006	0.019
CA: Bakersfield	2	0.041	0.025	0.033
CA: Eureka	4	0.007	0.003	0.004
CA: Fresno	3	0.036	0.006	0.020
CA: Los Angeles	4	0.026	0.012	0.019
CA: Richmond	4	0.019	0.010	0.013
CA: Riverside	8	0.031	0.004	0.016
CA: Sacramento	8	0.030	0.009	0.016
CA: San Bernardino Cty.	8	0.035	0.006	0.019
CA: San Diego	3	0.032	0.022	0.026
CA: San Francisco	8	0.023	0.003	0.012
CA: San Jose	4	0.019	0.003	0.010
CO: Colorado Springs	2	0.008	0.007	0.007
CO: Denver	8	0.011	0.004	0.006
CO: Grand Junction	2	0.021	0.011	0.016
CT: Hartford	6	0.014	0.008	0.011
DC: Washington	7	0.014	0.006	0.010
DE: Dover	2	0.009	0.004	0.007
FL: Jacksonville	7	0.011	0.003	0.007
FL: Orlando	7	0.007	0.005	0.006
FL: Tallahassee	3	0.009	0.005	0.007
FL: Tampa	8	0.010	0.005	0.007
GA: Atlanta	2	0.011	0.010	0.011
GA: Augusta	4	0.008	0.007	0.008
HI: Honolulu	8	0.005	0.003	0.004
IA: Des Moines	4	0.015	0.007	0.011
IA: Mason City	6	0.024	0.013	0.017
ID: Boise	4	0.015	0.002	0.008
ID: Idaho Falls	8	0.023	0.003	0.009

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
IL: Aurora	1	0.016	0.016	0.016
IL: Champaign	8	0.017	0.008	0.013
IL: Chicago	4	0.019	0.008	0.013
IN: Fort Wayne	1	0.007	0.007	0.007
IN: Indianapolis	8	0.023	0.008	0.014
KS: Kansas City	5	0.021	0.013	0.016
KS: Wichita	8	0.017	0.007	0.012
KY: Lexington	4	0.020	0.006	0.012
KY: Louisville	4	0.018	0.007	0.014
KY: Paducah	6	0.024	0.008	0.015
LA: Baton Rouge	7	0.017	0.006	0.011
LA: Shreveport	2	0.013	0.008	0.011
MA: Boston	1	0.009	0.009	0.009
MA: Worcester	8	0.016	0.009	0.012
MD: Baltimore	5	0.015	0.007	0.011
ME: Orono	1	0.014	0.014	0.014
ME: Portland	6	0.012	0.006	0.009
MI: Bay City 48708	8	0.024	0.003	0.014
MI: Detroit	7	0.021	0.010	0.014
MI: Grand Rapids	4	0.024	0.010	0.015
MN: Duluth	7	0.022	0.006	0.013
MN: St. Paul	3	0.024	0.013	0.019
MO: Jefferson City	4	0.018	0.010	0.014
MO: Springfield	8	0.019	0.010	0.015
MO: St. Louis	4	0.016	0.007	0.011
MS: Jackson/Deq	4	0.012	0.008	0.010
MT: Billings	3	0.013	0.008	0.011
NC: Charlotte	6	0.028	0.013	0.019
NC: Greensboro	2	0.008	0.005	0.007
NC: Raleigh	5	0.013	0.004	0.007
NC: Wilmington	4	0.007	0.003	0.005
ND: Bismarck	5	0.018	0.010	0.016
NE: Kearney	8	0.014	0.005	0.010
NE: Lincoln	6	0.018	0.008	0.013
NE: Omaha	3	0.020	0.010	0.015
NH: Concord	8	0.015	0.007	0.011
NJ: Edison	3	0.014	0.006	0.010
NM: Carlsbad	6	0.013	0.007	0.009

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
NM: Navajo Lake St Park	4	0.007	0.005	0.006
NV: Las Vegas/913	9	0.014	0.003	0.007
NV: Reno	8	0.016	0.003	0.009
NY: Albany	4	0.017	0.009	0.013
NY: Lockport	7	0.020	0.009	0.015
NY: New York City	4	0.018	0.009	0.012
NY: Rochester	6	0.016	0.008	0.013
NY: Syracuse	1	0.009	0.009	0.009
NY: Yaphank	3	0.011	0.005	0.008
OH: Cincinnati	5	0.014	0.006	0.010
OH: Cleveland	8	0.027	0.011	0.017
OH: Toledo	1	0.009	0.009	0.009
OK: Oklahoma City	8	0.020	0.008	0.014
OK: Tulsa	8	0.019	0.010	0.014
OR: Corvallis	8	0.007	0.001	0.004
OR: Portland	7	0.005	0.001	0.003
PA: Bloomsburg	6	0.010	0.005	0.008
PA: Philadelphia	4	0.014	0.006	0.010
PA: Pittsburgh	5	0.015	0.007	0.012
PR: San Juan	7	0.004	0.001	0.002
RI: Providence	4	0.013	0.008	0.011
SC: Columbia	6	0.014	0.006	0.011
SD: Pierre	8	0.018	0.009	0.013
SD: Rapid City	4	0.017	0.006	0.010
TN: Knoxville	2	0.011	0.007	0.009
TN: Memphis	6	0.020	0.007	0.013
TN: Nashville	7	0.016	0.007	0.012
TN: Oak Ridge/Bethel	5	0.029	0.007	0.015
TN: Oak Ridge/K25	5	0.018	0.007	0.012
TN: Oak Ridge/Melton	5	0.014	0.007	0.010
TN: Oak Ridge/Y12 E	5	0.018	0.008	0.012
TN: Oak Ridge/Y12 W	5	0.019	0.007	0.013
TX: Amarillo	7	0.014	0.008	0.011
TX: Austin	3	0.017	0.009	0.014
TX: El Paso	5	0.013	0.005	0.009
TX: Ft. Worth	2	0.011	0.011	0.011
TX: Harlingen	3	0.016	0.008	0.011
TX: Houston	5	0.011	0.006	0.009

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
TX: Laredo	7	0.013	0.007	0.009
TX: Lubbock	7	0.013	0.007	0.009
TX: San Angelo	7	0.017	0.010	0.013
TX: San Antonio	7	0.012	0.006	0.008
UT: Salt Lake City	7	0.015	0.003	0.007
UT: St. George	2	0.013	0.009	0.011
VA: Harrisonburg	5	0.014	0.005	0.009
VA: Richmond	4	0.014	0.006	0.010
VA: Virginia Beach	6	0.017	0.006	0.010
VT: Burlington	7	0.018	0.013	0.015
WA: Olympia	8	0.004	0.000	0.002
WA: Richland	6	0.010	0.003	0.006
WA: Seattle	4	0.005	0.001	0.003
WA: Spokane	6	0.010	0.002	0.007
WI: Lacrosse	2	0.018	0.012	0.015
WI: Madison	3	0.035	0.013	0.021
WI: Milwaukee	5	0.024	0.009	0.017
WI: Shawano	7	0.026	0.008	0.014
WV: Charleston	4	0.022	0.009	0.016
WY: Casper	3	0.008	0.004	0.007

Table 4
Gross Beta in Airborne Particulates
March 2015

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
AK: Anchorage	1	0.010	0.010	0.010
AK: Fairbanks	9	0.012	0.004	0.008
AK: Juneau	5	0.005	0.002	0.003
AL: Birmingham	9	0.012	0.004	0.008
AL: Montgomery/408	8	0.010	0.004	0.006
AR: Fort Smith	3	0.009	0.007	0.008
AR: Little Rock	7	0.011	0.003	0.008
AZ: Phoenix/956	9	0.019	0.006	0.011
AZ: Tucson	9	0.018	0.004	0.011
CA: Anaheim	9	0.018	0.002	0.009
CA: Bakersfield	3	0.014	0.008	0.011
CA: Eureka	4	0.007	0.002	0.004
CA: Fresno	5	0.016	0.005	0.011
CA: Los Angeles	6	0.017	0.003	0.010
CA: Richmond	4	0.012	0.004	0.007
CA: Riverside	8	0.018	0.003	0.010
CA: Sacramento	8	0.018	0.003	0.008
CA: San Bernardino Cty.	7	0.021	0.004	0.013
CA: San Diego	2	0.012	0.008	0.010
CA: San Francisco	9	0.018	0.002	0.007
CA: San Jose	1	0.003	0.003	0.003
CO: Colorado Springs	1	0.014	0.014	0.014
CO: Denver	8	0.015	0.005	0.010
CO: Grand Junction	4	0.020	0.010	0.014
CT: Hartford	8	0.010	0.004	0.007
DC: Washington	8	0.010	0.005	0.008
DE: Dover	4	0.007	0.004	0.005
FL: Jacksonville	7	0.012	0.003	0.007
FL: Miami	1	0.005	0.005	0.005
FL: Orlando	8	0.007	0.002	0.004
FL: Tallahassee	2	0.005	0.004	0.004
FL: Tampa	9	0.011	0.003	0.006
GA: Atlanta	4	0.013	0.005	0.008
GA: Augusta	5	0.007	0.004	0.005
HI: Honolulu	9	0.007	0.002	0.004
IA: Des Moines	8	0.009	0.006	0.007
IA: Mason City	6	0.017	0.007	0.010
ID: Boise	2	0.008	0.004	0.006

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
ID: Idaho Falls	6	0.013	0.010	0.011
IL: Champaign	9	0.012	0.006	0.008
IL: Chicago	8	0.011	0.006	0.008
IN: Fort Wayne	2	0.010	0.008	0.009
IN: Indianapolis	9	0.012	0.005	0.009
KS: Kansas City	8	0.017	0.007	0.011
KS: Wichita	8	0.015	0.008	0.011
KY: Lexington	7	0.009	0.006	0.008
KY: Louisville	4	0.013	0.007	0.010
KY: Paducah	9	0.017	0.006	0.010
LA: Baton Rouge	8	0.010	0.004	0.006
LA: Shreveport	2	0.006	0.005	0.005
MA: Boston	6	0.008	0.003	0.006
MA: Worcester	3	0.015	0.007	0.012
MD: Baltimore	6	0.014	0.006	0.010
ME: Portland	7	0.010	0.003	0.007
MI: Bay City 48708	9	0.015	0.006	0.010
MI: Detroit	9	0.015	0.006	0.009
MI: Grand Rapids	4	0.012	0.009	0.010
MN: Duluth	8	0.010	0.003	0.006
MN: St. Paul	2	0.013	0.012	0.013
MO: Jefferson City	6	0.017	0.007	0.011
MO: Springfield	9	0.013	0.009	0.011
MO: St. Louis	4	0.011	0.008	0.009
MS: Jackson/Deq	4	0.012	0.003	0.007
MT: Billings	3	0.011	0.005	0.008
NC: Charlotte	2	0.013	0.007	0.010
NC: Greensboro	1	0.006	0.006	0.006
NC: Raleigh	3	0.006	0.004	0.005
NC: Wilmington	4	0.005	0.003	0.004
ND: Bismarck	7	0.012	0.006	0.009
NE: Kearney	7	0.011	0.005	0.008
NE: Lincoln	9	0.010	0.006	0.008
NE: Omaha	2	0.010	0.010	0.010
NH: Concord	9	0.011	0.005	0.007
NJ: Edison	5	0.011	0.005	0.008
NM: Albuquerque	1	0.012	0.012	0.012
NM: Carlsbad	6	0.010	0.004	0.008

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
NM: Navajo Lake St Park	4	0.011	0.006	0.008
NV: Las Vegas/913	9	0.010	0.003	0.007
NV: Reno	9	0.021	0.001	0.011
NY: Albany	6	0.011	0.006	0.008
NY: Lockport	8	0.015	0.006	0.009
NY: New York City	4	0.013	0.007	0.010
NY: Rochester	8	0.013	0.005	0.008
NY: Syracuse	1	0.005	0.005	0.005
NY: Yaphank	6	0.007	0.004	0.005
OH: Cincinnati	3	0.009	0.005	0.007
OH: Cleveland	10	0.017	0.007	0.011
OH: Toledo	1	0.005	0.005	0.005
OK: Oklahoma City	9	0.014	0.009	0.011
OK: Tulsa	9	0.011	0.008	0.010
OR: Corvallis	9	0.006	0.002	0.004
OR: Portland	9	0.007	0.002	0.004
PA: Bloomsburg	7	0.008	0.004	0.006
PA: Philadelphia	4	0.011	0.005	0.009
PA: Pittsburgh	5	0.012	0.008	0.009
PR: San Juan	9	0.005	0.001	0.003
RI: Providence	2	0.009	0.007	0.008
SC: Columbia	8	0.012	0.005	0.007
SD: Pierre	8	0.008	0.005	0.007
SD: Rapid City	5	0.011	0.006	0.008
TN: Knoxville	2	0.010	0.008	0.009
TN: Memphis	9	0.013	0.006	0.009
TN: Nashville	8	0.010	0.005	0.007
TN: Oak Ridge/Bethel	8	0.018	0.006	0.009
TN: Oak Ridge/K25	4	0.019	0.008	0.011
TN: Oak Ridge/Y12 E	8	0.017	0.005	0.009
TN: Oak Ridge/Y12 W	8	0.017	0.008	0.010
TX: Amarillo	6	0.019	0.007	0.012
TX: Austin	3	0.012	0.007	0.009
TX: Dallas	4	0.012	0.004	0.009
TX: El Paso	7	0.011	0.004	0.007
TX: Ft. Worth	3	0.008	0.006	0.007
TX: Harlingen	5	0.010	0.006	0.008
TX: Houston	9	0.011	0.002	0.006

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
TX: Laredo	7	0.009	0.006	0.007
TX: Lubbock	7	0.013	0.007	0.009
TX: San Angelo	7	0.014	0.009	0.012
TX: San Antonio	9	0.008	0.004	0.006
UT: Salt Lake City	9	0.010	0.002	0.008
VA: Harrisonburg	8	0.017	0.005	0.009
VA: Richmond	4	0.009	0.006	0.007
VA: Virginia Beach	7	0.012	0.006	0.009
VT: Burlington	9	0.015	0.005	0.008
WA: Olympia	9	0.007	0.002	0.004
WA: Richland	7	0.013	0.002	0.006
WA: Seattle	4	0.008	0.003	0.005
WA: Spokane	9	0.012	0.003	0.007
WI: Lacrosse	2	0.012	0.006	0.009
WI: Madison	9	0.017	0.009	0.012
WI: Milwaukee	1	0.008	0.008	0.008
WI: Shawano	9	0.014	0.005	0.008
WV: Charleston	4	0.017	0.009	0.011
WY: Casper	4	0.010	0.004	0.008

Table 5
Gamma-Emitters in Precipitation
January 2015

Location	Nuclide	pCi/L \pm 2 <i>u</i>	
AL: Montgomery/408		ND	
AR: Little Rock	Be-7	27	18
AZ: Phoenix	Be-7	25	18
CT: Hartford	Be-7	50	20
FL: Jacksonville	Be-7	35	16
GA: Atlanta	Be-7	31	15
HI: Honolulu		ND	
ID: Idaho Falls	Be-7	28	17
MA: Boston	Be-7	74	20
MN: St. Paul	Be-7	44	38
MN: Welch/510		ND	
NC: Charlotte		ND	
NC: Wilmington		ND	
NH: Concord		ND	
NY: Albany	Be-7	49	17
OR: Portland	Be-7	30	16
PA: Harrisburg	Be-7	16.7	9.4
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	52	20
TN: Oak Ridge/Melton	Be-7	53	17
TN: Oak Ridge/Y12 E	Be-7	37	18
TX: Austin		ND	
UT: Salt Lake City	Be-7	42	22
VA: Lynchburg		ND	
WA: Olympia		ND	

Table 6
Gamma-Emitters in Precipitation
February 2015

Location	Nuclide	pCi/L \pm 2u	
AL: Montgomery/408	Be-7	36	18
AR: Little Rock	Be-7	19	18
CA: Richmond		ND	
CT: Hartford	Be-7	57	22
FL: Jacksonville	Be-7	52	14
GA: Atlanta		ND	
HI: Honolulu		ND	
ID: Idaho Falls		ND	
MN: St. Paul		ND	
MN: Welch/510	Be-7	48	22
NC: Wilmington	Be-7	24	14
	K-40	10.7	8.4
NY: Albany	Be-7	34	20
OR: Portland		ND	
PA: Harrisburg	Be-7	51	20
	K-40	18	14
TN: Nashville	Be-7	38	18
TN: Oak Ridge/K25	Be-7	86	24
TN: Oak Ridge/Melton	Be-7	93	25
TN: Oak Ridge/Y12 E	Be-7	80	21
UT: Salt Lake City	Be-7	76	25
VA: Lynchburg		ND	
WA: Olympia		ND	

Table 7
Gamma-Emitters in Precipitation
March 2015

Location	Nuclide	pCi/L \pm 2 <i>u</i>	
AL: Montgomery/408		ND	
AR: Little Rock		ND	
CA: Richmond	Be-7	74	43
CT: Hartford	Be-7	29	17
FL: Jacksonville	Be-7	47	17
GA: Atlanta		ND	
HI: Honolulu		ND	
ID: Idaho Falls	Be-7	45	39
KS: Kansas City		ND	
MA: Boston	Be-7	50	19
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte	Be-7	14.7	8.0
NC: Wilmington	Be-7	26.9	9.2
NH: Concord		ND	
NY: Albany	Be-7	33	16
OR: Portland	Be-7	23	17
PA: Harrisburg		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	62	20
TN: Oak Ridge/Melton	Be-7	63	22
TN: Oak Ridge/Y12 E	Be-7	51	20
TX: Austin		ND	
UT: Salt Lake City	Be-7	31	15
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 total volume of air represented by all the samples received from one sampling location during a year typically ranges from 120,000 m³ to 500,000 m³. The aliquot analyzed is a fraction of the total volume and is typically between 5,000 m³ and 30,000 m³.

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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
January–March 2015

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>
AK: Fairbanks	01/14/15	8 63
AL: Dothan	01/09/15	44 70
AL: Montgomery	03/17/15	35 84
AL: Muscle Shoals	01/07/15	4 68
AL: Scottsboro	01/06/15	90 72
AR: Little Rock	01/14/15	4 64
CO: Denver	02/06/15	2 82
CT: Hartford	01/13/15	8 68
DE: Dover	01/29/15	123 89
FL: Miami	03/26/15	10 97
FL: Tampa	03/30/15	-64 92
GA: Baxley	03/03/15	77 87
GA: Savannah	02/18/15	89 87
HI: Honolulu	02/17/15	70 86
IA: Cedar Rapids	02/20/15	96 89
ID: Idaho Falls	02/26/15	74 86
IL: Morris	02/17/15	37 85
IL: W. Chicago	03/09/15	48 85
KS: Topeka	01/28/15	-8 62
LA: New Orleans	01/30/15	28 65
MD: Baltimore	01/13/15	-2 67
MD: Conowingo	01/13/15	58 66
MI: Detroit	01/05/15	121 74
MN: St. Paul	01/20/15	4 63
MN: Welch	01/20/15	12 63
MO: Jefferson City	01/28/15	22 64
MS: Jackson	01/27/15	-4 63
MS: Port Gibson	01/27/15	0 63
MT: Helena	01/14/15	10 62
MT: Helena	03/30/15	0 95
ND: Bismarck	02/05/15	27 84
NE: Lincoln	01/07/15	14 68
NJ: Trenton	02/04/15	31 84
NJ: Waretown	02/05/15	-12 82
NV: Las Vegas	01/15/15	48 70
NY: New York City	03/26/15	-12 94
NY: Niagara Falls	01/27/15	75 68
NY: Syracuse	03/17/15	56 98
OH: Cincinnati	01/27/15	138 91
OH: Columbus	03/05/15	37 85

Table 8 (continued)
Tritium in Drinking Water
January–March 2015

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>
OH: E. Liverpool	01/28/15	25 64
OH: Painesville	02/24/15	132 89
OH: Toledo	01/12/15	171 77
OK: Oklahoma City	03/24/15	52 98
PA: Harrisburg	01/14/15	47 65
PA: Pittsburgh	01/27/15	18 64
RI: Providence	01/21/15	16 64
SC: Barnwell	01/31/15	86 86
SC: Columbia	01/28/15	-10 62
SC: Jenkinsville	01/21/15	23 64
SC: Seneca	01/16/15	-12 62
TN: Knoxville	01/13/15	6 67
TN: Oak Ridge/#360	01/05/15	58 71
TN: Oak Ridge/#371	01/05/15	30 69
TN: Oak Ridge/#768	01/05/15	-4 67
TN: Oak Ridge/#772	01/05/15	-42 64
TX: Austin	01/14/15	-14 66
WA: Richland	02/03/15	106 89
WI: Madison	01/14/15	-39 61

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

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