ENVIRONMENTAL RADIATION DATA

REPORT 167

July–September 2016

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. RadNet data are also available online in EPA's searchable Envirofacts database. Both the electronic ERD reports and the Envirofacts RadNet database can be accessed at:

https://www.epa.gov/radnet/radnet-databases-and-reports

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	1.8
Gross Beta	Air	pCi/m³	0.0006
	Water	pCi/L	1.4
Tritium	Water	pCi/L	150
* Plutonium-238,239/240	Air	aCi/m³	6
	Water	pCi/L	0.3
† Uranium-234,238	Air	aCi/m³	8
	Water	pCi/L	0.4
† Uranium-235	Air	aCi/m³	8
	Water	pCi/L	0.4
Radium-226	Water	pCi/L	0.4
Strontium-90	Water	pCi/L	1
‡ Iodine-131	Water (gamma)	pCi/L	4
	Water	pCi/L	0.7
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/m^3.

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
July 2016

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

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2016

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
ID: Boise	5	0.006	0.003	0.005
ID: Idaho Falls	6	0.011	0.004	0.008
IL: Aurora	4	0.010	0.007	0.009
IL: Champaign	7	0.015	0.008	0.011
IL: Chicago	6	0.010	0.005	0.008
IN: Fort Wayne	4	0.010	0.008	0.008
IN: Indianapolis	8	0.009	0.005	0.007
KS: Kansas City	3	0.011	0.008	0.009
KS: Wichita	9	0.012	0.007	0.009
KY: Lexington	4	0.011	0.006	0.008
KY: Louisville	1	0.006	0.006	0.006
KY: Paducah	4	0.014	0.008	0.011
LA: Baton Rouge	2	0.007	0.005	0.006
LA: Shreveport	2	0.011	0.007	0.009
MA: Boston	9	0.008	0.001	0.006
MA: Worcester	8	0.012	0.003	0.008
MD: Baltimore	6	0.010	0.006	0.007
ME: Orono	2	0.003	0.002	0.003
ME: Portland	8	0.011	0.001	0.007
MI: Bay City 48708	9	0.007	0.003	0.005
MI: Detroit	8	0.011	0.003	0.006
MI: Grand Rapids	3	0.009	0.008	0.009
MN: Duluth	6	0.008	0.004	0.006
MN: St. Paul	4	0.011	0.006	0.009
MO: Jefferson City	8	0.012	0.006	0.008
MO: Springfield	7	0.013	0.009	0.011
MO: St. Louis	3	0.013	0.008	0.010
MS: Jackson/Deq	4	0.011	0.007	0.009
MT: Billings	3	0.014	0.006	0.010
NC: Charlotte	9	0.014	0.005	0.009
NC: Greensboro	1	0.006	0.006	0.006
NC: Raleigh	3	0.010	0.006	0.007
NC: Wilmington	4	0.008	0.005	0.006
ND: Bismarck	6	0.009	0.004	0.006
NE: Lincoln	8	0.009	0.007	0.008
NE: Omaha	4	0.012	0.009	0.011
NH: Concord	4	0.007	0.004	0.005
NJ: Edison	4	0.008	0.006	0.007

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2016

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
NM: Albuquerque	2	0.012	0.006	0.009
NM: Navajo Lake	4	0.010	0.007	0.008
NV: Las Vegas/913	6	0.013	0.005	0.008
NV: Reno	6	0.012	0.006	0.009
NY: Albany	7	0.015	0.004	0.008
NY: Lockport	9	0.014	0.004	0.007
NY: New York City	3	0.009	0.005	0.008
NY: Rochester	7	0.012	0.004	0.006
NY: Yaphank	7	0.010	0.004	0.007
OH: Cincinnati	6	0.012	0.006	0.008
OH: Cleveland	6	0.012	0.008	0.010
OH: Columbus	7	0.012	0.008	0.010
OH: Toledo	8	0.011	0.006	0.008
OK: Oklahoma City	6	0.014	0.007	0.010
OK: Tulsa	8	0.013	0.007	0.009
OR: Corvallis	7	0.005	0.001	0.003
OR: Portland	7	0.003	0.001	0.002
PA: Bloomsburg	8	0.007	0.003	0.004
PA: Philadelphia	4	0.010	0.008	0.009
PA: Pittsburgh	4	0.008	0.006	0.007
PR: San Juan	7	0.007	0.003	0.006
RI: Providence	4	0.006	0.004	0.005
SC: Columbia	3	0.013	0.006	0.009
SD: Pierre	6	0.008	0.004	0.006
SD: Rapid City	5	0.014	0.006	0.009
TN: Knoxville	2	0.015	0.009	0.012
TN: Memphis	7	0.011	0.006	0.009
TN: Nashville	8	0.020	0.007	0.011
TN: Oak Ridge/Bethel	6	0.014	0.007	0.011
TN: Oak Ridge/K25	6	0.015	0.007	0.010
TN: Oak Ridge/Melton	6	0.010	0.006	0.007
TN: Oak Ridge/Y12 E	6	0.015	0.007	0.011
TN: Oak Ridge/Y12 W	6	0.012	0.005	0.009
TX: Amarillo	5	0.015	0.008	0.012
TX: Corpus Christi	7	0.016	0.005	0.010
TX: Dallas	3	0.011	0.006	0.008
TX: El Paso	8	0.009	0.005	0.007
TX: Harlingen	3	0.007	0.005	0.006

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2016

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
TX: Houston	7	0.015	0.006	0.008
TX: Laredo	3	0.012	0.004	0.008
TX: Lubbock	9	0.010	0.005	0.008
TX: San Angelo	7	0.009	0.004	0.007
UT: St. George	2	0.008	0.007	0.008
VA: Harrisonburg	9	0.016	0.007	0.010
VA: Richmond	4	0.013	0.007	0.010
VA: Virginia Beach	3	0.014	0.007	0.010
VT: Burlington	7	0.006	0.003	0.004
WA: Olympia	8	0.003	0.001	0.002
WA: Richland	1	0.004	0.004	0.004
WA: Seattle	4	0.003	0.002	0.003
WA: Spokane	7	0.009	0.003	0.006
WI: La Crosse	5	0.006	0.003	0.004
WI: Madison	9	0.012	0.006	0.009
WI: Milwaukee	6	0.010	0.007	0.008
WI: Shawano	8	0.010	0.005	0.008
WV: Charleston	4	0.012	0.005	0.010
WY: Casper	3	0.008	0.005	0.006

Table 3
Gross Beta in Airborne Particulates
August 2016

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

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2016

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
IA: Mason City	4	0.008	0.007	0.007
ID: Boise	8	0.011	0.003	0.007
ID: Idaho Falls	4	0.018	0.008	0.013
IL: Aurora	5	0.011	0.008	0.010
IL: Champaign	7	0.020	0.006	0.012
IL: Chicago	8	0.009	0.006	0.008
IN: Fort Wayne	4	0.012	0.006	0.009
IN: Indianapolis	9	0.014	0.005	0.007
KS: Kansas City	7	0.011	0.006	0.009
KS: Wichita	8	0.011	0.004	0.008
KY: Lexington	9	0.017	0.004	0.009
KY: Louisville	7	0.019	0.004	0.009
KY: Paducah	8	0.013	0.003	0.008
LA: Baton Rouge	3	0.005	0.004	0.004
LA: Shreveport	3	0.011	0.004	0.008
MA: Boston	8	0.008	0.005	0.006
MA: Worcester	7	0.011	0.005	0.009
MD: Baltimore	7	0.009	0.005	0.007
ME: Orono	3	0.004	0.002	0.003
ME: Portland	9	0.011	0.006	0.009
MI: Bay City 48708	8	0.006	0.004	0.005
MI: Detroit	10	0.010	0.005	0.007
MI: Grand Rapids	5	0.008	0.005	0.007
MN: Duluth	9	0.010	0.006	0.007
MN: St. Paul	5	0.012	0.008	0.010
MO: Jefferson City	9	0.014	0.005	0.009
MO: Springfield	7	0.015	0.007	0.011
MO: St. Louis	2	0.009	0.008	0.009
MS: Jackson/Deq	5	0.011	0.006	0.008
MT: Billings	2	0.011	0.010	0.011
NC: Charlotte	6	0.012	0.005	0.009
NC: Greensboro	2	0.007	0.004	0.005
NC: Raleigh	4	0.007	0.004	0.005
NC: Wilmington	5	0.007	0.004	0.006
ND: Bismarck	4	0.010	0.006	0.008
NE: Lincoln	9	0.010	0.005	0.008
NE: Omaha	4	0.011	0.009	0.010
NH: Concord	7	0.007	0.005	0.006

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2016

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
NJ: Edison	4	0.008	0.006	0.007
NM: Albuquerque	5	0.007	0.006	0.007
NM: Carlsbad	3	0.007	0.001	0.005
NM: Navajo Lake	5	0.011	0.007	0.009
NV: Las Vegas/913	4	0.012	0.009	0.011
NV: Reno	5	0.017	0.009	0.014
NY: Albany	8	0.010	0.006	0.007
NY: Lockport	8	0.010	0.005	0.007
NY: New York City	2	0.010	0.005	0.007
NY: Rochester	8	0.008	0.003	0.006
NY: Yaphank	6	0.010	0.005	0.008
OH: Cincinnati	10	0.019	0.004	0.009
OH: Cleveland	4	0.013	0.010	0.011
OH: Columbus	9	0.011	0.005	0.008
OH: Toledo	2	0.011	0.010	0.010
OK: Oklahoma City	7	0.014	0.008	0.010
OK: Tulsa	8	0.010	0.005	0.008
OR: Corvallis	7	0.006	0.002	0.004
OR: Portland	8	0.004	0.002	0.003
PA: Bloomsburg	9	0.006	0.003	0.004
PA: Philadelphia	6	0.009	0.006	0.007
PA: Pittsburgh	5	0.009	0.005	0.008
PR: San Juan	8	0.012	0.004	0.008
RI: Providence	2	0.005	0.005	0.005
SC: Columbia	4	0.009	0.006	0.007
SD: Pierre	8	0.011	0.006	0.008
SD: Rapid City	8	0.011	0.007	0.009
TN: Knoxville	2	0.013	0.007	0.010
TN: Memphis	9	0.013	0.003	0.008
TN: Nashville	7	0.013	0.004	0.009
TN: Oak Ridge/Bethel	8	0.014	0.005	0.009
TN: Oak Ridge/K25	8	0.013	0.005	0.009
TN: Oak Ridge/Melton	8	0.009	0.003	0.006
TN: Oak Ridge/Y12 E	8	0.014	0.005	0.009
TN: Oak Ridge/Y12 W	8	0.011	0.004	0.008
TX: Amarillo	9	0.016	0.007	0.011
TX: Austin	3	0.006	0.004	0.005
TX: Corpus Christi	9	0.012	0.006	0.009

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2016

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
TX: Dallas	5	0.009	0.004	0.007
TX: El Paso	9	0.006	0.004	0.005
TX: Fort Worth	4	0.012	0.007	0.009
TX: Harlingen	1	0.005	0.005	0.005
TX: Houston	9	0.010	0.003	0.006
TX: Laredo	3	0.008	0.008	0.008
TX: Lubbock	8	0.010	0.006	0.007
TX: San Angelo	4	0.006	0.003	0.005
TX: San Antonio	7	0.009	0.003	0.006
UT: St. George	3	0.010	0.007	0.008
VA: Harrisonburg	9	0.014	0.004	0.009
VA: Richmond	4	0.009	0.008	0.008
VA: Virginia Beach	4	0.007	0.006	0.006
VT: Burlington	9	0.007	0.003	0.005
WA: Olympia	7	0.005	0.002	0.003
WA: Richland	2	0.006	0.005	0.006
WA: Seattle	3	0.005	0.003	0.003
WA: Spokane	6	0.007	0.006	0.006
WI: La Crosse	4	0.007	0.003	0.005
WI: Madison	9	0.020	0.006	0.012
WI: Milwaukee	8	0.013	0.005	0.009
WI: Shawano	9	0.011	0.006	0.008
WV: Charleston	5	0.010	0.005	0.007
WY: Casper	3	0.009	0.007	0.008

Table 4
Gross Beta in Airborne Particulates
September 2016

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
AK: Anchorage	1	0.002	0.002	0.002
AK: Fairbanks	9	0.005	0.001	0.003
AK: Juneau	4	0.029	0.001	0.009
AL: Birmingham	9	0.013	0.007	0.010
AL: Mobile	4	0.013	0.005	0.008
AL: Montgomery/408	8	0.013	0.005	0.008
AR: Fort Smith	5	0.009	0.006	0.007
AR: Little Rock	7	0.020	0.006	0.011
AZ: Phoenix/956	5	0.010	0.006	0.007
AZ: Tucson	8	0.010	0.005	0.007
CA: Anaheim	9	0.016	0.004	0.010
CA: Eureka	5	0.003	0.002	0.003
CA: Los Angeles	4	0.016	0.008	0.013
CA: Richmond	4	0.006	0.004	0.005
CA: Riverside	3	0.015	0.009	0.012
CA: Sacramento	6	0.012	0.003	0.007
CA: San Bernardino	4	0.016	0.007	0.012
CA: San Diego	2	0.011	0.011	0.011
CA: San Francisco	9	0.006	0.002	0.005
CA: San Jose	9	0.009	0.003	0.006
CO: Colorado Springs	2	0.013	0.011	0.012
CO: Denver	5	0.018	0.009	0.012
CO: Grand Junction	4	0.009	0.006	0.008
CT: Hartford	9	0.008	0.003	0.005
DC: Washington	9	0.014	0.007	0.010
DE: Dover	4	0.009	0.003	0.006
FL: Jacksonville	7	0.008	0.002	0.004
FL: Miami	4	0.004	0.002	0.003
FL: Orlando	7	0.007	0.002	0.004
FL: Tampa	7	0.008	0.003	0.005
GA: Atlanta	2	0.016	0.012	0.014
GA: Augusta	5	0.012	0.006	0.008
HI: Honolulu	8	0.003	0.001	0.002
IA: Des Moines	4	0.006	0.004	0.005
IA: Fort Madison	5	0.013	0.006	0.009
IA: Mason City	5	0.009	0.005	0.006
ID: Boise	5	0.008	0.004	0.005
ID: Idaho Falls	6	0.009	0.005	0.006

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2016

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
IL: Aurora	4	0.011	0.007	0.009
IL: Champaign	5	0.018	0.007	0.012
IL: Chicago	5	0.007	0.002	0.005
IN: Fort Wayne	4	0.019	0.006	0.011
IN: Indianapolis	7	0.018	0.005	0.009
KS: Kansas City	7	0.016	0.005	0.008
KS: Wichita	7	0.010	0.006	0.008
KY: Lexington	8	0.026	0.009	0.015
KY: Louisville	7	0.021	0.008	0.012
KY: Paducah	9	0.026	0.007	0.014
LA: Baton Rouge	4	0.008	0.004	0.006
LA: Shreveport	4	0.012	0.005	0.009
MA: Boston	9	0.008	0.003	0.005
MA: Worcester	8	0.012	0.005	0.008
MD: Baltimore	4	0.009	0.005	0.007
ME: Orono	2	0.003	0.002	0.003
ME: Portland	6	0.010	0.003	0.006
MI: Bay City 48708	9	0.007	0.003	0.005
MI: Detroit	7	0.011	0.005	0.007
MI: Grand Rapids	5	0.013	0.005	0.007
MN: Duluth	9	0.008	0.002	0.006
MN: St. Paul	3	0.009	0.007	0.008
MO: Jefferson City	9	0.015	0.005	0.010
MO: Springfield	6	0.016	0.007	0.010
MS: Jackson/Deq	4	0.016	0.006	0.011
NC: Charlotte	8	0.017	0.007	0.011
NC: Greensboro	2	0.009	0.007	0.008
NC: Raleigh	5	0.009	0.004	0.008
NC: Wilmington	4	0.007	0.003	0.005
ND: Bismarck	7	0.010	0.004	0.006
NE: Lincoln	9	0.012	0.004	0.008
NE: Omaha	1	0.008	0.008	0.008
NH: Concord	7	0.009	0.002	0.005
NJ: Edison	3	0.006	0.005	0.006
NM: Albuquerque	3	0.009	0.005	0.008
NM: Carlsbad	6	0.009	0.002	0.007
NM: Navajo Lake	4	0.014	0.005	0.009
NV: Las Vegas/913	3	0.014	0.007	0.010

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2016

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
NV: Reno	7	0.013	0.007	0.009
NY: Albany	9	0.011	0.006	0.008
NY: Lockport	9	0.015	0.005	0.008
NY: New York City	5	0.010	0.006	0.008
NY: Rochester	7	0.008	0.003	0.006
NY: Yaphank	5	0.011	0.006	0.008
OH: Cincinnati	7	0.022	0.005	0.011
OH: Cleveland	6	0.018	0.007	0.011
OH: Columbus	9	0.022	0.006	0.012
OH: Toledo	9	0.014	0.006	0.009
OK: Oklahoma City	9	0.015	0.005	0.008
OK: Tulsa	8	0.019	0.007	0.010
OR: Corvallis	6	0.007	0.002	0.005
OR: Portland	7	0.006	0.002	0.004
PA: Bloomsburg	9	0.005	0.003	0.004
PA: Philadelphia	4	0.012	0.006	0.009
PA: Pittsburgh	4	0.012	0.008	0.010
PR: San Juan	6	0.007	0.002	0.005
RI: Providence	4	0.007	0.003	0.005
SC: Columbia	3	0.010	0.002	0.007
SD: Pierre	8	0.009	0.004	0.006
SD: Rapid City	6	0.010	0.005	0.007
TN: Knoxville	3	0.015	0.013	0.014
TN: Memphis	9	0.021	0.005	0.012
TN: Nashville	9	0.019	0.004	0.013
TN: Oak Ridge/Bethel	8	0.019	0.012	0.014
TN: Oak Ridge/K25	8	0.020	0.010	0.014
TN: Oak Ridge/Melton	8	0.013	0.007	0.009
TN: Oak Ridge/Y12 E	8	0.017	0.012	0.014
TN: Oak Ridge/Y12 W	8	0.017	0.009	0.012
TX: Amarillo	7	0.018	0.004	0.011
TX: Austin	4	0.009	0.004	0.007
TX: Corpus Christi	7	0.012	0.004	0.008
TX: Dallas	4	0.011	0.005	0.007
TX: El Paso	9	0.007	0.004	0.006
TX: Fort Worth	1	0.014	0.014	0.014
TX: Harlingen	1	0.004	0.004	0.004
TX: Houston	7	0.012	0.003	0.007

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2016

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
TX: Laredo	1	0.009	0.009	0.009
TX: Lubbock	5	0.013	0.007	0.009
TX: San Angelo	9	0.026	0.003	0.008
TX: San Antonio	1	0.006	0.006	0.006
UT: St. George	3	0.011	0.008	0.009
VA: Harrisonburg	8	0.021	0.007	0.012
VA: Richmond	5	0.017	0.006	0.012
VA: Virginia Beach	4	0.012	0.006	0.010
VT: Burlington	9	0.005	0.003	0.004
WA: Ellensburg	1	0.005	0.005	0.005
WA: Olympia	6	0.005	0.002	0.004
WA: Richland	2	0.015	0.004	0.009
WA: Seattle	5	0.006	0.004	0.004
WA: Spokane	8	0.011	0.002	0.005
WI: La Crosse	3	0.005	0.004	0.004
WI: Madison	9	0.014	0.007	0.010
WI: Milwaukee	6	0.013	0.006	0.009
WI: Shawano	9	0.009	0.003	0.007
WV: Charleston	2	0.014	0.010	0.012
WY: Casper	4	0.010	0.006	0.007

Table 5
Gamma-Emitters in Precipitation
July 2016

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408	K-40	12	11
AR: Little Rock		ND	
CT: Hartford	Be-7	71	21
FL: Jacksonville	Be-7	49	19
	K-40	13	12
GA: Atlanta	Be-7	51	16
HI: Honolulu		ND	
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MI: Lansing	Be-7	11.8	9.6
MN: St. Paul		ND	
MN: Welch/510	Be-7	41	19
NC: Charlotte	Be-7	48	19
NC: Wilmington	Be-7	36	16
NH: Concord	Be-7	56	17
NY: Albany	Be-7	50	13
OR: Portland		ND	
PA: Harrisburg	K-40	12.5	8.7
TN: Knoxville	K-40	16	12
TN: Nashville	Be-7	30	11
TN: Oak Ridge/K25	Be-7	54	17
TN: Oak Ridge/Melton	Be-7	90	24
TN: Oak Ridge/Y12 E	Be-7	55	20
VA: Lynchburg		ND	
WA: Olympia	Be-7	37	19

Table 6
Gamma-Emitters in Precipitation
August 2016

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408		ND	
AR: Little Rock		ND	
CT: Hartford	Be-7	34	16
FL: Jacksonville	Be-7	30	17
GA: Atlanta	Be-7	52	20
HI: Honolulu		ND	
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MA: Boston	Be-7	59	26
MI: Lansing		ND	
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte	Be-7	36	13
NC: Wilmington		ND	
NY: Albany	Be-7	24	15
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville	Be-7	26	14
TN: Oak Ridge/K25	Be-7	40	24
TN: Oak Ridge/Melton		ND	
TN: Oak Ridge/Y12 E	Be-7	40	24
TX: Austin		ND	
VA: Lynchburg		ND	
WA: Olympia		ND	

Table 7
Gamma-Emitters in Precipitation
September 2016

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery		ND	
AR: Little Rock		ND	
CT: Hartford	Be-7	42	20
FL: Jacksonville		ND	
GA: Atlanta		ND	
HI: Honolulu		ND	
ID: Idaho Falls	Be-7	35	24
KS: Kansas City		ND	
MI: Lansing		ND	
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte	Be-7	37	17
NC: Wilmington		ND	
NY: Albany	Be-7	37	23
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25		ND	
TN: Oak Ridge/Melton		ND	
TN: Oak Ridge/Y12 E		ND	
TX: Austin		ND	
UT: Salt Lake City	Be-7	60	34
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 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.

Table 8
Plutonium and Uranium in Airborne Particulates
January–December 2015 Composites

Location	^{238}Pu aCi/m³	± 2*u*	$^{239–240}$Pu aCi/m³	± 2*u*	^{234}U aCi/m³	± 2*u*	^{235}U aCi/m³	± 2*u*	^{238}U aCi/m³	± 2*u*
AL: Mobile	0.11	0.19	0.26	0.21	11.9	2.6	0.07	0.32	9.8	2.3
AZ: Yuma	−0.14	0.69	0.14	0.80	47.9	8.2	2.2	2.1	44.2	7.8
CA: Anaheim	0.25	0.31	0.05	0.26	28.7	4.8	1.28	0.72	25.0	4.3
CA: San Jose	−0.07	0.13	−0.05	0.12	12.8	2.5	0.65	0.48	12.5	2.4
CO: Denver	0.11	0.25	0.09	0.20	19.7	3.3	1.19	0.58	19.2	3.2
FL: Orlando	0.02	0.10	0.13	0.14	5.3	1.2	0.39	0.30	6.6	1.4
GA: Atlanta	0.05	0.12	0.26	0.20	14.6	2.6	0.67	0.44	12.4	2.3
HI: Honolulu	−0.02	0.12	0.02	0.11	2.19	0.72	0.13	0.24	2.73	0.82
IA: Mason City	0.14	0.25	0.02	0.18	10.3	2.0	0.65	0.43	11.1	2.1
IN: Indianapolis	−0.05	0.12	−0.04	0.12	10.0	1.9	0.57	0.37	10.8	2.0
LA: Shreveport	0.02	0.14	0.08	0.15	10.4	1.8	0.45	0.27	9.7	1.7
MA: Worcester	0.10	0.27	−0.10	0.19	25.0	4.3	1.46	0.79	22.2	3.9
MD: Baltimore	−0.070	0.094	0.06	0.13	8.9	1.7	0.53	0.37	8.0	1.6
MN: Duluth	0.063	0.087	0.013	0.071	3.44	0.74	0.14	0.14	3.02	0.67
MO: Jefferson City	−0.021	0.073	0.032	0.092	8.0	1.5	0.27	0.24	8.3	1.5
MT: Billings	−0.02	0.12	−0.04	0.13	15.6	2.9	0.65	0.48	16.6	3.0
NC: Charlotte	0.05	0.16	0.11	0.23	15.2	2.9	0.81	0.56	15.8	3.0
NE: Lincoln	0.02	0.24	0.11	0.22	17.8	3.2	0.79	0.55	21.3	3.7
NJ: Edison	−0.03	0.10	0.09	0.13	8.1	1.7	0.29	0.32	8.7	1.8
NM: Albuquerque	−0.07	0.45	1.4	1.2	15.5	3.1	0.99	0.82	14.8	3.0
NV: Reno	0.10	0.32	−0.05	0.24	22.4	4.3	1.09	0.81	20.4	4.0
NY: Rochester	0.06	0.17	0.04	0.16	6.3	1.6	0.09	0.25	5.4	1.5
OH: Toledo	0.15	0.21	0.10	0.15	11.9	2.2	0.43	0.35	11.2	2.1
OK: Tulsa	−0.01	0.14	−0.03	0.10	15.6	2.7	0.80	0.49	15.0	2.7
OR: Corvallis	0.052	0.091	−0.017	0.060	3.67	0.83	0.12	0.18	2.78	0.69
SD: Pierre	0.21	0.30	0.53	0.38	15.8	2.9	0.79	0.52	16.5	3.0
TN: Nashville	0.01	0.10	0.06	0.15	9.4	1.8	0.56	0.38	9.8	1.9
TX: Corpus Christi	0.04	0.24	0.04	0.20	13.1	2.6	0.95	0.62	12.6	2.5
TX: San Angelo	0.04	0.17	0.13	0.23	13.5	2.6	0.49	0.43	15.1	2.8
UT: St. George	0.03	0.24	0.46	0.45	21.1	3.6	0.44	0.41	16.7	3.0
VA: Virginia Beach	−0.009	0.085	0.15	0.16	7.8	1.5	0.54	0.33	7.4	1.4
VT: Burlington	−0.01	0.11	0.09	0.14	6.0	1.2	0.35	0.29	5.2	1.1
WA: Seattle	−0.005	0.036	0.016	0.060	2.69	0.69	0.18	0.18	2.41	0.65
WI: Milwaukee	0.13	0.18	0.16	0.19	7.5	1.5	0.46	0.35	7.4	1.5
WV: Charleston	0.010	0.095	0.05	0.13	10.3	2.0	0.50	0.38	10.2	2.0

Note: NA = No Analysis

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 9
Tritium in Drinking Water
July–September 2016

Location	Date Collected	^{3}H pCi/L	± 2*u*
AK: Fairbanks	09/15/16	−31	89
AL: Dothan	09/23/16	0	89
AL: Muscle Shoals	07/06/16	22	59
AL: Scottsboro	07/05/16	116	65
AR: Little Rock	08/04/16	−23	90
CT: Hartford	07/15/16	16	68
DE: Dover	07/20/16	21	93
FL: Miami	09/27/16	−43	90
GA: Savannah	09/23/16	−53	89
HI: Honolulu	08/16/16	−23	90
IA: Cedar Rapids	09/12/16	−86	87
ID: Idaho Falls	08/16/16	−48	88
KS: Topeka	09/23/16	−8	90
LA: New Orleans	09/16/16	17	91
MD: Conowingo	09/13/16	−50	88
MN: St. Paul	07/11/16	13	59
MN: Welch	07/11/16	0	57
MS: Jackson	08/02/16	−31	90
MS: Port Gibson	08/02/16	2	91
MT: Helena	09/29/16	−49	89
ND: Bismarck	07/12/16	26	59
NE: Lincoln	07/12/16	−2	58
NM: Santa Fe	07/21/16	−41	61
NY: Albany	09/30/16	−52	87
NY: New York City	09/26/16	89	96
NY: Niagara Falls	07/06/16	48	60
NY: Niagara Falls	09/28/16	−59	88
NY: Syracuse	07/21/16	33	93
OH: Cincinnati	08/23/16	−36	89
OH: Columbus	09/06/16	−61	88
OH: E. Liverpool	07/26/16	−54	89
OH: Painesville	09/16/16	−29	89
OH: Toledo	09/27/16	10	90
PA: Columbia	09/28/16	−14	91
PA: Harrisburg	09/28/16	77	92
PA: Pittsburgh	07/26/16	23	92
RI: Providence	07/05/16	13	59
SC: Columbia	07/06/16	48	61
SC: Hartsville	07/05/16	4	59
SC: Jenkinsville	09/29/16	8	87

Table 9 (continued)
Tritium in Drinking Water
July–September 2016

Location	Date Collected	^{3}H pCi/L	± 2*u*
SC: Rock Hill	07/14/16	830	110
SC: Seneca	07/06/16	28	60
TN: Oak Ridge/#360	07/05/16	2	60
TN: Oak Ridge/#371	07/05/16	13	57
TN: Oak Ridge/#768	07/05/16	33	59
TN: Oak Ridge/#772	07/05/16	−73	52
TX: Austin	07/05/16	−28	66
WA: Richland	09/08/16	10	91
WI: Madison	07/19/16	−14	65

Table 10
Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples
January–December 2015

Location	^{238}Pu pCi/L ± 2*u*	$^{239–240}$Pu pCi/L ± 2*u*	^{234}U pCi/L ± 2*u*	^{235}U pCi/L ± 2*u*	^{238}U pCi/L ± 2*u*
FL: Tampa	0.010 0.056	0.000 0.046	0.091 0.093	0.014 0.061	0.13 0.10
GA: Baxley	−0.021 0.040	−0.005 0.051	0.11 0.10	0.008 0.071	0.019 0.072
HI: Honolulu	0.080 0.087	0.016 0.059	0.12 0.10	−0.020 0.063	0.064 0.076
IA: Cedar Rapids	0.026 0.068	0.016 0.059	0.27 0.13	−0.030 0.046	0.18 0.11
IL: Morris	0.11 0.28	0.09 0.24	0.50 0.48	0.07 0.31	0.06 0.26
MD: Conowingo	0.005 0.047	−0.015 0.037	1.38 0.32	0.070 0.088	0.74 0.23
MI: Detroit	0.025 0.054	0.010 0.045	0.11 0.12	0.000 0.058	0.10 0.12
MN: Welch	0.019 0.053	0.024 0.052	0.108 0.088	−0.006 0.041	0.031 0.065
MO: Jefferson City	0.010 0.056	−0.005 0.047	0.104 0.085	0.000 0.037	0.084 0.080
MS: Port Gibson	0.000 0.077	0.000 0.053	0.16 0.12	0.037 0.079	0.055 0.086
ND: Bismarck	−0.019 0.060	−0.034 0.040	0.134 0.096	0.036 0.065	0.082 0.075
NE: Lincoln	−0.016 0.067	0.000 0.051	4.38 0.63	0.13 0.11	3.04 0.50
NM: Santa Fe	−0.010 0.035	−0.005 0.034	2.33 0.44	0.089 0.096	0.60 0.21
NV: Las Vegas	−0.005 0.032	0.010 0.043	2.51 0.57	0.031 0.089	1.11 0.36
NY: Albany	0.010 0.094	−0.010 0.068	0.18 0.17	0.04 0.12	0.12 0.16
NY: Syracuse	0.016 0.046	−0.011 0.037	0.091 0.098	0.016 0.070	0.14 0.12
OH: Cincinnati	0.000 0.031	0.005 0.044	0.070 0.075	0.042 0.075	0.080 0.082
OH: Columbus	−0.005 0.033	−0.010 0.035	0.29 0.14	0.019 0.054	0.23 0.13
PA: Pittsburgh	0.038 0.067	−0.005 0.036	0.015 0.043	0.018 0.052	0.039 0.061
SC: Jenkinsville	−0.006 0.079	−0.023 0.059	1.31 0.35	0.072 0.098	0.58 0.23
TN: Oak Ridge/#371	−0.014 0.034	0.000 0.045	0.121 0.099	0.000 0.043	0.034 0.061
WI: Madison	0.005 0.047	0.000 0.048	0.98 0.25	0.067 0.076	0.20 0.11

Note: NA = No Analysis

Table 11
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
Composites
January–December 2015

Location	Gross Beta pCi/L ± 2*u*	Gross Alpha pCi/L ± 2*u*	^{90}Sr pCi/L ± 2*u*
AK: Fairbanks	4.2 2.8	0.6 3.8	
AL: Dothan	2.6 1.4	1.8 3.3	
AL: Montgomery	2.2 1.2	0.7 1.7	
AL: Muscle Shoals	2.6 2.6	−0.6 3.3	
AL: Scottsboro	1.7 1.2	1.5 2.5	
AR: Little Rock	0.5 1.3	0.9 1.8	0.15 0.18
CO: Denver	3.3 2.8	0.5 3.6	−0.32 0.77
CT: Hartford	2.5 2.5	1.8 3.4	
DE: Dover	4.7 2.8	−1.2 4.9	
FL: Miami	3.9 2.8	1.5 4.0	
FL: Tampa	0.2 2.5	3.8 4.9	
GA: Baxley	3.9 2.7	2.5 3.9	
GA: Savannah	2.3 1.3	0.3 2.7	
HI: Honolulu	5.3 3.1	2.7 5.2	
IA: Cedar Rapids	3.3 2.9	3.1 4.4	0.02 0.16
ID: Idaho Falls	6.0 2.9	0.0 5.2	
IL: Morris	11.4 6.4	11 11	0.2 1.6
IL: W. Chicago	14.8 3.9	1.3 4.0	
KS: Topeka	9.0 3.5	1.2 6.5	0.09 0.17
LA: New Orleans	3.4 2.8	1.4 5.6	0.06 0.16
MD: Baltimore	1.7 2.5	0.8 3.9	
MD: Conowingo	9.7 3.2	2.8 4.3	
MI: Detroit	3.9 5.3	3.7 6.5	
MN: St. Paul	2.6 2.7	−0.6 3.3	
MN: Welch	6.8 3.3	5.8 7.6	
MO: Jefferson City	4.4 2.9	3.0 5.5	−0.12 0.14
MS: Jackson	4.0 1.7	1.0 2.0	
MS: Port Gibson	5.3 3.3	7.7 7.4	
MT: Helena	2.2 2.7	0.0 3.1	0.19 0.18
NC: Raleigh	2.1 2.6	−0.7 3.6	−0.10 0.31
ND: Bismarck	6.0 3.2	2.7 6.8	−0.05 0.14
NE: Lincoln	14.0 4.0	8.1 6.5	0.13 0.17
NH: Concord	3.1 2.8	1.7 3.9	
NJ: Trenton	1.0 2.6	0.3 3.8	
NJ: Waretown	3.0 1.3	0.7 1.8	
NM: Santa Fe	4.1 2.8	4.3 5.2	−0.04 0.14
NV: Las Vegas	7.6 3.4	6.0 9.6	−0.7 1.3

Table 11 (continued)
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
Composites
January–December 2015

Location	Gross Beta pCi/L ± 2*u*	Gross Alpha pCi/L ± 2*u*	^{90}Sr pCi/L ± 2*u*
NY: Albany	−0.7 5.0	3.2 6.7	
NY: New York City	1.9 1.2	1.5 1.8	
NY: Niagara Falls	2.9 1.6	1.2 3.1	
NY: Syracuse	1.9 2.7	3.3 4.5	
OH: Cincinnati	3.6 2.8	2.1 4.6	−0.10 0.76
OH: Columbus	3.1 2.8	2.2 5.7	−0.10 0.16
OH: E. Liverpool	5.2 3.0	0.2 3.9	0.10 0.18
OH: Painesville	4.1 2.9	0.4 3.9	0.09 0.19
OH: Toledo	2.8 2.7	0.9 3.6	0.16 0.19
OK: Oklahoma City	5.3 2.9	0.8 4.3	0.08 0.15
OR: Portland	1.2 1.4	1.3 1.7	
PA: Columbia	3.1 1.3	1.4 2.6	
PA: Harrisburg	2.3 1.3	0.3 2.3	
PA: Pittsburgh	3.5 2.9	2.3 4.1	
RI: Providence	1.3 1.2	1.1 2.1	
SC: Barnwell	0.8 1.1	0.6 1.4	
SC: Columbia	1.8 1.2	0.4 1.7	
SC: Jenkinsville	4.5 2.9	3.4 4.0	
SC: Seneca	0.7 1.0	1.4 1.6	
TN: Knoxville	1.7 1.2	0.2 1.8	
TN: Oak Ridge/#360	2.2 2.6	−0.1 3.6	
TN: Oak Ridge/#371	1.8 2.5	3.4 4.7	
TN: Oak Ridge/#768	2.1 2.8	1.5 4.2	
TN: Oak Ridge/#772	1.7 2.8	1.5 4.2	
TX: Austin	4.1 3.0	1.1 4.1	0.10 0.15
WA: Richland	1.4 1.2	1.4 1.9	
WI: Madison	7.4 5.8	7.6 9.1	0.16 0.18

Table 12
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2015

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
AK: Fairbanks	NA	NA	Co-60	−0.25 0.92
			Cs-137	0.45 0.90
			K-40	14 11
			Ra-228	2.3 4.7
AL: Dothan	NA	NA	Co-60	0.27 0.77
			Cs-137	−0.24 0.75
			K-40	5.3 9.7
			Ra-228	−0.2 3.2
AL: Montgomery	NA	NA	Co-60	−0.04 0.62
			Cs-137	−0.30 0.62
			K-40	−2 11
AL: Muscle Shoals	NA	NA	Co-60	0.33 0.80
			Cs-137	0.51 0.97
			K-40	12 15
			Ra-228	0.3 3.7
AL: Scottsboro	NA	NA	Co-60	0.22 0.88
			Cs-137	−0.3 1.1
			K-40	−13 21
			Ra-228	−2.7 7.4
AR: Little Rock	NA	NA	Co-60	0.07 0.83
			Cs-137	0.14 0.91
			K-40	−16 25
			Ra-228	1.0 4.2
CO: Denver	NA	NA	Co-60	0.27 0.69
			Cs-137	0.59 0.86
			K-40	−7 15
			Ra-228	1.6 3.5
CT: Hartford	NA	NA	Co-60	0.45 0.86
			Cs-137	−0.01 0.89
			K-40	15 12
			Ra-228	1.0 3.7
DE: Dover	NA	NA	Co-60	0.37 0.86
			Cs-137	0.02 0.91
			K-40	10 11
			Ra-228	−1.0 4.6

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2015

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
FL: Miami	NA	NA	Co-60	0.23 0.94
			Cs-137	−0.3 1.1
			K-40	−15 24
			Ra-228	2.7 3.2
FL: Tampa	0.30 0.15	NA	Co-60	0.12 0.74
			Cs-137	0.45 0.84
			K-40	26 18
			Ra-228	−1.9 5.7
GA: Baxley	2.68 0.49	NA	Co-60	0.38 0.89
			Cs-137	0.29 0.92
			K-40	21 15
			Ra-228	4.7 7.1
GA: Savannah	NA	NA	Co-60	−0.14 0.87
			Cs-137	−0.25 0.81
			K-40	−17 18
			Ra-228	−4.4 8.6
HI: Honolulu	0.051 0.070	NA	Co-60	−0.01 0.78
			Cs-137	−0.47 0.85
			K-40	−2 14
			Ra-228	−1.1 5.0
IA: Cedar Rapids	0.064 0.073	NA	Co-60	0.00 0.98
			Cs-137	−0.14 0.96
			K-40	−10 16
			Ra-228	0.7 3.4
ID: Idaho Falls	NA	NA	Co-60	0.31 0.94
			Cs-137	0.05 0.95
			K-40	17 14
			Ra-228	−2.9 8.4
IL: Morris	1.22 0.30	NA	Co-60	−0.6 2.4
			Cs-137	1.3 1.9
			K-40	16 29
			Ra-228	10 14
IL: W. Chicago	NA	NA	Co-60	0.00 0.72
			Cs-137	0.23 0.88
			K-40	11 13

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2015

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
IL: W. Chicago			Ra-228	−0.3 4.8
KS: Topeka	NA	NA	Co-60	−0.10 0.75
			Cs-137	−0.17 0.92
			K-40	12 14
			Ra-228	0.2 3.3
LA: New Orleans	NA	NA	Co-60	0.53 0.74
			Cs-137	0.10 0.95
			K-40	10 13
			Ra-228	−0.6 4.2
MD: Baltimore	NA	NA	Co-60	−0.01 0.77
			Cs-137	0.0 1.1
			K-40	3 13
			Ra-228	1.6 4.3
MD: Conowingo	0.39 0.16	NA	Co-60	0.18 0.83
			Cs-137	0.45 0.73
			K-40	−12 30
			Ra-228	0.1 2.9
MI: Detroit	0.058 0.089	NA	Co-60	0.21 0.79
			Cs-137	0.06 0.79
			K-40	−9 14
			Ra-228	−2.1 4.5
MN: St. Paul	NA	NA	Co-60	−0.03 0.89
			Cs-137	−0.40 0.93
			K-40	9 12
			Ra-228	−1.4 4.1
MN: Welch	1.25 0.31	NA	Co-60	0.28 0.79
			Cs-137	−0.26 0.87
			K-40	−8 16
			Ra-226	2 23
			Ra-228	0.4 3.3
MO: Jefferson City	0.026 0.075	NA	Co-60	0.03 0.80
			Cs-137	0.31 0.66
			K-40	−11 18
			Ra-228	−0.9 4.6
MS: Jackson	NA	NA	Co-60	0.00 0.66

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2015

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
MS: Jackson			Cs-137	−0.08 0.60
			K-40	3 11
			Ra-228	−1.3 5.3
MS: Port Gibson	0.29 0.14	NA	Co-60	0.04 0.90
			Cs-137	0.20 0.90
			K-40	−16 31
			Ra-228	1.3 4.8
MT: Helena	NA	NA	Co-60	−0.04 0.66
			Cs-137	0.0 1.0
			K-40	10 13
			Ra-228	1.6 3.1
NC: Raleigh	NA	NA	Co-60	−0.02 0.90
			Cs-137	−0.08 0.98
			K-40	3 13
			Ra-228	−2.5 6.6
ND: Bismarck	0.09 0.10	NA	Co-60	0.00 0.98
			Cs-137	−0.5 1.1
			K-40	12 13
			Ra-228	−2.0 6.4
NE: Lincoln	0.26 0.14	NA	Co-60	0.06 0.79
			Cs-137	0.04 0.88
			K-40	10 13
			Ra-228	3.6 4.2
NH: Concord	NA	NA	Co-60	−0.4 2.4
			Cs-137	0.1 1.6
			K-40	26 34
			Ra-228	13 16
NJ: Trenton	NA	NA	Co-60	0.16 0.72
			Cs-137	−0.60 0.99
			K-40	14 13
			Ra-228	2.5 4.2
NJ: Waretown	NA	NA	Co-60	0.05 0.74
			Cs-137	−0.03 0.65
			K-40	−16 58
			Ra-228	3.8 4.3

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2015

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
NM: Santa Fe	0.078 0.087	NA	Co-60	0.56 0.82
			Cs-137	0.35 0.92
			K-40	10 12
			Ra-228	1.1 4.3
NV: Las Vegas	0.21 0.12	NA	Co-60	−0.5 5.2
			Cs-137	−0.3 5.7
			K-40	71 68
			Ra-228	21 30
NY: Albany	0.083 0.089	NA	Co-60	0.0 1.3
			Cs-137	0.1 1.4
			K-40	−4 25
			Ra-228	−3.1 9.6
NY: New York City	NA	NA	Co-60	0.28 0.61
			Cs-137	−0.11 0.64
			K-40	6.8 9.4
			Ra-228	−0.4 3.1
NY: Niagara Falls	NA	NA	Co-60	0.03 0.91
			Cs-137	0.3 1.0
			K-40	14 14
			Ra-228	4.1 4.6
NY: Syracuse	0.17 0.12	NA	Co-60	0.61 0.84
			Cs-137	0.33 0.92
			K-40	9 11
			Ra-228	−2.0 6.2
OH: Cincinnati	0.21 0.13	NA	Co-60	0.25 0.88
			Cs-137	0.48 0.86
			K-40	9 13
			Ra-228	3.7 4.9
OH: Columbus	0.19 0.12	NA	Co-60	0.03 0.91
			Cs-137	0.56 0.83
			K-40	10 12
			Ra-228	0.1 3.4
OH: E. Liverpool	NA	NA	Co-60	0.31 0.80
			Cs-137	−0.59 0.96
			K-40	9 13

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2015

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
OH: E. Liverpool			Ra-228	2.8 5.0
OH: Painesville	NA	NA	Co-60	−0.23 0.56
			Cs-137	−0.01 0.55
			K-40	4.8 8.3
			Ra-228	0.1 3.0
OH: Toledo	NA	NA	Co-60	−0.29 0.89
			Cs-137	0.23 0.93
			K-40	5 13
			Ra-228	2.7 4.0
OK: Oklahoma City	NA	NA	Co-60	0.23 0.88
			Cs-137	0.08 0.90
			K-40	16 11
			Ra-228	−2.7 7.2
OR: Portland	NA	NA	Co-60	0.3 1.7
			Cs-137	1.3 2.2
			K-40	9 27
			Ra-228	−2 11
PA: Columbia	NA	NA	Co-60	0.26 0.79
			Cs-137	−0.12 0.99
			K-40	21 13
			Ra-228	3.3 4.4
PA: Harrisburg	NA	NA	Co-60	−0.32 0.98
			Cs-137	0.0 1.0
			K-40	13 16
			Ra-228	−2.6 8.2
PA: Pittsburgh	0.14 0.11	NA	Co-60	0.36 0.86
			Cs-137	−0.2 1.1
			K-40	−7 13
RI: Providence	NA	NA	Co-60	0.45 0.93
			Cs-137	−0.22 0.99
			K-40	−14 21
			Ra-228	−2.7 8.2
SC: Barnwell	NA	NA	Co-60	0.34 0.74
			Cs-137	−0.3 1.1
			K-40	−11 23

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2015

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
SC: Barnwell			Ra-228	5.1 8.0
SC: Columbia	NA	NA	Co-60	−0.08 0.91
			Cs-137	−0.04 0.99
			K-40	−8 15
			Ra-228	4.1 6.1
SC: Jenkinsville	0.15 0.14	NA	Co-60	−0.40 0.91
			Cs-137	0.67 0.90
			K-40	−6 13
			Ra-228	2.8 4.6
SC: Seneca	NA	NA	Co-60	0.15 0.91
			Cs-137	−0.1 1.1
			K-40	16 13
			Ra-228	4.5 4.7
TN: Knoxville	NA	NA	Co-60	0.01 0.66
			Cs-137	0.0 1.0
			K-40	12 13
			Ra-228	4.1 4.0
TN: Oak Ridge/#360	NA	NA	Co-60	0.09 0.67
			Cs-137	0.01 0.79
			K-40	20 16
			Ra-228	−2.8 6.0
TN: Oak Ridge/#371	0.086 0.082	NA	Co-60	0.67 0.89
			Cs-137	0.35 0.80
			K-40	4 14
			Ra-226	10 26
			Ra-228	−3.2 6.8
TN: Oak Ridge/#768	NA	NA	Co-60	0.1 1.1
			Cs-137	−0.09 0.95
			K-40	26 18
			Ra-228	−4 13
TN: Oak Ridge/#772	NA	NA	Co-60	0.26 0.78
			Cs-137	0.00 0.85
			K-40	11 11
			Ra-228	−1.8 5.0
TX: Austin	NA	NA	Co-60	0.08 0.84

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2015

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
TX: Austin			Cs-137	0.20 0.90
			K-40	−11 16
			Ra-228	1.5 4.9
WA: Richland	NA	NA	Co-60	0.30 0.82
			Cs-137	0.1 1.1
			K-40	7 12
			Ra-228	−0.9 5.0
WI: Madison	0.99 0.28	NA	Co-60	0.28 0.74
			Cs-137	0.56 0.92
			K-40	8 12
			Ra-228	−0.1 3.3

Note: ND = Not Detected
NA = No Analysis

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