

ENVIRONMENTAL

RADIATION

DATA

REPORT 163

July–September 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. 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/m ³	0.0006
	Water	pCi/L	1.4
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	8
	Water	pCi/L	0.4
† Uranium-235	Air	aCi/m ³	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 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
July 2015

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

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

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

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

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

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min	Avg
TX: Fort Worth	3	0.010	0.008	0.009
TX: Harlingen	2	0.016	0.013	0.015
TX: Houston	9	0.015	0.005	0.011
TX: Laredo	6	0.016	0.009	0.011
TX: Lubbock	7	0.008	0.005	0.007
TX: San Angelo	8	0.016	0.006	0.012
TX: San Antonio	8	0.017	0.007	0.011
UT: Salt Lake City	7	0.013	0.005	0.008
UT: St. George	2	0.006	0.006	0.006
VA: Harrisonburg	9	0.015	0.006	0.011
VA: Richmond	4	0.010	0.006	0.008
VA: Virginia Beach	6	0.010	0.007	0.008
VT: Burlington	9	0.009	0.002	0.005
WA: Olympia	9	0.004	0.001	0.003
WA: Richland	2	0.004	0.003	0.003
WA: Seattle	5	0.005	0.002	0.004
WA: Spokane	8	0.014	0.004	0.008
WI: La Crosse	2	0.005	0.005	0.005
WI: Madison	9	0.014	0.004	0.009
WI: Milwaukee	9	0.015	0.003	0.010
WI: Shawano	9	0.010	0.003	0.007
WV: Charleston	2	0.010	0.008	0.009
WY: Casper	1	0.007	0.007	0.007

Table 3
Gross Beta in Airborne Particulates
August 2015

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

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
IL: Aurora	4	0.015	0.009	0.011
IL: Champaign	9	0.026	0.007	0.014
IL: Chicago	9	0.014	0.003	0.008
IN: Indianapolis	9	0.013	0.005	0.008
KS: Kansas City	7	0.020	0.007	0.014
KS: Wichita	7	0.013	0.006	0.010
KY: Lexington	6	0.014	0.005	0.010
KY: Louisville	6	0.012	0.005	0.009
KY: Paducah	9	0.015	0.007	0.010
LA: Baton Rouge	9	0.014	0.003	0.009
LA: Shreveport	4	0.013	0.009	0.012
MA: Boston	8	0.008	0.002	0.006
MA: Worcester	9	0.018	0.004	0.009
MD: Baltimore	6	0.013	0.007	0.010
ME: Orono	1	0.003	0.003	0.003
ME: Portland	5	0.010	0.003	0.007
MI: Bay City 48708	8	0.010	0.003	0.005
MI: Detroit	8	0.012	0.002	0.006
MI: Grand Rapids	3	0.017	0.008	0.012
MN: Duluth	8	0.015	0.002	0.006
MN: St. Paul	4	0.014	0.005	0.008
MO: Jefferson City	7	0.015	0.006	0.010
MO: Springfield	8	0.019	0.007	0.012
MS: Jackson/Deq	2	0.013	0.005	0.009
MT: Billings	1	0.011	0.011	0.011
NC: Charlotte	8	0.017	0.004	0.011
NC: Greensboro	2	0.009	0.007	0.008
NC: Raleigh	4	0.007	0.004	0.006
NC: Wilmington	4	0.006	0.005	0.005
ND: Bismarck	9	0.023	0.006	0.011
NE: Kearney	6	0.015	0.006	0.010
NE: Lincoln	8	0.015	0.006	0.009
NE: Omaha	6	0.013	0.008	0.010
NH: Concord	8	0.012	0.003	0.006
NJ: Edison	7	0.010	0.004	0.007
NM: Carlsbad	4	0.013	0.009	0.011
NM: Navajo Lake	3	0.011	0.006	0.008
NV: Las Vegas/913	8	0.015	0.005	0.009

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
NV: Reno	4	0.017	0.006	0.010
NY: Albany	2	0.013	0.006	0.009
NY: Lockport	8	0.012	0.003	0.006
NY: New York City	2	0.009	0.008	0.008
NY: Yaphank	7	0.007	0.002	0.005
OH: Cincinnati	8	0.011	0.005	0.007
OH: Cleveland	8	0.016	0.007	0.010
OH: Columbus	1	0.013	0.013	0.013
OH: Toledo	8	0.012	0.003	0.007
OK: Oklahoma City	8	0.019	0.007	0.013
OK: Tulsa	9	0.017	0.008	0.012
OR: Corvallis	8	0.007	0.002	0.004
OR: Portland	6	0.004	0.003	0.003
PA: Bloomsburg	8	0.008	0.003	0.005
PA: Philadelphia	4	0.010	0.005	0.008
PA: Pittsburgh	5	0.014	0.009	0.010
PR: San Juan	8	0.006	0.002	0.004
RI: Providence	5	0.011	0.005	0.008
SC: Columbia	4	0.010	0.006	0.008
SD: Pierre	8	0.008	0.005	0.007
SD: Rapid City	7	0.016	0.007	0.010
TN: Knoxville	5	0.015	0.005	0.009
TN: Memphis	10	0.017	0.005	0.010
TN: Nashville	8	0.016	0.006	0.012
TN: Oak Ridge/Bethel	9	0.020	0.007	0.013
TN: Oak Ridge/K25	9	0.018	0.008	0.012
TN: Oak Ridge/Melton	9	0.014	0.006	0.009
TN: Oak Ridge/Y12 E	9	0.024	0.010	0.015
TN: Oak Ridge/Y12 W	9	0.017	0.006	0.011
TX: Amarillo	5	0.022	0.015	0.018
TX: Austin	5	0.014	0.006	0.010
TX: Corpus Christi	8	0.012	0.004	0.009
TX: Dallas	6	0.013	0.006	0.011
TX: El Paso	8	0.011	0.006	0.009
TX: Fort Worth	4	0.011	0.006	0.009
TX: Harlingen	3	0.012	0.006	0.008
TX: Houston	6	0.012	0.004	0.010
TX: Laredo	5	0.010	0.004	0.007

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
TX: Lubbock	8	0.012	0.007	0.009
TX: San Angelo	9	0.025	0.010	0.016
TX: San Antonio	7	0.012	0.005	0.008
UT: Salt Lake City	5	0.011	0.006	0.008
VA: Harrisonburg	9	0.020	0.007	0.012
VA: Richmond	4	0.011	0.006	0.008
VA: Virginia Beach	8	0.011	0.007	0.008
VT: Burlington	7	0.009	0.002	0.005
WA: Olympia	9	0.004	0.002	0.003
WA: Richland	3	0.008	0.007	0.007
WA: Seattle	2	0.004	0.004	0.004
WI: La Crosse	3	0.006	0.005	0.006
WI: Madison	8	0.020	0.007	0.011
WI: Milwaukee	6	0.024	0.008	0.013
WI: Shawano	9	0.012	0.003	0.006
WV: Charleston	5	0.016	0.007	0.012
WY: Casper	3	0.007	0.005	0.006

Table 4
Gross Beta in Airborne Particulates
September 2015

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
AK: Anchorage	3	0.003	0.002	0.003
AK: Fairbanks	6	0.005	0.002	0.002
AK: Juneau	6	0.002	0.001	0.001
AL: Birmingham	7	0.011	0.004	0.008
AL: Mobile	4	0.012	0.008	0.010
AL: Montgomery/408	7	0.016	0.002	0.009
AR: Fort Smith	4	0.022	0.008	0.013
AR: Little Rock	3	0.012	0.010	0.011
AZ: Phoenix/956	5	0.010	0.004	0.007
AZ: Tucson	4	0.013	0.005	0.009
AZ: Yuma	1	0.009	0.009	0.009
CA: Anaheim	9	0.010	0.006	0.008
CA: Bakersfield	1	0.007	0.007	0.007
CA: Eureka	4	0.003	0.002	0.003
CA: Los Angeles	4	0.013	0.006	0.010
CA: Richmond	5	0.005	0.004	0.005
CA: Riverside	8	0.011	0.007	0.009
CA: Sacramento	6	0.018	0.007	0.010
CA: San Bernardino	9	0.017	0.007	0.013
CA: San Diego	4	0.011	0.008	0.009
CA: San Francisco	8	0.006	0.003	0.004
CA: San Jose	5	0.007	0.004	0.006
CO: Colorado Springs	2	0.012	0.010	0.011
CO: Denver	7	0.017	0.007	0.011
CT: Hartford	8	0.012	0.005	0.007
DC: Washington	9	0.028	0.007	0.012
DE: Dover	5	0.014	0.003	0.007
FL: Jacksonville	3	0.006	0.002	0.004
FL: Miami	4	0.004	0.003	0.003
FL: Orlando	4	0.007	0.002	0.005
FL: Tallahassee	5	0.008	0.005	0.007
FL: Tampa	6	0.008	0.004	0.006
GA: Atlanta	4	0.016	0.010	0.012
GA: Augusta	4	0.012	0.004	0.008
HI: Honolulu	9	0.003	0.001	0.002
IA: Des Moines	8	0.008	0.003	0.005
IA: Mason City	6	0.021	0.006	0.011
ID: Boise	6	0.009	0.004	0.006

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
ID: Idaho Falls	7	0.020	0.006	0.011
IL: Champaign	6	0.026	0.008	0.014
IL: Chicago	6	0.019	0.005	0.011
IN: Fort Wayne	4	0.028	0.007	0.013
IN: Indianapolis	8	0.019	0.006	0.010
KS: Kansas City	7	0.018	0.008	0.012
KS: Wichita	9	0.018	0.006	0.011
KY: Lexington	7	0.031	0.008	0.017
KY: Louisville	7	0.024	0.005	0.013
KY: Paducah	8	0.030	0.007	0.013
LA: Baton Rouge	8	0.012	0.006	0.009
LA: Shreveport	3	0.015	0.006	0.012
MA: Boston	8	0.018	0.005	0.009
MA: Worcester	7	0.026	0.006	0.012
MD: Baltimore	4	0.029	0.009	0.017
ME: Orono	3	0.007	0.004	0.006
ME: Portland	4	0.018	0.005	0.009
MI: Bay City 48708	7	0.016	0.004	0.009
MI: Detroit	8	0.024	0.005	0.011
MI: Grand Rapids	3	0.020	0.007	0.012
MN: Duluth	9	0.020	0.005	0.010
MN: St. Paul	5	0.017	0.011	0.014
MO: Jefferson City	8	0.025	0.005	0.012
MO: Springfield	8	0.026	0.007	0.014
MS: Jackson/Deq	4	0.016	0.010	0.013
NC: Charlotte	9	0.023	0.004	0.012
NC: Greensboro	1	0.006	0.006	0.006
NC: Raleigh	4	0.013	0.002	0.007
NC: Wilmington	4	0.008	0.002	0.005
ND: Bismarck	8	0.020	0.005	0.011
NE: Kearney	5	0.019	0.009	0.013
NE: Lincoln	8	0.014	0.005	0.010
NE: Omaha	2	0.020	0.012	0.016
NH: Concord	7	0.019	0.004	0.010
NJ: Edison	7	0.026	0.005	0.011
NM: Carlsbad	6	0.013	0.008	0.010
NM: Navajo Lake	5	0.013	0.009	0.010
NV: Las Vegas/913	5	0.012	0.004	0.009

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min	Avg
NV: Reno	3	0.017	0.010	0.015
NY: Lockport	8	0.036	0.006	0.015
NY: New York City	5	0.016	0.006	0.010
NY: Yaphank	7	0.018	0.003	0.007
OH: Cincinnati	8	0.022	0.006	0.011
OH: Cleveland	8	0.032	0.008	0.016
OH: Columbus	1	0.014	0.014	0.014
OH: Toledo	9	0.020	0.006	0.012
OK: Oklahoma City	9	0.024	0.007	0.012
OK: Tulsa	8	0.022	0.006	0.011
OR: Corvallis	8	0.007	0.004	0.006
OR: Portland	8	0.006	0.003	0.004
PA: Bloomsburg	8	0.016	0.004	0.008
PA: Philadelphia	5	0.020	0.006	0.011
PA: Pittsburgh	3	0.011	0.009	0.011
PR: San Juan	9	0.008	0.002	0.005
RI: Providence	4	0.011	0.001	0.006
SC: Columbia	4	0.012	0.004	0.008
SD: Pierre	9	0.019	0.005	0.011
SD: Rapid City	4	0.019	0.011	0.014
TN: Knoxville	5	0.021	0.007	0.013
TN: Memphis	8	0.025	0.007	0.012
TN: Nashville	7	0.031	0.008	0.015
TN: Oak Ridge/Bethel	7	0.026	0.004	0.015
TN: Oak Ridge/K25	7	0.024	0.003	0.012
TN: Oak Ridge/Melton	7	0.019	0.002	0.010
TN: Oak Ridge/Y12 E	7	0.028	0.004	0.016
TN: Oak Ridge/Y12 W	7	0.024	0.004	0.014
TX: Amarillo	3	0.026	0.014	0.018
TX: Austin	4	0.013	0.005	0.008
TX: Corpus Christi	9	0.013	0.004	0.008
TX: Dallas	7	0.020	0.005	0.011
TX: El Paso	9	0.027	0.006	0.011
TX: Fort Worth	2	0.010	0.007	0.008
TX: Harlingen	4	0.014	0.005	0.009
TX: Houston	8	0.014	0.003	0.008
TX: Laredo	7	0.013	0.004	0.008
TX: Lubbock	9	0.012	0.006	0.008

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

Location	Number of Samples	NAREL Lab Measurement		
		Max	Min (pCi/m ³)	Avg
TX: San Angelo	8	0.018	0.006	0.011
TX: San Antonio	8	0.014	0.003	0.008
UT: Salt Lake City	5	0.012	0.006	0.008
UT: St. George	5	0.010	0.007	0.009
VA: Harrisonburg	8	0.023	0.008	0.013
VA: Richmond	4	0.014	0.004	0.009
VA: Virginia Beach	8	0.015	0.005	0.009
VT: Burlington	8	0.012	0.004	0.008
WA: Olympia	8	0.005	0.002	0.003
WA: Richland	5	0.010	0.004	0.007
WI: La Crosse	4	0.011	0.006	0.008
WI: Madison	9	0.028	0.007	0.016
WI: Milwaukee	8	0.030	0.008	0.018
WI: Shawano	8	0.017	0.006	0.010
WV: Charleston	5	0.029	0.008	0.018
WY: Casper	4	0.012	0.007	0.009

Table 5
Gamma-Emitters in Precipitation
July 2015

Location	Nuclide	pCi/L \pm 2u	
AL: Montgomery/408		ND	
AR: Little Rock	Be-7	27	25
	K-40	16	11
AZ: Phoenix	K-40	14	13
CT: Hartford	Be-7	98	29
FL: Jacksonville	Be-7	65	27
GA: Atlanta	Be-7	30	18
HI: Honolulu	Be-7	64	54
ID: Idaho Falls	Be-7	57	18
	K-40	9.2	5.8
KS: Kansas City	K-40	11	11
MA: Boston	Be-7	60	27
MI: Lansing	Be-7	18	14
MN: St. Paul	K-40	7.5	5.5
MN: Welch/510	Be-7	32	16
NC: Charlotte		ND	
NC: Wilmington		ND	
NY: Albany	Be-7	34	22
NY: Yaphank		ND	
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	68	18
TN: Oak Ridge/Melton	Be-7	76	26
TN: Oak Ridge/Y12 E	Be-7	55	27
UT: Salt Lake City	Be-7	39	22
VA: Lynchburg		ND	

Table 6
Gamma-Emitters in Precipitation
August 2015

Location	Nuclide	pCi/L \pm 2u	
AL: Montgomery/408	Be-7	27	13
AR: Little Rock	Be-7	30	19
CT: Hartford	Be-7	35	11
	K-40	8.9	5.2
FL: Jacksonville	Be-7	35	16
GA: Atlanta		ND	
HI: Honolulu		ND	
ID: Idaho Falls	Be-7	111	44
	K-40	13	12
KS: Kansas City		ND	
MA: Boston	Be-7	70	21
MI: Lansing	Be-7	33	19
	K-40	12	11
MN: St. Paul		ND	
MN: Welch/510	Be-7	19	19
NC: Charlotte		ND	
NC: Wilmington	K-40	13	12
NH: Concord	Be-7	44	13
NY: Albany	Be-7	64	20
OR: Portland	Be-7	53	19
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25		ND	
TN: Oak Ridge/Melton	Be-7	48	14
TN: Oak Ridge/Y12 E	Be-7	53	20
UT: Salt Lake City	Be-7	30	19
VA: Lynchburg		ND	
WA: Olympia	Be-7	66	33

Table 7
Gamma-Emitters in Precipitation
September 2015

Location	Nuclide	pCi/L \pm 2u	
AL: Montgomery/408		ND	
CT: Hartford		ND	
FL: Jacksonville		ND	
GA: Atlanta	Be-7	50	23
	K-40	15	11
HI: Honolulu		ND	
ID: Idaho Falls	Be-7	42	27
	K-40	16	10
KS: Kansas City		ND	
MA: Boston		ND	
MI: Lansing	Be-7	33	26
MN: St. Paul		ND	
MN: Welch/510	Be-7	43	25
NC: Charlotte	K-40	14	11
NC: Wilmington	K-40	14	12
NY: Albany	Be-7	49	18
OR: Portland		ND	
PA: Harrisburg		ND	
TN: Knoxville		ND	
TN: Nashville		ND	
TN: Oak Ridge/K25	Be-7	54	31
TN: Oak Ridge/Melton		ND	
TN: Oak Ridge/Y12 E		ND	
TX: Austin		ND	
UT: Salt Lake City		ND	
VA: Lynchburg	K-40	14	11
WA: Olympia	Be-7	72	31

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. One-fourth of the annual composites are analyzed each year on a four year rotating schedule.

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.

Table 8
Plutonium and Uranium in Airborne Particulates
January–December 2014 Composites

Location	²³⁸ Pu		^{239–240} Pu		²³⁴ U		²³⁵ U		²³⁸ U	
	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u	aCi/m ³	± 2u
AK: Fairbanks	-0.01	0.14	0.05	0.11	8.1	1.5	0.45	0.30	7.6	1.4
AL: Montgomery/408	0.018	0.067	0.018	0.067	6.3	1.2	0.38	0.25	7.6	1.4
AR: Fort Smith	-0.03	0.17	0.07	0.19	14.5	2.6	0.37	0.36	11.7	2.2
CA: Los Angeles	0.02	0.26	0.02	0.21	24.6	4.2	1.56	0.82	21.8	3.8
CA: San Diego	0.12	0.55	-0.18	0.44	19.7	5.0	1.2	1.2	19.3	4.9
CA: San Francisco	-0.03	0.17	0.28	0.29	8.6	1.9	0.49	0.43	8.0	1.8
CO: Grand Junction	0.07	0.24	0.02	0.20	21.4	3.9	0.84	0.63	23.6	4.2
DC: Washington	-0.03	0.13	0.07	0.13	8.7	1.8	0.58	0.43	8.5	1.8
FL: Tampa	0.01	0.19	0.17	0.19	35.0	5.4	1.87	0.77	34.1	5.3
GA: Augusta	-0.019	0.092	0.08	0.12	8.3	1.5	0.40	0.27	8.2	1.5
ID: Idaho Falls	-0.04	0.34	0.13	0.23	20.4	3.7	1.09	0.68	23.5	4.1
IL: Champaign	0.13	0.17	0.04	0.12	8.4	1.6	0.52	0.33	9.4	1.7
KS: Wichita	-0.03	0.18	0.08	0.31	23.1	4.2	1.67	0.93	25.8	4.6
KY: Lexington	0.022	0.098	-0.011	0.073	8.9	1.7	0.70	0.40	9.5	1.8
MA: Boston	-0.031	0.078	-0.006	0.041	4.21	0.87	0.14	0.15	5.2	1.0
ME: Orono	0.03	0.12	0.015	0.068	5.1	1.0	0.06	0.13	5.6	1.1
MI: Grand Rapids	0.000	0.050	0.06	0.10	5.3	1.0	0.30	0.22	5.4	1.1
MN: St. Paul	-0.03	0.16	0.03	0.14	9.2	1.9	1.10	0.63	10.5	2.1
NC: Greensboro	-0.05	0.10	0.05	0.10	6.3	1.3	0.28	0.24	6.2	1.2
NC: Wilmington	0.012	0.070	0.043	0.078	5.6	1.1	0.36	0.23	5.8	1.1
ND: Bismarck	0.04	0.19	0.06	0.23	18.8	3.5	1.01	0.74	19.4	3.5
NE: Omaha	0.09	0.26	0.05	0.20	20.1	3.3	0.69	0.54	20.8	3.4
NV: Las Vegas/913	0.06	0.28	-0.03	0.30	24.9	4.6	1.14	0.83	22.8	4.4
NY: Albany	0.00	0.12	0.11	0.18	10.2	2.0	0.38	0.35	10.5	2.1
NY: Yaphank	0.07	0.13	0.10	0.14	5.6	1.2	0.32	0.30	6.1	1.3
OH: Cleveland	-0.07	0.16	0.04	0.20	18.8	3.4	0.69	0.54	19.4	3.5
PA: Bloomsburg	-0.011	0.080	0.029	0.062	7.6	1.4	0.32	0.22	7.4	1.3
TN: Memphis	-0.04	0.25	0.12	0.26	18.8	3.4	0.93	0.63	18.0	3.3
TX: Amarillo	-0.03	0.27	0.23	0.35	24.4	4.4	1.48	0.91	24.1	4.4
TX: El Paso	0.18	0.40	0.18	0.47	23.6	4.6	1.6	1.1	27.1	5.1
TX: Fort Worth	0.05	0.23	0.08	0.29	24.6	4.2	1.11	0.75	29.9	4.9
TX: San Antonio	-0.05	0.24	0.10	0.27	17.9	3.5	1.16	0.78	16.0	3.2
WA: Olympia	0.18	0.19	-0.025	0.087	2.04	0.66	0.13	0.21	3.22	0.86
WA: Spokane	-0.08	0.15	0.04	0.17	16.9	3.2	1.25	0.72	13.1	2.6
WI: Madison	-0.03	0.13	0.04	0.11	10.0	1.9	0.28	0.28	9.5	1.8

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 2015

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>
AK: Fairbanks	08/18/15	-27 66
AL: Dothan	07/01/15	44 76
AL: Montgomery	07/14/15	22 75
AL: Muscle Shoals	07/08/15	93 79
AL: Scottsboro	07/07/15	123 80
AR: Little Rock	07/07/15	54 75
CO: Denver	07/30/15	-6 81
DE: Dover	07/07/15	82 78
FL: Miami	09/30/15	-27 63
FL: Tampa	07/07/15	44 76
GA: Baxley	08/25/15	-14 67
GA: Savannah	09/10/15	19 64
HI: Honolulu	08/14/15	-22 67
IA: Cedar Rapids	08/11/15	-71 78
ID: Idaho Falls	08/27/15	-16 67
KS: Topeka	09/14/15	-23 63
LA: New Orleans	09/22/15	74 68
MD: Baltimore	07/21/15	-55 79
MI: Detroit	07/07/15	87 78
MN: St. Paul	07/14/15	-26 79
MN: Welch	07/14/15	-26 79
MO: Jefferson City	07/17/15	74 84
MS: Jackson	08/17/15	-14 67
MS: Port Gibson	08/11/15	-27 66
ND: Bismarck	07/15/15	22 81
NE: Lincoln	07/07/15	-29 73
NJ: Trenton	07/13/15	35 82
NJ: Waretown	07/15/15	-64 77
NM: Santa Fe	08/10/15	-39 79
NY: New York City	09/21/15	15 65
NY: Niagara Falls	07/31/15	52 84
NY: Syracuse	07/24/15	37 83
NY: Syracuse	09/22/15	-47 63
OH: Columbus	08/18/15	-25 66
OH: E. Liverpool	08/04/15	32 83
OH: Painesville	08/20/15	50 70
OH: Toledo	08/12/15	77 73
OK: Oklahoma City	09/08/15	8 65
PA: Harrisburg	09/28/15	76 69
PA: Pittsburgh	08/04/15	-4 81

Table 9 (continued)
Tritium in Drinking Water
July–September 2015

Location	Date Collected	³ H pCi/L ± 2 <i>u</i>
RI: Providence	07/07/15	-18 79
SC: Barnwell	07/20/15	2 82
SC: Columbia	07/15/15	6 81
SC: Jenkinsville	07/08/15	57 77
SC: Seneca	07/08/15	70 78
TN: Knoxville	07/09/15	75 78
TN: Oak Ridge/#360	07/07/15	46 76
TN: Oak Ridge/#371	07/07/15	-9 74
TN: Oak Ridge/#768	07/07/15	-16 72
TN: Oak Ridge/#772	07/07/15	-27 72
TX: Austin	08/10/15	11 82
WA: Richland	08/05/15	-22 80

Table 10
Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples
January–December 2014

Location	²³⁸ Pu	^{239–240} Pu	²³⁴ U	²³⁵ U	²³⁸ U
	pCi/L ± 2u	pCi/L ± 2u	pCi/L ± 2u	pCi/L ± 2u	pCi/L ± 2u
DE: Dover	-0.010 0.062	0.051 0.071	0.048 0.073	-0.021 0.051	0.065 0.082
FL: Miami	0.005 0.047	0.010 0.058	0.36 0.17	0.043 0.076	0.25 0.14
FL: Tampa	-0.020 0.070	0.005 0.057	0.064 0.082	-0.006 0.062	0.091 0.087
GA: Baxley	0.041 0.073	-0.005 0.034	0.091 0.093	0.061 0.083	0.023 0.062
IA: Cedar Rapids	-0.011 0.038	0.006 0.051	0.27 0.16	-0.007 0.080	0.19 0.14
ID: Idaho Falls	-0.016 0.038	-0.010 0.036	0.78 0.25	0.09 0.11	0.57 0.21
IL: W. Chicago	-0.011 0.052	-0.021 0.040	0.006 0.052	0.048 0.086	0.029 0.062
LA: New Orleans	0.010 0.045	-0.005 0.033	0.42 0.18	0.000 0.065	0.30 0.17
MD: Conowingo	0.005 0.068	-0.005 0.049	2.45 0.47	0.076 0.096	1.08 0.29
MN: St. Paul	-0.026 0.040	0.026 0.066	0.11 0.10	-0.013 0.045	0.059 0.074
MN: Welch	0.033 0.051	0.008 0.037	0.22 0.13	0.000 0.064	0.023 0.062
MS: Port Gibson	0.005 0.081	-0.005 0.051	0.100 0.091	0.000 0.059	0.032 0.056
NE: Lincoln	0.016 0.060	0.011 0.048	3.58 0.60	0.16 0.13	2.73 0.50
OH: Cincinnati	-0.005 0.061	0.015 0.045	0.16 0.11	0.019 0.056	0.059 0.074
OH: Columbus	0.010 0.059	0.000 0.033	0.22 0.13	0.035 0.075	0.26 0.14
OK: Oklahoma City	-0.028 0.053	0.014 0.063	0.060 0.075	-0.013 0.045	-0.005 0.036
PA: Harrisburg	-0.006 0.087	-0.006 0.038	0.039 0.069	-0.007 0.064	-0.006 0.053
SC: Jenkinsville	-0.032 0.076	0.026 0.093	2.14 0.43	0.07 0.10	0.63 0.23
TN: Oak Ridge/#371	0.036 0.074	-0.010 0.036	0.057 0.071	0.019 0.054	0.052 0.072
TX: Austin	0.005 0.070	-0.005 0.034	0.15 0.11	0.052 0.080	0.054 0.084
WI: Madison	0.058 0.080	-0.012 0.040	1.08 0.31	0.000 0.049	0.24 0.15

Note: NA = No Analysis

Table 11
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
Composites
January–December 2014

Location	Gross Beta pCi/L $\pm 2u$	Gross Alpha pCi/L $\pm 2u$	⁹⁰ Sr pCi/L $\pm 2u$
AK: Fairbanks	5.3 3.1	0.5 4.5	
AL: Dothan	2.9 1.4	1.4 3.5	
AL: Montgomery	2.0 1.3	-0.1 1.7	
AL: Muscle Shoals	4.3 3.0	0.6 3.6	
AL: Scottsboro	1.8 1.1	-0.6 1.7	0.11 0.44
AR: Little Rock	1.6 1.4	1.6 1.9	
CA: Richmond	1.4 1.4	1.2 1.9	
CO: Denver	3.9 2.9	1.0 3.7	
CT: Hartford	1.0 2.6	0.6 3.1	
DE: Dover	4.8 3.1	2.0 5.6	
FL: Miami	5.4 3.1	3.6 4.5	0.23 0.45
FL: Tampa	6.1 3.2	2.5 4.7	0.10 0.49
GA: Baxley	5.0 3.2	5.5 5.3	-0.09 0.50
GA: Savannah	2.1 1.3	0.6 3.1	-0.01 0.39
HI: Honolulu	2.6 2.7	0.8 4.7	
IA: Cedar Rapids	4.1 2.8	2.0 4.4	
ID: Boise	0.3 2.6	0.7 3.4	
ID: Idaho Falls	6.0 3.3	2.3 5.8	
IL: W. Chicago	9.1 3.5	4.1 5.1	0.08 0.80
KS: Topeka	7.0 3.4	0.3 6.6	
LA: New Orleans	5.6 3.0	2.3 5.3	
MD: Baltimore	3.3 2.9	0.2 4.2	
MD: Conowingo	5.7 3.2	6.3 5.1	
MI: Detroit	0.2 5.0	-0.9 5.8	0.26 0.47
MN: St. Paul	4.4 2.8	2.1 4.0	0.27 0.40
MN: Welch	8.0 3.3	3.4 7.5	0.04 0.36
MO: Jefferson City	7.4 3.3	0.5 4.3	
MS: Jackson	2.8 1.3	0.2 1.7	-0.12 0.39
MS: Port Gibson	7.8 3.4	5.6 7.0	-0.34 0.48
MT: Helena	4.9 2.9	0.5 3.6	
ND: Bismarck	4.3 3.0	0.1 5.5	
NE: Lincoln	17.9 4.4	9.2 7.0	
NH: Concord	1.7 1.2	0.7 2.0	
NJ: Trenton	1.8 2.7	1.9 3.9	
NJ: Waretown	2.2 1.2	1.1 1.9	
NY: Albany	1.3 2.5	-0.1 3.5	
NY: New York City	1.0 1.1	0.2 1.5	

Table 11 (continued)
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
Composites
January–December 2014

Location	Gross Beta pCi/L $\pm 2u$	Gross Alpha pCi/L $\pm 2u$	⁹⁰ Sr pCi/L $\pm 2u$
NY: Niagara Falls	1.9 1.2	0.5 3.1	
NY: Syracuse	2.1 2.6	0.6 4.2	
OH: Cincinnati	4.3 3.0	2.0 4.4	
OH: Columbus	4.5 3.1	3.0 5.7	
OH: E. Liverpool	4.5 3.0	1.3 3.9	
OH: Painesville	4.1 3.0	0.4 4.0	
OH: Toledo	3.4 2.8	1.2 4.0	
OK: Oklahoma City	4.5 2.8	2.8 3.8	
OR: Portland	2.2 1.2	1.7 1.6	
PA: Columbia	1.3 1.2	0.7 2.8	
PA: Harrisburg	3.2 1.4	2.5 3.3	
PA: Pittsburgh	4.3 2.9	0.7 4.1	
RI: Providence	0.6 1.1	0.8 2.1	
SC: Barnwell	1.0 1.1	1.0 1.8	0.17 0.51
SC: Columbia	3.1 1.3	0.5 1.8	0.18 0.43
SC: Jenkinsville	1.6 2.6	5.4 4.5	-0.09 0.44
SC: Seneca	1.5 1.1	0.3 1.5	0.27 0.47
TN: Chattanooga	2.4 2.8	0.1 3.5	
TN: Knoxville	3.0 1.4	-0.1 2.6	0.13 0.46
TN: Oak Ridge/#360	4.9 3.0	0.9 3.4	0.21 0.49
TN: Oak Ridge/#371	4.4 3.0	2.7 4.2	0.35 0.49
TN: Oak Ridge/#4442	4.4 2.9	0.5 3.7	0.34 0.51
TN: Oak Ridge/#768	2.8 2.8	0.1 3.6	0.28 0.44
TN: Oak Ridge/#772	4.3 2.9	-0.9 3.6	-0.03 0.43
TX: Austin	5.3 2.9	2.5 3.9	
VA: Ashland	5.6 3.8	-0.6 4.0	
VA: Lynchburg	0.0 2.5	-0.5 2.9	
WA: Richland	2.2 1.5	0.9 2.1	
WI: Madison	7.0 5.7	6.4 8.7	

Table 12
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2014

Location	²²⁶ Ra pCi/L ± 2u	²²⁸ Ra pCi/L ± 2u	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2u
AK: Fairbanks	NA	NA	Co-60	-0.07 0.83
			Cs-137	0.20 0.94
			K-40	-20 47
			Ra-228	0.3 3.2
AL: Dothan	NA	NA	Co-60	0.01 0.87
			Cs-137	-0.5 1.0
			K-40	-15 21
			Ra-228	-3.4 8.6
AL: Montgomery	NA	NA	Co-60	0.00 0.76
			Cs-137	0.61 0.95
			K-40	-11 17
			Ra-228	-2.6 7.0
AL: Muscle Shoals	NA	NA	Co-60	0.47 0.68
			Cs-137	-0.22 0.67
			K-40	3.7 9.1
			Ra-228	2.7 4.3
AL: Scottsboro	NA	NA	Co-60	-0.20 0.86
			Cs-137	-0.05 0.81
			K-40	0 15
			Ra-228	3.3 4.5
AR: Little Rock	NA	NA	Co-60	0.18 0.81
			Cs-137	0.77 0.91
			K-40	-11 16
			Ra-228	3.5 4.4
CA: Richmond	NA	NA	Co-60	0.7 2.5
			Cs-137	0.8 2.4
			K-40	52 35
			Ra-228	12 13
CO: Denver	NA	NA	Co-60	0.4 1.8
			Cs-137	-0.1 2.7
			K-40	39 38
			Ra-228	13 13
CT: Hartford	NA	NA	Co-60	0.45 0.96
			Cs-137	0.50 0.90
			K-40	5 14

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2014

Location	²²⁶ Ra pCi/L ± 2u	²²⁸ Ra pCi/L ± 2u	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2u
CT: Hartford DE: Dover	0.092 0.093	NA	Ra-228	-1.0 4.4
			Co-60	0.19 0.75
			Cs-137	0.01 0.94
			K-40	8 12
FL: Miami	0.22 0.13	NA	Ra-228	-0.2 4.3
			Co-60	-0.03 0.71
			Cs-137	0.00 0.91
			K-40	5 14
FL: Tampa	0.45 0.18	NA	Ra-228	1.2 3.3
			Co-60	0.25 0.75
			Cs-137	-0.44 0.96
			K-40	6 12
GA: Baxley	4.28 0.62	NA	Ra-228	-1.0 4.9
			Co-60	0.11 0.79
			Cs-137	-0.03 0.85
			K-40	7 13
GA: Savannah	NA	NA	Ra-228	4.0 4.6
			Co-60	0.30 0.69
			Cs-137	0.30 0.67
			K-40	10 12
HI: Honolulu	NA	NA	Ra-228	2.8 3.6
			Co-60	0.46 0.89
IA: Cedar Rapids	0.090 0.089	NA	Cs-137	-0.06 0.99
			Co-60	-0.45 0.94
			Cs-137	-0.11 0.86
			K-40	12 16
ID: Boise	NA	NA	Ra-228	0.7 5.4
			Co-60	1.3 2.2
			K-40	5 30
			Ra-228	5 14
ID: Idaho Falls	0.053 0.074	NA	Co-60	-0.07 0.87
			Cs-137	0.0 1.1
			K-40	-6 12
			Ra-226	3 31
IL: W. Chicago	0.86 0.25	NA	Co-60	-0.10 0.77

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2014

Location	²²⁶ Ra pCi/L ± 2 <i>u</i>	²²⁸ Ra pCi/L ± 2 <i>u</i>	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2 <i>u</i>
IL: W. Chicago			Cs-137	-0.73 0.97
			K-40	20 14
			Ra-228	3.9 4.9
KS: Topeka	NA	NA	Co-60	-0.17 0.58
			Cs-137	0.13 0.70
			K-40	13.0 9.8
			Ra-228	0.7 2.8
			Co-60	0.07 0.80
LA: New Orleans	0.16 0.12	NA	Cs-137	-0.6 1.1
			K-40	7 11
			Ra-228	1.3 3.8
			Co-60	-0.04 0.78
			Cs-137	0.0 1.1
MD: Baltimore	NA	NA	K-40	0 13
			Ra-228	2.5 4.4
			Co-60	0.37 0.64
			Cs-137	0.00 0.65
			K-40	9 10
MD: Conowingo	0.49 0.19	NA	Ra-228	2.9 4.0
			Co-60	0.36 0.80
			Cs-137	0.06 0.81
			K-40	-2 11
			Ra-228	-1.1 4.4
MI: Detroit	NA	NA	Co-60	-0.18 0.90
			Cs-137	-0.6 1.0
			K-40	-14 21
			Ra-228	4.6 4.8
			Co-60	-0.02 0.86
MN: St. Paul	0.062 0.077	NA	Cs-137	0.00 0.89
			K-40	8 12
			Ra-228	1.9 4.8
			Co-60	0.0 3.3
			Cs-137	1.2 2.5
MN: Welch	0.38 0.17	NA	K-40	43 28
			Ra-228	8 10
			Co-60	
			Cs-137	
			K-40	
MO: Jefferson City	NA	NA	Co-60	
			Cs-137	
			K-40	
			Ra-228	
			Co-60	

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2014

Location	²²⁶ Ra pCi/L ± 2u	²²⁸ Ra pCi/L ± 2u	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2u
MS: Jackson	NA	NA	Co-60	0.26 0.67
			Cs-137	-0.24 0.67
			K-40	2 10
			Ra-228	2.2 4.3
MS: Port Gibson	0.24 0.14	NA	Co-60	-0.17 0.79
			Cs-137	0.29 0.88
			K-40	-1 12
			Ra-228	2.8 5.0
MT: Helena	NA	NA	Co-60	0.01 0.65
			Cs-137	0.00 0.72
			K-40	-7 15
			Ra-228	0.3 3.6
ND: Bismarck	NA	NA	Co-60	-0.32 0.99
			Cs-137	0.33 0.93
			K-40	8 14
			Ra-228	2.2 4.2
NE: Lincoln	0.23 0.13	NA	Co-60	0.51 0.77
			Cs-137	0.06 0.68
			K-40	6 10
			Ra-228	-2.9 5.2
NH: Concord	NA	NA	Co-60	0.38 0.78
			Cs-137	0.15 0.73
			K-40	1 10
			Ra-228	2.1 4.1
NJ: Trenton	NA	NA	Co-60	0.33 0.77
			Cs-137	-0.21 0.99
			K-40	4 12
			Ra-228	-2.5 6.3
NJ: Waretown	NA	NA	Co-60	-0.17 0.89
			Cs-137	0.20 0.98
			K-40	1 14
			Ra-228	3.5 4.6
NY: Albany	NA	NA	Co-60	-0.05 0.85
			Cs-137	0.0 1.0
			K-40	5 12

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2014

Location	²²⁶ Ra pCi/L ± 2u	²²⁸ Ra pCi/L ± 2u	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2u
NY: Albany	NA	NA	Ra-228	-2.4 6.5
NY: New York City			Co-60	-0.14 0.72
			Cs-137	0.23 0.66
			K-40	5 11
NY: Niagara Falls	NA	NA	Ra-228	2.3 2.7
			Co-60	0.76 0.80
			Cs-137	-0.13 0.95
			K-40	-11 16
NY: Syracuse	NA	NA	Ra-228	-3.1 8.0
			Co-60	0.16 0.79
			Cs-137	-0.09 0.74
			K-40	0 14
OH: Cincinnati	0.10 0.10	NA	Ra-228	-5 13
			Co-60	0.66 0.88
			Cs-137	0.52 0.94
			K-40	8 11
OH: Columbus	0.12 0.11	NA	Ra-228	1.3 4.2
			Co-60	0.9 2.2
			Cs-137	0.2 2.4
			K-40	30 33
OH: E. Liverpool	NA	NA	Ra-228	9 13
			Co-60	-0.03 0.91
			Cs-137	0.46 0.90
			K-40	10 11
OH: Painesville	NA	NA	Ra-228	0.5 3.8
			Co-60	0.50 0.87
			Cs-137	-0.36 0.92
			Ra-228	-1.4 5.6
OH: Toledo	NA	NA	Co-60	-0.18 0.94
			Cs-137	-0.18 0.98
			K-40	1 11
			Ra-228	4.3 4.8
OK: Oklahoma City	0.077 0.083	NA	Co-60	0.36 0.86
			Cs-137	0.55 0.85
			K-40	-3 10
			Ra-228	

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2014

Location	²²⁶ Ra pCi/L ± 2u	²²⁸ Ra pCi/L ± 2u	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2u
OR: Portland	NA	NA	Co-60	0.4 1.0
			Cs-137	-0.01 0.91
			K-40	-9 18
			Ra-228	-1.8 5.8
PA: Columbia	NA	NA	Co-60	-0.12 0.70
			Cs-137	0.03 0.68
			K-40	-14 21
			Ra-228	1.8 5.7
PA: Harrisburg	0.021 0.056	NA	Co-60	-0.08 0.64
			Cs-137	-0.02 0.54
			K-40	-10 220
			Ra-228	0.0 2.3
PA: Pittsburgh	NA	NA	Co-60	-0.25 0.86
			Cs-137	0.28 0.97
			K-40	8 14
			Ra-228	-2.8 7.0
RI: Providence	NA	NA	Co-60	0.14 0.61
			Cs-137	-0.41 0.63
			K-40	0.3 5.7
			Ra-228	1.0 2.2
SC: Barnwell	NA	NA	Co-60	0.39 0.85
			Cs-137	-0.16 0.87
			K-40	4 11
			Ra-228	4.1 3.9
SC: Columbia	NA	NA	Co-60	-0.12 0.81
			Cs-137	0.06 0.93
			K-40	6 12
			Ra-228	2.9 4.9
SC: Jenkinsville	0.054 0.075	NA	Co-60	0.09 0.76
			Cs-137	0.64 0.89
			K-40	-9 22
			Ra-228	2.7 4.3
SC: Seneca	NA	NA	Co-60	0.48 0.83
			Cs-137	0.68 0.86
			K-40	-6 16

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2014

Location	²²⁶ Ra pCi/L ± 2u	²²⁸ Ra pCi/L ± 2u	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2u
SC: Seneca	NA	NA	Ra-228	-2.5 7.2
TN: Chattanooga			Co-60	0.0 1.7
			Cs-137	0.3 2.0
			K-40	-5 28
TN: Knoxville	NA	NA	Ra-228	-8 24
			Co-60	-0.38 0.84
			Cs-137	-0.51 0.97
			K-40	0 11
TN: Oak Ridge/#360	NA	NA	Ra-228	-0.1 3.4
			Co-60	0.41 0.83
			Cs-137	0.67 0.93
			K-40	3 13
TN: Oak Ridge/#371	0.069 0.078	NA	Ra-228	0.6 4.3
			Co-60	0.0 1.0
			Cs-137	-0.33 0.92
			K-40	-8 17
TN: Oak Ridge/#4442	NA	NA	Ra-228	-2.7 6.3
			Co-60	0.39 0.65
			Cs-137	-0.06 0.66
			K-40	-11 11
TN: Oak Ridge/#768	NA	NA	Ra-228	2.2 3.3
			Co-60	0.00 0.70
			Cs-137	-0.02 0.69
			K-40	-16 28
TN: Oak Ridge/#772	NA	NA	Ra-228	-1.7 3.9
			Co-60	0.32 0.59
			Cs-137	-0.18 0.61
			K-40	-0.8 7.0
TX: Austin	0.114 0.093	NA	Ra-228	0.3 2.3
			Co-60	0.61 0.82
			Cs-137	-0.29 0.98
			K-40	11 14
VA: Ashland	NA	NA	Ra-228	-0.1 3.6
			Co-60	0.6 2.1
			Cs-137	0.1 2.2

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2014

Location	²²⁶ Ra pCi/L ± 2 <i>u</i>	²²⁸ Ra pCi/L ± 2 <i>u</i>	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2 <i>u</i>
VA: Ashland			K-40	35 24
VA: Lynchburg	NA	NA	Ra-228	-3 14
			Co-60	0.69 0.83
			Cs-137	0.47 0.94
			K-40	-16 21
WA: Richland	NA	NA	Ra-228	-3.3 8.4
			Co-60	-0.06 0.59
			Cs-137	0.03 0.72
			K-40	-15 28
			Ra-228	-0.9 4.0
WI: Madison	1.60 0.35	NA	Co-60	0.03 0.96
			Cs-137	0.3 1.0
			K-40	-14 20
			Ra-228	4.9 5.1

Note: ND = Not Detected
NA = No Analysis

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Jessica Wieder
USEPA – ORIA, Radiation Protection Division

Radiation Protection Division (MC6608J)
1200 Pennsylvania Ave. N.W.
Washington, DC 20460
email: wieder.jessica@epa.gov

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Jonathan Edwards
USEPA - ORIA
1200 Pennsylvania Ave. N.W.
Washington, DC 20460
email: edwards.jonathan@epa.gov

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