ENVIRONMENTAL RADIATION DATA

REPORT 155

July–September 2013

United States Environmental Protection Agency

Office of Radiation and Indoor Air

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Preface

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

Sampling locations are selected to provide population and geographic coverage for the United States. The radiation analyses performed on RadNet samples may include gross alpha and gross beta analysis, gamma analyses, and radionuclide-specific analyses for isotopes of uranium, plutonium, strontium, iodine, radium, and tritium. This monitoring effort also provides information on natural background levels and possible accidental releases into the environment.

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Acknowledgments

All sampling for the RadNet monitoring system (formerly ERAMS) is performed by volunteer collectors who are frequently members of health departments or related environmental agencies of their respective states. The National Analytical Radiation Environmental Laboratory (NAREL), on behalf of the U.S. Environmental Protection Agency, would like to acknowledge the time and effort of these volunteer collectors, who are so essential to the successful operation of RadNet. The efforts of the sample collectors are especially appreciated during times of emergency operation when sampling frequencies are increased and schedules are sometimes demanding.

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Data Reporting Conventions

Every laboratory measurement involves uncertainty. When there is little or no radioactivity in a sample, one consequence of measurement uncertainty is the possibility of obtaining a measured value that is less than zero. Such a negative result occurs when random effects in the measurement process cause the measured value for the sample to be less than that of the blank or background, which is subtracted from it. From April 1991 to December 1995, negative results were reported as "not detected" or "ND," and gamma analysis results that were less than their estimated measurement uncertainties were also reported as "ND." In January 1996, both of these practices were discontinued. Although negative activities are physically impossible, the inclusion of negative results in the report allows better statistical analysis of the data.

Results of gamma analyses are still reported as "ND" when gamma-emitting radionuclides are not detected.

Measurement Uncertainty

Each measured value y is reported with an expanded uncertainty $U = k\,u_c(y)$, which is determined from the combined standard uncertainty $u_c(y)$ and the coverage factor $k = 2$. The interval from $y - U$ to $y + U$ is estimated to have a level of confidence of approximately 95 %.

Significant Figures

Expanded uncertainties are reported to two significant figures. Measurement results are rounded to the corresponding number of decimal places.

Detection Capability

The minimum detectable concentrations (MDCs) for each radionuclide are shown in Table 1. The MDC is defined as the minimum concentration that gives a 95 % probability of detection when the detection criteria are chosen to give only a 5 % probability of false detection in a sample that is analyte-free.

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Table 1

Reporting Units and Minimum Detectable Concentrations for Radionuclide Analyses

Radionuclide	Media	Reporting Unit	Minimum Detectable Concentration
Gross Alpha	Water	pCi/L	2
Gross Beta	Air	pCi/m³	0.0006
	Water	pCi/L	2
	Precipitation	pCi/L	2
Tritium	Water	pCi/L	150
* Plutonium-238,239/240	Air	aCi/m³	6
	Water	pCi/L	0.3
† Uranium-234,238	Air	aCi/m³	7.5
	Water	pCi/L	0.35
† Uranium-235	Air	aCi/m³	9
	Water	pCi/L	0.4
Radium-226	Water	pCi/L	0.02
Strontium-90	Milk	pCi/L	2
	Water	pCi/L	1
‡ Iodine-131	Milk (gamma)	pCi/L	4
	Water (gamma)	pCi/L	4
	Water	pCi/L	0.3
Cesium-137	Milk	pCi/L	5
	Water	pCi/L	5
‡ Barium-140	Milk	pCi/L	15
	Water	pCi/L	15
Potassium	Milk	g/L	0.06
	Water	g/L	0.06
Potassium-40	Water	pCi/L	50

* The MDC for air is based on an assumed total sample volume of 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 generally field measurements are made with a dual-phosphor scintillation counter at least 5 hours after collection to allow ^{222}Rn progeny to decay. Field estimates are reported to appropriate EPA officials by telephone or mail depending on the activity levels found; however, as of the first quarter of 2012, NAREL no longer reports field estimates in *Environmental Radiation Data*.

The filters are sent to NAREL for more sensitive analysis in a gas proportional counter. Gamma scans are performed on all filters showing gross beta activity greater than 1 pCi/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. NAREL discontinued gross beta analysis of precipitation in January 2010 and discontinued tritium analysis of precipitation in January 2012.

Table 2
Gross Beta in Airborne Particulates
July 2013

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

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2013

Location	Number of Samples	NAREL Lab Measurement (pCi/m³) Max	Min	Avg
IL: Aurora	7	0.010	0.005	0.007
IL: Champaign	8	0.006	0.002	0.004
IL: Chicago	8	0.011	0.004	0.007
IN: Fort Wayne	5	0.012	0.008	0.009
IN: Indianapolis	9	0.010	0.004	0.007
KS: Kansas City	9	0.012	0.007	0.009
KS: Wichita	6	0.012	0.004	0.008
KY: Lexington	8	0.011	0.005	0.008
KY: Louisville	5	0.014	0.005	0.007
LA: Baton Rouge	6	0.013	0.004	0.007
LA: Shreveport	7	0.010	0.003	0.006
MA: Boston	9	0.009	0.004	0.006
MA: Worcester	9	0.015	0.005	0.008
MD: Baltimore	7	0.010	0.005	0.007
ME: Orono	4	0.009	0.004	0.007
ME: Portland	7	0.007	0.002	0.005
MI: Bay City 48708	8	0.009	0.003	0.005
MI: Detroit	9	0.009	0.004	0.006
MI: Grand Rapids	4	0.014	0.005	0.008
MN: Duluth	7	0.007	0.002	0.005
MN: St. Paul	5	0.010	0.003	0.006
MO: Jefferson City	9	0.010	0.005	0.007
MO: Springfield	6	0.008	0.005	0.007
MO: St. Louis	4	0.024	0.006	0.011
MS: Jackson/Deq	5	0.011	0.005	0.008
MT: Billings	2	0.011	0.009	0.010
NC: Charlotte	8	0.008	0.003	0.005
NC: Greensboro	2	0.007	0.006	0.007
NC: Wilmington	5	0.006	0.003	0.004
ND: Bismarck	8	0.014	0.005	0.009
NE: Lincoln	9	0.010	0.005	0.008
NE: Omaha	4	0.009	0.006	0.008
NH: Concord	8	0.020	0.005	0.012
NJ: Edison	9	0.008	0.003	0.005
NM: Carlsbad	5	0.015	0.006	0.009
NM: Navajo Lake St Park	4	0.012	0.004	0.008
NV: Las Vegas/913	9	0.011	0.005	0.008
NV: Reno	9	0.015	0.009	0.012

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
NY: Albany	9	0.015	0.004	0.007
NY: Lockport	8	0.010	0.003	0.006
NY: New York City	4	0.007	0.004	0.006
NY: Rochester	7	0.008	0.002	0.005
NY: Syracuse	1	0.006	0.006	0.006
NY: Yaphank	7	0.009	0.003	0.005
OH: Cincinnati	9	0.011	0.003	0.006
OH: Cleveland	8	0.007	0.004	0.005
OH: Painesville	7	0.009	0.004	0.006
OH: Toledo	7	0.009	0.002	0.005
OK: Oklahoma City	9	0.013	0.006	0.009
OK: Tulsa	10	0.014	0.005	0.008
OR: Corvallis	9	0.003	0.001	0.002
OR: Portland	9	0.003	0.001	0.002
PA: Bloomsburg	2	0.004	0.003	0.003
PA: Philadelphia	4	0.010	0.005	0.008
PA: Pittsburgh	5	0.009	0.004	0.006
PR: San Juan	8	0.009	0.005	0.008
RI: Providence	2	0.006	0.005	0.005
SC: Columbia	7	0.011	0.003	0.007
SD: Pierre	9	0.019	0.006	0.011
SD: Rapid City	7	0.012	0.007	0.009
TN: Knoxville	4	0.011	0.006	0.008
TN: Memphis	7	0.010	0.006	0.007
TN: Nashville	7	0.007	0.004	0.006
TN: Oak Ridge/Bethel	8	0.011	0.004	0.007
TN: Oak Ridge/K25	8	0.011	0.005	0.008
TN: Oak Ridge/Melton	8	0.007	0.003	0.005
TN: Oak Ridge/Y12 E	8	0.009	0.004	0.007
TN: Oak Ridge/Y12 W	8	0.010	0.004	0.007
TX: Amarillo	7	0.019	0.007	0.012
TX: Austin	4	0.014	0.007	0.011
TX: Dallas	4	0.012	0.007	0.010
TX: El Paso	8	0.022	0.008	0.013
TX: Ft. Worth	4	0.010	0.005	0.008
TX: Harlingen	5	0.016	0.004	0.008
TX: Houston	9	0.017	0.004	0.008
TX: Laredo	2	0.007	0.006	0.006

Table 2 (continued)
Gross Beta in Airborne Particulates
July 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
TX: Lubbock	7	0.003	0.001	0.002
TX: San Angelo	4	0.013	0.003	0.007
TX: San Antonio	8	0.015	0.005	0.008
UT: Salt Lake City	8	0.012	0.007	0.009
UT: St. George	5	0.012	0.008	0.010
VA: Harrisonburg	8	0.011	0.005	0.008
VA: Lynchburg	8	0.010	0.003	0.007
VA: Richmond	7	0.012	0.005	0.007
VA: Virginia Beach	8	0.007	0.003	0.005
VT: Burlington	9	0.007	0.002	0.005
WA: Olympia	8	0.002	0.001	0.002
WA: Richland	7	0.006	0.004	0.005
WA: Spokane	7	0.008	0.004	0.006
WI: Madison	7	0.016	0.003	0.008
WI: Milwaukee	5	0.006	0.002	0.004
WI: Shawano	9	0.013	0.003	0.006
WV: Charleston	6	0.012	0.004	0.008

Table 3
Gross Beta in Airborne Particulates
August 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
AK: Anchorage	4	0.003	0.001	0.002
AK: Fairbanks	8	0.006	0.002	0.004
AK: Juneau	5	0.003	0.001	0.001
AL: Birmingham	7	0.017	0.004	0.009
AL: Montgomery/408	8	0.014	0.003	0.007
AR: Fort Smith	2	0.017	0.009	0.013
AR: Little Rock	9	0.017	0.006	0.011
AZ: Phoenix/956	7	0.013	0.007	0.010
AZ: Tucson	9	0.014	0.005	0.010
CA: Anaheim	7	0.013	0.004	0.006
CA: Bakersfield	2	0.009	0.005	0.007
CA: Eureka	4	0.002	0.001	0.001
CA: Fresno	3	0.008	0.007	0.007
CA: Los Angeles	5	0.018	0.005	0.009
CA: Richmond	4	0.003	0.002	0.003
CA: Riverside	7	0.013	0.006	0.010
CA: Sacramento	7	0.006	0.002	0.004
CA: San Bernardino Cty.	4	0.011	0.009	0.011
CA: San Diego	4	0.008	0.006	0.007
CA: San Francisco	8	0.002	0.000	0.001
CA: San Jose	9	0.005	0.002	0.003
CO: Colorado Springs	4	0.018	0.010	0.013
CO: Denver	9	0.022	0.011	0.014
CO: Grand Junction	4	0.010	0.007	0.008
CT: Hartford	9	0.009	0.003	0.006
DC: Washington	9	0.017	0.005	0.009
DE: Dover	4	0.021	0.004	0.009
FL: Jacksonville	7	0.006	0.002	0.004
FL: Miami	1	0.006	0.006	0.006
FL: Orlando	9	0.011	0.003	0.005
FL: Tallahassee	3	0.009	0.004	0.006
GA: Atlanta	5	0.015	0.004	0.010
GA: Augusta	5	0.010	0.003	0.006
HI: Honolulu	9	0.003	0.002	0.002
IA: Des Moines	9	0.024	0.008	0.013
IA: Mason City	6	0.016	0.006	0.011
ID: Boise	5	0.017	0.012	0.014
ID: Idaho Falls	7	0.013	0.007	0.011

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
IL: Aurora	6	0.019	0.007	0.012
IL: Champaign	9	0.011	0.005	0.007
IL: Chicago	9	0.019	0.003	0.011
IN: Fort Wayne	4	0.018	0.009	0.012
IN: Indianapolis	9	0.018	0.005	0.011
KS: Kansas City	8	0.023	0.010	0.014
KS: Wichita	8	0.019	0.005	0.012
KY: Lexington	7	0.022	0.009	0.014
KY: Louisville	4	0.015	0.007	0.012
LA: Baton Rouge	7	0.017	0.003	0.009
LA: Shreveport	7	0.018	0.003	0.009
MA: Boston	9	0.010	0.003	0.005
MA: Worcester	9	0.021	0.005	0.009
MD: Baltimore	5	0.009	0.007	0.008
ME: Orono	3	0.012	0.005	0.008
ME: Portland	8	0.011	0.002	0.006
MI: Bay City 48708	9	0.015	0.004	0.007
MI: Detroit	7	0.018	0.003	0.009
MI: Grand Rapids	5	0.013	0.005	0.009
MN: Duluth	8	0.012	0.003	0.007
MN: St. Paul	4	0.014	0.004	0.008
MO: Jefferson City	9	0.027	0.008	0.013
MO: Springfield	8	0.019	0.007	0.012
MO: St. Louis	3	0.015	0.009	0.012
MS: Jackson/Deq	4	0.019	0.005	0.010
MT: Billings	5	0.015	0.010	0.012
NC: Charlotte	9	0.017	0.003	0.008
NC: Greensboro	2	0.012	0.008	0.010
NC: Wilmington	4	0.006	0.003	0.005
ND: Bismarck	5	0.020	0.008	0.012
NE: Kearney	5	0.016	0.009	0.012
NE: Lincoln	9	0.011	0.007	0.009
NE: Omaha	4	0.023	0.012	0.016
NH: Concord	8	0.028	0.007	0.013
NJ: Edison	7	0.006	0.003	0.005
NM: Albuquerque	5	0.018	0.008	0.012
NM: Carlsbad	7	0.014	0.005	0.009
NM: Navajo Lake St Park	3	0.012	0.006	0.010

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
NV: Las Vegas/913	8	0.007	0.005	0.006
NV: Reno	6	0.014	0.009	0.012
NY: Albany	8	0.021	0.005	0.010
NY: Lockport	7	0.016	0.003	0.008
NY: New York City	5	0.006	0.004	0.005
NY: Rochester	7	0.021	0.004	0.009
NY: Syracuse	3	0.012	0.005	0.007
NY: Yaphank	7	0.007	0.003	0.004
OH: Cincinnati	9	0.017	0.004	0.010
OH: Cleveland	9	0.014	0.005	0.008
OH: Painesville	7	0.016	0.005	0.009
OH: Toledo	8	0.015	0.004	0.007
OK: Oklahoma City	9	0.020	0.010	0.014
OK: Tulsa	9	0.015	0.007	0.011
OR: Corvallis	9	0.004	0.002	0.003
OR: Portland	6	0.003	0.002	0.003
PA: Bloomsburg	8	0.011	0.003	0.006
PA: Philadelphia	4	0.011	0.006	0.009
PA: Pittsburgh	4	0.017	0.008	0.011
PR: San Juan	9	0.010	0.003	0.006
RI: Providence	4	0.007	0.003	0.005
SC: Columbia	8	0.016	0.004	0.010
SD: Pierre	8	0.018	0.011	0.015
SD: Rapid City	6	0.016	0.012	0.014
TN: Knoxville	6	0.028	0.010	0.015
TN: Memphis	7	0.017	0.008	0.011
TN: Nashville	7	0.014	0.007	0.009
TN: Oak Ridge/Bethel	9	0.019	0.005	0.011
TN: Oak Ridge/K25	9	0.019	0.006	0.011
TN: Oak Ridge/Melton	9	0.015	0.006	0.009
TN: Oak Ridge/Y12 E	9	0.019	0.006	0.011
TN: Oak Ridge/Y12 W	9	0.017	0.006	0.011
TX: Amarillo	9	0.031	0.009	0.016
TX: Austin	4	0.012	0.007	0.009
TX: Dallas	9	0.020	0.006	0.013
TX: El Paso	7	0.018	0.006	0.013
TX: Ft. Worth	5	0.016	0.007	0.010
TX: Harlingen	2	0.013	0.006	0.010

Table 3 (continued)
Gross Beta in Airborne Particulates
August 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
TX: Houston	8	0.017	0.003	0.008
TX: Lubbock	6	0.002	0.001	0.001
TX: San Angelo	2	0.008	0.004	0.006
TX: San Antonio	9	0.016	0.003	0.009
UT: Salt Lake City	9	0.012	0.005	0.008
UT: St. George	4	0.009	0.006	0.008
VA: Harrisonburg	8	0.016	0.006	0.010
VA: Lynchburg	7	0.020	0.005	0.011
VA: Richmond	9	0.019	0.004	0.009
VA: Virginia Beach	4	0.006	0.005	0.006
VT: Burlington	9	0.010	0.002	0.005
WA: Olympia	9	0.004	0.002	0.002
WA: Richland	8	0.009	0.003	0.006
WA: Seattle	2	0.003	0.002	0.002
WA: Spokane	7	0.013	0.006	0.009
WI: Lacrosse	4	0.015	0.006	0.008
WI: Madison	9	0.017	0.008	0.011
WI: Milwaukee	3	0.014	0.003	0.008
WI: Shawano	9	0.016	0.003	0.007
WV: Charleston	6	0.012	0.009	0.010

Table 4
Gross Beta in Airborne Particulates
September 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
AK: Anchorage	7	0.004	0.001	0.002
AK: Fairbanks	7	0.004	0.001	0.002
AK: Juneau	6	0.003	0.001	0.001
AL: Birmingham	9	0.020	0.008	0.014
AL: Montgomery/408	8	0.029	0.006	0.014
AR: Fort Smith	4	0.018	0.013	0.015
AR: Little Rock	8	0.023	0.007	0.015
AZ: Phoenix/956	7	0.013	0.003	0.008
AZ: Tucson	8	0.009	0.004	0.007
CA: Anaheim	8	0.009	0.002	0.005
CA: Bakersfield	1	0.011	0.011	0.011
CA: Eureka	4	0.003	0.002	0.002
CA: Fresno	1	0.005	0.005	0.005
CA: Los Angeles	5	0.012	0.005	0.008
CA: Richmond	4	0.005	0.002	0.004
CA: Riverside	8	0.014	0.005	0.009
CA: Sacramento	9	0.006	0.002	0.004
CA: San Bernardino Cty.	4	0.020	0.007	0.014
CA: San Diego	4	0.010	0.005	0.007
CA: San Francisco	8	0.003	0.001	0.002
CA: San Jose	8	0.006	0.002	0.004
CO: Colorado Springs	3	0.013	0.008	0.010
CO: Denver	6	0.017	0.007	0.011
CO: Grand Junction	5	0.011	0.006	0.007
CT: Hartford	7	0.016	0.003	0.006
DC: Washington	8	0.021	0.004	0.008
DE: Dover	4	0.009	0.003	0.007
FL: Jacksonville	6	0.015	0.007	0.010
FL: Miami	3	0.007	0.004	0.006
FL: Orlando	3	0.004	0.003	0.004
FL: Tallahassee	3	0.012	0.003	0.007
FL: Tampa	1	0.003	0.003	0.003
GA: Atlanta	4	0.016	0.009	0.012
GA: Augusta	4	0.011	0.005	0.009
HI: Honolulu	8	0.003	0.001	0.002
IA: Des Moines	8	0.020	0.005	0.012
IA: Mason City	4	0.012	0.005	0.008
ID: Boise	3	0.008	0.004	0.006

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2013

Location	Number of Samples	NAREL Lab Measurement Max	Min	Avg
		(pCi/m³)		
ID: Idaho Falls	8	0.011	0.005	0.009
IL: Aurora	7	0.013	0.005	0.010
IL: Champaign	9	0.014	0.005	0.008
IL: Chicago	7	0.021	0.006	0.010
IN: Fort Wayne	5	0.020	0.008	0.014
IN: Indianapolis	9	0.023	0.006	0.012
KS: Kansas City	6	0.021	0.008	0.015
KS: Wichita	8	0.019	0.008	0.013
KY: Lexington	7	0.030	0.010	0.018
KY: Louisville	4	0.013	0.011	0.012
LA: Baton Rouge	6	0.014	0.003	0.009
LA: Shreveport	4	0.011	0.008	0.009
MA: Boston	9	0.014	0.001	0.005
MA: Worcester	9	0.016	0.003	0.007
MD: Baltimore	8	0.021	0.004	0.009
ME: Orono	3	0.009	0.005	0.007
ME: Portland	8	0.011	0.001	0.005
MI: Bay City 48708	8	0.012	0.003	0.006
MI: Detroit	6	0.017	0.005	0.010
MI: Grand Rapids	4	0.014	0.005	0.008
MN: Duluth	6	0.009	0.004	0.007
MN: St. Paul	4	0.012	0.005	0.008
MO: Jefferson City	9	0.018	0.007	0.012
MO: Springfield	8	0.019	0.006	0.013
MO: St. Louis	4	0.015	0.010	0.012
MS: Jackson/Deq	5	0.021	0.009	0.015
MT: Billings	4	0.011	0.006	0.009
NC: Charlotte	8	0.018	0.007	0.011
NC: Greensboro	1	0.009	0.009	0.009
NC: Wilmington	4	0.009	0.004	0.007
ND: Bismarck	8	0.014	0.005	0.010
NE: Kearney	7	0.015	0.007	0.010
NE: Lincoln	9	0.015	0.005	0.008
NE: Omaha	4	0.022	0.007	0.012
NH: Concord	6	0.021	0.001	0.007
NJ: Edison	7	0.019	0.003	0.008
NM: Albuquerque	4	0.014	0.008	0.010
NM: Carlsbad	4	0.012	0.007	0.009

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
NM: Navajo Lake St Park	4	0.010	0.007	0.008
NV: Las Vegas/913	8	0.008	0.003	0.006
NV: Reno	7	0.015	0.007	0.011
NY: Albany	8	0.020	0.003	0.008
NY: Lockport	9	0.018	0.003	0.007
NY: New York City	3	0.008	0.003	0.005
NY: Rochester	8	0.014	0.003	0.006
NY: Syracuse	2	0.005	0.004	0.005
NY: Yaphank	7	0.011	0.001	0.004
OH: Cincinnati	6	0.017	0.007	0.012
OH: Cleveland	8	0.016	0.003	0.008
OH: Painesville	6	0.014	0.005	0.010
OH: Toledo	9	0.015	0.003	0.007
OK: Oklahoma City	7	0.023	0.009	0.015
OK: Tulsa	8	0.016	0.008	0.012
OR: Corvallis	9	0.005	0.002	0.003
OR: Portland	8	0.004	0.001	0.003
PA: Bloomsburg	8	0.009	0.003	0.005
PA: Philadelphia	4	0.015	0.004	0.010
PA: Pittsburgh	5	0.015	0.007	0.010
PR: San Juan	9	0.009	0.002	0.005
RI: Providence	4	0.009	0.002	0.005
SC: Columbia	7	0.019	0.005	0.013
SD: Pierre	7	0.026	0.008	0.012
SD: Rapid City	6	0.014	0.006	0.010
TN: Knoxville	5	0.025	0.012	0.018
TN: Memphis	7	0.024	0.008	0.014
TN: Nashville	5	0.019	0.006	0.012
TN: Oak Ridge/Bethel	8	0.031	0.012	0.016
TN: Oak Ridge/K25	8	0.029	0.013	0.017
TN: Oak Ridge/Melton	8	0.024	0.009	0.014
TN: Oak Ridge/Y12 E	8	0.029	0.011	0.016
TN: Oak Ridge/Y12 W	8	0.026	0.011	0.016
TX: Amarillo	8	0.021	0.008	0.014
TX: Austin	5	0.011	0.005	0.008
TX: Dallas	5	0.021	0.010	0.014
TX: El Paso	9	0.015	0.005	0.012
TX: Ft. Worth	5	0.017	0.007	0.011

Table 4 (continued)
Gross Beta in Airborne Particulates
September 2013

Location	Number of Samples	NAREL Lab Measurement Max (pCi/m³)	Min (pCi/m³)	Avg (pCi/m³)
TX: Harlingen	2	0.008	0.007	0.008
TX: Houston	8	0.011	0.004	0.008
TX: Lubbock	5	0.002	0.001	0.001
TX: San Angelo	3	0.011	0.008	0.009
TX: San Antonio	8	0.009	0.003	0.006
UT: Salt Lake City	9	0.010	0.004	0.007
UT: St. George	4	0.012	0.006	0.010
VA: Harrisonburg	8	0.023	0.005	0.011
VA: Lynchburg	6	0.014	0.005	0.011
VA: Richmond	8	0.018	0.004	0.009
VA: Virginia Beach	2	0.006	0.003	0.005
VT: Burlington	5	0.007	0.002	0.004
WA: Olympia	6	0.005	0.001	0.003
WA: Richland	9	0.012	0.002	0.005
WA: Seattle	4	0.004	0.002	0.003
WA: Spokane	7	0.013	0.003	0.007
WI: Lacrosse	4	0.011	0.006	0.008
WI: Madison	8	0.016	0.004	0.008
WI: Milwaukee	4	0.005	0.003	0.004
WI: Shawano	9	0.012	0.003	0.007
WV: Charleston	6	0.017	0.005	0.013

Table 5
Specific Gamma in Precipitation
July 2013

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408		ND	
CA: Richmond	Cs-137	2.1	1.9
CO: Denver	Be-7	26	17
CT: Hartford	Be-7	34	17
FL: Jacksonville	Be-7	40	17
GA: Atlanta	Be-7	38	19
MA: Boston	Be-7	99	19
MI: Lansing	Be-7	52	20
MN: St. Paul	Be-7	9.6	9.2
MN: Welch/510	Be-7	17	13
NC: Charlotte	Be-7	27	11
NC: Wilmington	Be-7	12.6	8.2
NH: Concord	Be-7	26	15
NY: Albany	Be-7	18	15
NY: Yaphank		ND	
OH: Painesville	Be-7	45	14
PA: Harrisburg	Be-7	45	10
TN: Nashville	Be-7	47	20
TN: Oak Ridge/K25	Be-7	90	24
TN: Oak Ridge/Melton	Be-7	61	17
TN: Oak Ridge/Y12 E	Be-7	81	21
	Cs-137	0.81	0.78
TX: Austin		ND	
TX: El Paso		ND	
UT: Salt Lake City		ND	
VA: Lynchburg		ND	
WA: Olympia		ND	

Table 6
Specific Gamma in Precipitation
August 2013

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408	K-40	15	11
AR: Little Rock	K-40	15	13
CO: Denver	Be-7	23	21
CT: Hartford	Be-7	51	23
FL: Jacksonville	Be-7	33	13
GA: Atlanta	Be-7	63	23
	K-40	16	12
HI: Honolulu	K-40	17	13
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MA: Boston	Be-7	30	19
MI: Lansing	Be-7	34	20
	K-40	14	12
MN: St. Paul	K-40	17	12
MN: Welch/510	K-40	20	13
NC: Charlotte	Be-7	19	14
NC: Wilmington		ND	
NY: Albany		ND	
OH: Painesville	Be-7	38	23
	K-40	14	10
PA: Harrisburg		ND	
TN: Nashville	Be-7	24	20
	K-40	13	11
TN: Oak Ridge/K25	Be-7	74	25
TN: Oak Ridge/Melton	Be-7	37	23
TN: Oak Ridge/Y12 E	Be-7	53	23
VA: Lynchburg		ND	
WA: Olympia	Be-7	22	21

Table 7
Specific Gamma in Precipitation
September 2013

Location	Nuclide	pCi/L ± 2*u*	
AL: Montgomery/408		ND	
CA: Richmond		ND	
CO: Denver	Be-7	18	12
CT: Hartford	Be-7	36	13
FL: Jacksonville	Be-7	46	15
GA: Atlanta		ND	
HI: Honolulu	Be-7	14	12
ID: Idaho Falls		ND	
KS: Kansas City		ND	
MA: Boston	Be-7	73	22
MI: Lansing	Be-7	25	19
MN: St. Paul		ND	
MN: Welch/510		ND	
NC: Charlotte		ND	
NC: Wilmington		ND	
NY: Albany	Be-7	20	20
OR: Portland	Ra-228	4.7	4.3
PA: Harrisburg	Be-7	40	22
TN: Knoxville		ND	
TN: Nashville	K-40	14	11
TN: Oak Ridge/K25	Be-7	42	21
TN: Oak Ridge/Melton	Be-7	44	19
TN: Oak Ridge/Y12 E	Be-7	23	12
TX: Austin		ND	
TX: El Paso		ND	
UT: Salt Lake City	Be-7	30	16
VA: Lynchburg		ND	
WA: Olympia	Be-7	22	20

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 2012 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*
AK: Anchorage	0.1	2.2	0.4	1.3	8.9	4.3	0.9	1.9	11.1	4.9
AK: Fairbanks	−0.2	1.2	0.10	0.88	7.2	3.0	0.32	0.93	7.1	3.0
AK: Juneau	−0.04	0.42	0.09	0.39	1.36	0.73	0.10	0.30	1.05	0.66
AL: Birmingham	0.1	1.2	0.11	0.97	16.8	5.8	0.8	2.7	15.5	5.3
AL: Montgomery/408	−0.3	1.0	0.17	0.74	8.9	3.4	0.7	1.2	10.2	3.7
AR: Fort Smith	0.74	0.80	0.05	0.49	17.1	4.9	1.3	1.4	15.0	4.5
AR: Little Rock	−0.24	0.38	0.05	0.44	16.9	4.3	1.9	1.6	13.9	3.9
AZ: Phoenix	1.4	5.0	−1.0	2.5	38	13	1.7	3.7	45	14
AZ: Phoenix/956	−0.4	3.5	−0.4	2.4	42	14	1.9	4.0	53	16
AZ: Tucson	−0.5	1.2	0.0	1.5	51	13	4.6	3.8	41	11
AZ: Yuma	0.4	5.0	−1.7	3.3	70	23	5.6	7.6	89	27
CA: Anaheim	0.2	2.3	0.3	1.5	26.1	7.7	1.1	1.9	24.3	7.4
CA: Bakersfield	0.0	2.1	−0.3	1.1	88	18	2.9	2.9	78	16
CA: Eureka	−0.38	0.71	0.10	0.87	3.1	1.8	0.9	1.3	3.6	2.0
CA: Fresno	1.3	1.6	−0.10	0.93	48	10	2.6	2.3	43.6	9.6
CA: Los Angeles	−0.2	1.7	0.9	1.9	17.7	5.9	2.4	2.4	18.0	6.0
CA: Richmond	0.24	0.53	0.44	0.60	5.8	2.1	0.76	0.87	4.1	1.7
CA: Riverside	0.5	1.3	−0.35	0.66	35.8	8.1	0.6	1.3	26.4	6.7
CA: Sacramento	0.47	0.96	−0.07	0.44	13.5	3.7	1.8	1.4	11.0	3.3
CA: San Bernardino Cty.	1.2	3.3	0.0	1.9	42	14	0.8	3.4	31	12
CA: San Diego	0.12	0.87	0.06	0.53	15.8	4.0	1.4	1.3	14.1	3.8
CA: San Francisco	0.7	1.1	−0.29	0.54	4.3	1.8	0.60	0.82	5.8	2.1
CA: San Jose	−0.05	0.51	0.00	0.34	9.8	3.1	0.00	0.51	9.3	3.0
CO: Colorado Springs	−2.6	3.0	0.5	2.4	37	12	1.6	3.4	39	12
CO: Denver	−0.3	1.3	1.1	1.7	20.1	6.0	0.3	1.3	26.0	7.0
CO: Grand Junction	0.4	2.3	−0.2	1.4	34	10	0.5	2.2	34	10
CT: Hartford	−0.35	0.65	−0.20	0.38	8.3	2.4	0.70	0.76	6.4	2.0
DC: Washington	0.00	0.56	0.14	0.53	5.5	2.1	0.96	0.96	9.1	2.7
DE: Dover	−0.05	0.33	−0.10	0.34	5.6	2.2	0.15	0.66	5.7	2.3
FL: Jacksonville	0.26	0.72	0.26	0.72	10.6	3.5	0.7	1.1	7.6	2.9
FL: Miami	−0.1	1.1	−0.11	0.75	12.7	4.9	0.9	1.9	16.7	5.6
FL: Orlando	−0.09	0.60	0.54	0.95	9.2	3.2	0.45	0.97	8.6	3.1
FL: Tallahassee	−0.28	0.50	−0.14	0.34	10.2	3.0	1.7	1.3	11.5	3.3
FL: Tampa	−0.82	0.97	0.1	1.4	38.5	9.2	2.3	2.3	38.7	9.2
GA: Atlanta	0.39	0.84	0.00	0.73	11.8	3.6	0.8	1.2	10.5	3.3
GA: Augusta	−0.37	0.58	0.8	1.0	15.7	4.7	3.1	2.2	14.9	4.5
HI: Hilo	0.5	1.1	−0.17	0.60	1.2	1.2	0.16	0.71	1.6	1.3
HI: Honolulu	−0.27	0.66	0.4	1.0	2.9	1.7	0.00	0.81	1.7	1.3
IA: Des Moines	0.3	1.1	0.49	0.87	26.0	7.1	3.4	2.6	21.3	6.3
IA: Mason City	−0.6	1.1	−0.6	1.1	21.3	6.8	2.1	2.4	18.8	6.4

Note: NA = No Analysis

Table 8 (continued)
Plutonium and Uranium in Airborne Particulates
January–December 2012 Composites

Location	^{238}Pu		$^{239–240}$Pu		^{234}U		^{235}U		^{238}U	
	aCi/m³	± 2*u*	aCi/m³	± 2*u*	aCi/m³	± 2*u*	aCi/m³	± 2*u*	aCi/m³	± 2*u*
ID: Boise	−0.10	0.50	0.10	0.45	8.8	2.4	0.71	0.76	5.9	1.9
ID: Idaho Falls	−1.0	2.1	0.6	1.8	27.8	9.4	3.6	3.9	26.6	9.2
IL: Aurora	−0.4	1.5	−0.4	1.1	14.1	6.4	1.8	2.8	17.0	6.8
IL: Champaign	−0.2	1.1	−0.19	0.65	10.1	3.6	0.7	1.4	11.4	3.8
IL: Chicago	0.0	1.6	0.0	1.3	11.8	5.7	4.4	4.0	17.6	6.8
IN: Fort Wayne	−0.48	0.75	−0.39	0.72	16.0	5.4	0.4	1.3	18.0	5.7
IN: Indianapolis	0.09	0.87	−0.19	0.66	13.7	4.8	2.4	2.3	8.3	3.7
KS: Kansas City	1.3	1.2	0.07	0.80	27.4	7.2	3.4	2.7	24.0	6.7
KS: Topeka	−0.5	1.2	−0.2	1.1	26.9	7.8	3.7	3.3	23.8	7.3
KS: Wichita	1.2	1.4	0.8	1.1	39	10	5.6	4.0	31.4	9.0
KY: Lexington	0.08	0.71	−0.08	0.52	16.3	5.0	0.1	1.1	11.4	4.1
KY: Louisville	0.27	0.74	0.47	0.84	11.9	3.6	−0.08	0.79	9.8	3.2
LA: Baton Rouge	0.2	1.5	0.0	1.0	26.1	8.5	1.5	2.7	19.6	7.2
LA: Shreveport	−0.20	0.96	0.5	1.1	11.6	4.2	2.1	2.0	9.1	3.7
MA: Boston	0.00	0.41	0.14	0.38	7.1	2.1	1.04	0.90	6.9	2.0
MA: Worcester	0.2	1.2	0.11	0.97	31.3	8.2	2.7	2.9	28.2	7.6
MD: Baltimore	0.73	0.71	0.24	0.43	7.1	2.2	0.33	0.58	5.8	2.0
ME: Orono	0.29	0.69	0.05	0.44	7.2	2.4	1.7	1.3	7.7	2.5
ME: Portland	0.1	1.2	−0.09	0.87	38.9	8.7	2.6	2.2	32.2	7.7
MI: Bay City 48708	−0.65	0.77	−0.19	0.64	12.0	3.7	0.09	0.85	12.0	3.7
MI: Detroit	−0.4	1.0	0.00	0.64	18.2	5.5	0.3	1.2	14.1	4.8
MI: Grand Rapids	0.00	0.85	−0.07	0.48	8.6	3.1	0.7	1.2	8.3	3.1
MI: Lansing	0.5	1.8	−0.36	0.86	13.9	5.2	1.6	2.3	14.8	5.0
MN: Duluth	0.29	0.69	−0.05	0.32	4.4	1.8	0.00	0.56	2.9	1.5
MN: St. Paul	0.1	1.5	−0.11	0.76	13.0	4.9	0.3	1.4	11.0	4.5
MO: Jefferson City	−0.2	1.3	−0.26	0.63	11.0	3.8	1.5	1.7	12.7	4.1
MO: Springfield	0.7	2.2	0.6	1.3	14.6	4.7	0.6	1.3	13.9	4.6
MO: St. Louis	0.34	0.77	0.15	0.54	16.2	4.2	2.2	1.6	14.5	3.9
MS: Jackson/Deq	0.5	1.2	−0.46	0.72	19.5	6.0	0.7	1.5	23.5	6.6
MT: Billings	−1.3	2.5	2.3	4.1	48	15	3.5	4.8	36	13
NC: Charlotte	−0.15	0.54	−0.15	0.54	10.8	3.5	0.9	1.3	8.9	3.2
NC: Raleigh	−0.20	0.51	−0.25	0.39	8.2	2.6	1.3	1.2	10.0	2.9
NC: Wilmington	0.19	0.62	0.05	0.43	6.1	2.2	−0.23	0.71	5.8	2.1
ND: Bismarck	1.7	2.6	0.0	2.0	19.9	7.7	2.0	3.1	24.9	8.7
NE: Kearney	−0.2	2.5	−0.8	1.6	21.0	7.3	1.7	2.7	28.4	8.7
NE: Lincoln	−1.1	1.6	−0.4	1.5	30	10	2.6	3.5	29	10
NE: Omaha	−0.45	0.93	0.45	0.97	24.5	6.9	2.0	2.2	28.8	7.6
NH: Concord	0.12	0.45	0.03	0.28	7.8	1.9	0.47	0.50	9.5	2.2
NJ: Edison	0.19	0.49	−0.04	0.25	7.3	2.2	0.73	0.88	6.4	2.0
NJ: Trenton	−0.16	0.54	0.16	0.47	9.8	2.9	2.2	1.4	8.1	2.6

Note: NA = No Analysis

Table 8 (continued)
Plutonium and Uranium in Airborne Particulates
January–December 2012 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*
NM: Albuquerque	−0.5	1.6	0.2	1.5	29.0	8.8	1.3	2.3	23.3	7.8
NM: Carlsbad	−1.3	1.3	0.1	1.3	34	10	3.6	3.8	20.2	7.5
NM: Navajo Lake/St Park	−0.13	0.76	0.13	0.57	19.3	5.4	1.0	1.4	17.6	5.1
NV: Las Vegas/913	0.5	1.4	0.34	0.93	31.1	7.2	2.5	2.1	29.5	7.0
NV: Reno	−0.5	1.3	0.0	1.1	23.2	6.9	1.8	2.3	18.4	6.1
NY: Albany	0.5	1.2	0.15	0.67	14.0	4.0	0.7	1.0	10.7	3.4
NY: Lockport	0.33	0.59	0.66	0.68	5.6	1.7	0.59	0.64	7.5	2.1
NY: New York City	0.57	0.73	0.24	0.51	10.1	2.9	1.3	1.1	10.5	3.0
NY: Rochester	0.00	0.46	0.00	0.32	6.1	2.0	1.23	0.95	7.8	2.3
NY: Syracuse	0.00	0.40	0.10	0.30	7.8	2.2	1.22	0.93	10.1	2.6
NY: Yaphank	0.22	0.60	0.19	0.40	6.9	2.1	1.5	1.0	5.5	1.8
OH: Cincinnati	−0.27	0.65	−0.36	0.68	10.8	3.6	1.3	1.5	9.7	3.3
OH: Cleveland	0.4	2.1	−0.14	0.93	13.8	5.2	0.7	1.8	15.2	5.4
OH: Painesville	0.42	0.89	0.21	0.61	8.1	3.0	0.34	0.95	9.6	3.2
OH: Toledo	−0.1	1.6	0.1	1.1	11.7	4.5	0.7	1.5	9.6	4.0
OK: Oklahoma City	0.2	1.5	−0.41	0.76	21.9	6.6	1.7	2.1	24.1	7.1
OK: Tulsa	1.0	2.2	1.0	1.8	23.7	8.2	0.7	2.0	22.5	7.9
OR: Corvallis	0.00	0.88	−0.15	0.74	4.3	1.8	0.06	0.59	5.6	2.1
OR: Portland	−0.45	0.69	−0.09	0.59	6.0	2.3	0.30	0.82	5.3	2.1
PA: Bloomsburg	0.38	0.66	0.31	0.68	8.4	2.9	0.24	0.71	9.0	3.0
PA: Harrisburg	−0.13	0.52	0.13	0.37	3.5	1.4	0.72	0.74	3.8	1.4
PA: Philadelphia	0.00	0.73	0.19	0.69	11.3	3.7	0.28	0.82	8.1	3.1
PA: Pittsburgh	−0.28	0.52	−0.07	0.46	13.4	4.5	1.1	1.5	16.1	5.1
PR: San Juan	1.4	1.8	0.00	0.60	21.0	5.8	0.6	1.5	19.8	5.6
RI: Providence	−0.15	0.28	0.11	0.32	8.0	2.3	1.6	1.1	7.5	2.2
SC: Barnwell	−0.15	0.31	0.09	0.34	5.2	1.7	0.39	0.67	5.3	1.6
SC: Columbia	0.26	0.72	0.00	0.62	14.6	4.0	1.4	1.3	12.6	3.6
SD: Pierre	0.4	2.4	−0.6	1.6	27.7	9.9	4.0	4.4	33	11
SD: Rapid City	2.1	3.7	0.7	2.1	26	10	−0.6	2.1	32	11
TN: Knoxville	−0.29	0.70	0.10	0.88	11.3	3.9	0.9	1.4	8.0	3.2
TN: Memphis	−0.41	0.76	−0.2	1.0	16.5	6.1	2.0	2.5	21.8	7.1
TN: Nashville	0.4	1.2	0.00	0.89	15.7	4.6	−0.22	0.75	7.6	3.1
TN: Oak Ridge/Bethel	−0.21	0.54	−0.16	0.38	12.2	4.1	−0.11	0.72	6.8	2.9
TN: Oak Ridge/K25	0.35	0.63	0.13	0.39	22.5	5.1	2.0	1.5	5.1	2.1
TN: Oak Ridge/Melton	0.15	0.57	0.31	0.54	6.8	2.3	0.62	0.87	4.8	1.9
TN: Oak Ridge/Y12 E	0.17	0.64	0.00	0.36	25.5	5.8	0.50	0.88	5.9	2.4
TN: Oak Ridge/Y12 W	0.42	0.65	0.11	0.47	48.1	9.3	4.3	2.3	9.8	3.2
TX: Austin	0.7	1.1	0.28	0.76	17.3	4.7	2.5	1.9	13.6	4.0
TX: Dallas	0.6	1.1	0.07	0.65	13.3	4.7	4.1	2.9	17.8	5.4
TX: El Paso	0.0	1.9	−0.4	1.4	69	18	3.2	4.5	43	14

Note: NA = No Analysis

Table 8 (continued)
Plutonium and Uranium in Airborne Particulates
January–December 2012 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*
TX: Ft. Worth	0.3	1.0	0.6	1.1	22.3	6.7	1.9	2.2	22.9	6.8
TX: Harlingen	0.44	0.93	0.07	0.67	20.8	5.8	2.1	2.0	14.6	4.7
TX: Houston	0.31	0.67	−0.12	0.43	14.1	4.3	2.1	1.8	20.5	5.4
TX: Laredo	−0.13	0.77	−0.19	0.47	11.7	3.6	1.0	1.2	12.8	3.8
TX: Lubbock	0.4	1.7	0.1	1.2	40.0	9.6	2.7	2.6	30.1	8.1
TX: San Angelo	0.8	1.2	−0.44	0.68	26.0	7.0	1.3	2.0	22.6	6.6
TX: San Antonio	−0.43	0.58	0.29	0.79	19.5	5.5	3.2	2.3	13.5	4.4
UT: Salt Lake City	0.4	1.8	2.0	3.1	28.5	8.9	2.0	2.8	31.9	9.6
UT: St. George	−0.5	1.7	0.7	1.9	23.1	7.9	0.4	2.0	25.6	8.3
VA: Harrisonburg	0.06	0.54	−0.12	0.41	6.1	2.5	0.27	0.79	6.7	2.7
VA: Lynchburg	−0.31	0.64	0.24	0.79	13.8	3.8	1.0	1.1	5.7	2.4
VA: Richmond	0.21	0.60	0.41	0.73	11.9	3.5	0.33	0.90	10.1	3.2
VA: Virginia Beach	−0.13	0.46	0.46	0.83	10.3	3.2	1.7	1.5	8.8	2.8
VT: Burlington	−0.17	0.40	−0.06	0.37	5.4	2.0	0.55	0.76	6.2	2.2
WA: Olympia	−0.19	0.47	0.39	0.69	2.7	1.4	0.11	0.51	1.7	1.1
WA: Richland	−0.3	1.2	0.3	1.1	14.4	5.1	1.7	2.1	14.2	5.2
WA: Seattle	0.14	0.70	0.00	0.30	3.1	1.2	−0.08	0.28	1.40	0.83
WA: Spokane	0.3	1.0	0.14	0.78	9.5	3.3	2.8	1.9	12.2	3.8
WI: Madison	−1.3	1.6	−0.6	1.4	25.5	9.9	1.9	4.3	28.0	9.9
WI: Milwaukee	0.7	1.6	0.31	0.89	12.0	4.1	0.7	1.2	8.7	3.4
WI: Shawano	0.37	0.77	−0.24	0.46	6.5	2.2	0.36	0.83	4.0	1.7
WV: Charleston	−0.46	0.82	0.00	0.49	11.8	3.8	1.1	1.3	9.5	3.4

Note: NA = No Analysis

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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 9
Tritium in Drinking Water
July–September 2013

Location	Date Collected	^{3}H pCi/L	± 2*u*
AK: Fairbanks	07/30/13	0	81
AL: Dothan	07/09/13	21	83
AL: Montgomery	07/08/13	23	84
AL: Muscle Shoals	07/02/13	30	80
AL: Scottsboro	07/01/13	4	79
AR: Little Rock	07/02/13	−39	77
CO: Denver	07/08/13	27	84
CT: Hartford	07/02/13	50	85
DE: Dover	08/01/13	−47	79
FL: Tampa	07/11/13	−17	82
GA: Baxley	07/16/13	50	84
GA: Savannah	09/11/13	−32	91
HI: Honolulu	08/12/13	−53	78
IA: Cedar Rapids	07/10/13	17	83
ID: Boise	07/08/13	8	83
ID: Idaho Falls	07/18/13	11	81
IL: W. Chicago	08/05/13	13	80
KS: Topeka	07/29/13	−24	80
LA: New Orleans	07/01/13	19	79
MD: Baltimore	07/08/13	98	87
MD: Conowingo	07/09/13	13	83
MI: Detroit	07/02/13	115	84
MN: St. Paul	07/10/13	0	82
MN: Welch	07/10/13	−2	82
MO: Jefferson City	07/01/13	−49	76
MS: Jackson	07/30/13	−2	80
MS: Port Gibson	07/30/13	−60	78
MT: Helena	07/23/13	24	82
ND: Bismarck	07/01/13	69	85
NE: Lincoln	07/03/13	66	86
NJ: Trenton	07/17/13	60	83
NJ: Waretown	07/22/13	−56	78
NY: New York City	09/10/13	−46	77
OH: Cincinnati	07/11/13	167	90
OH: Columbus	07/22/13	67	83
OH: E. Liverpool	07/24/13	244	91
OH: Painesville	08/08/13	15	82
OR: Portland	09/27/13	−58	90
PA: Columbia	07/03/13	12	79
PA: Harrisburg	07/03/13	−11	78

Table 9 (continued)
Tritium in Drinking Water
July–September 2013

Location	Date Collected	^{3}H pCi/L	± 2*u*
PA: Pittsburgh	07/23/13	22	82
RI: Providence	07/02/13	13	83
SC: Columbia	07/15/13	0	82
SC: Jenkinsville	07/08/13	−6	82
SC: Seneca	07/08/13	29	85
TN: Knoxville	07/18/13	29	82
TN: Oak Ridge/#360	07/02/13	−2	79
TN: Oak Ridge/#371	07/02/13	−9	79
TN: Oak Ridge/#4442	07/02/13	12	79
TN: Oak Ridge/#768	07/02/13	81	86
TN: Oak Ridge/#772	07/02/13	−27	78
TX: Austin	07/22/13	7	81
WA: Richland	08/07/13	11	81
WI: Madison	07/03/13	−19	78

Table 10
Plutonium and Uranium Analyses
Selected Drinking Water Composite Samples
January–December 2012

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*
AK: Fairbanks	−0.037 0.046	0.000 0.039	0.144 0.083	0.013 0.037	0.158 0.086
CA: Los Angeles	0.042 0.065	0.025 0.053	1.48 0.28	0.058 0.062	1.00 0.22
CO: Denver	0.000 0.048	0.008 0.037	0.103 0.071	0.008 0.036	0.043 0.051
CT: Hartford	−0.004 0.028	−0.012 0.030	−0.010 0.053	0.004 0.037	0.071 0.067
GA: Baxley	0.004 0.037	−0.004 0.027	0.059 0.091	0.000 0.066	0.12 0.10
IL: Morris	−0.024 0.037	−0.005 0.032	0.40 0.16	0.011 0.051	0.057 0.065
IL: W. Chicago	0.000 0.051	0.074 0.070	0.096 0.076	−0.005 0.033	0.025 0.044
LA: New Orleans	0.006 0.043	0.000 0.020	0.54 0.16	0.037 0.050	0.42 0.14
MD: Conowingo	0.000 0.027	−0.004 0.028	3.43 0.47	0.077 0.077	1.52 0.28
MI: Detroit	0.058 0.074	0.012 0.043	0.051 0.065	0.015 0.044	0.102 0.077
MN: Welch	0.011 0.039	−0.004 0.023	0.065 0.065	0.000 0.033	0.065 0.071
NC: Charlotte	0.041 0.081	0.008 0.037	0.058 0.068	−0.005 0.033	0.025 0.060
NE: Lincoln	0.007 0.038	0.017 0.037	4.21 0.54	0.21 0.11	2.66 0.40
OH: E. Liverpool	0.029 0.052	0.000 0.026	0.029 0.045	0.019 0.042	0.026 0.040
SC: Jenkinsville	−0.032 0.029	−0.006 0.022	4.66 0.65	0.082 0.082	1.73 0.34
TN: Chattanooga	0.05 0.15	0.06 0.11	0.06 0.11	0.04 0.11	0.13 0.16
WI: Madison	0.042 0.058	0.016 0.041	0.91 0.21	0.038 0.051	0.098 0.071

Note: NA = No Analysis

Table 11
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
Composites
January–December 2012

Location	Total Solids (mg/L)	Gross Beta pCi/L ± 2*u*	Gross Alpha pCi/L ± 2*u*	^{90}Sr pCi/L ± 2*u*
AK: Fairbanks	49.3	4.5 3.0	2.2 5.6	−0.40 0.58
AL: Dothan	48.4	3.2 2.0	0.8 3.6	
AL: Montgomery	34.7	1.1 1.1	0.1 1.7	
AL: Muscle Shoals	58.3	2.5 1.3	1.5 2.6	
AL: Scottsboro	56.0	1.3 1.2	0.0 2.4	
AR: Little Rock	17.5	0.4 1.3	0.3 1.7	
CA: Los Angeles	111.2	5.6 2.0	3.9 5.6	
CA: Richmond	32.6	0.0 1.3	−0.7 1.9	
CO: Denver	26.6	2.5 2.8	3.4 4.4	
CT: Hartford	11.8	4.0 2.8	2.4 3.5	0.18 0.84
DE: Dover	63.8	5.6 3.1	0.1 6.5	0.12 0.33
FL: Tampa	51.8	1.8 2.8	−0.7 5.4	
GA: Baxley	43.7	0.4 2.6	2.2 5.1	
GA: Savannah	87.5	2.2 1.3	0.3 3.4	
HI: Honolulu	53.3	2.6 2.8	−1.4 5.2	0.02 0.26
IA: Cedar Rapids	71.2	2.4 1.6	0.4 3.6	
ID: Boise	22.3	1.6 2.6	−0.3 3.5	0.00 0.29
ID: Idaho Falls	60.7	1.7 2.8	1.8 6.3	0.71 0.80
IL: Morris	40.6	6.8 5.7	7 10	
IL: W. Chicago	47.6	12.6 3.8	2.4 5.6	
KS: Topeka	60.0	9.5 3.5	−0.3 5.9	
LA: New Orleans	60.2	4.1 3.1	2.4 6.7	
MD: Baltimore	26.3	3.1 2.8	0.9 3.8	0.01 0.44
MD: Conowingo	28.2	5.9 3.0	3.9 4.4	0.08 0.29
MI: Detroit	16.0	2.6 5.3	3.1 7.1	
MN: St. Paul	53.1	2.3 1.9	−0.8 3.4	
MN: Welch	74.9	5.3 3.3	12.2 9.7	
MO: Jefferson City	49.7	4.0 3.0	−0.9 5.2	
MS: Jackson	43.7	3.6 1.4	1.3 2.2	
MS: Port Gibson	64.0	5.6 3.1	1.2 6.6	
MT: Helena	45.4	2.7 1.5	0.3 2.6	
NC: Charlotte	13.9	0.7 2.6	5.7 4.2	
ND: Bismarck	46.2	2.8 3.3	1.7 6.0	
NE: Lincoln	64.5	13.3 4.0	9.7 8.4	
NH: Concord	26.0	0.8 1.7	0.4 2.5	0.24 0.31
NJ: Trenton	69.6	1.6 1.2	0.0 2.8	−0.18 0.32
NJ: Waretown	43.1	3.3 1.3	0.6 2.0	0.48 0.38

Table 11 (continued)
Drinking Water
Alpha, Beta, and Sr-90 Concentrations
Composites
January–December 2012

Location	Total Solids (mg/L)	Gross Beta pCi/L ± 2*u*	Gross Alpha pCi/L ± 2*u*	^{90}Sr pCi/L ± 2*u*
NM: Santa Fe	41.6	1.9 1.9	0.4 3.1	
NY: Albany	22.8	−0.5 2.3	−0.7 3.3	0.09 0.29
NY: New York City	29.6	1.2 1.1	0.0 1.5	−0.03 0.35
NY: Niagara Falls	33.6	2.6 2.7	0.2 4.1	0.54 0.37
NY: Syracuse	75.1	1.5 1.2	−0.1 2.8	0.15 0.62
OH: Cincinnati	58.8	2.8 2.0	−0.3 4.0	
OH: Columbus	73.9	4.0 2.2	1.4 5.1	
OH: E. Liverpool	60.9	1.9 1.9	2.0 4.4	
OH: Painesville	55.1	2.4 2.0	0.4 4.0	
OH: Toledo	48.2	1.4 1.4	−0.4 2.5	
OR: Portland	21.3	0.0 1.3	0.1 1.7	−0.04 0.37
PA: Columbia	68.6	2.9 1.3	−0.2 2.7	0.12 0.30
PA: Harrisburg	56.7	2.2 1.5	1.5 3.2	−0.04 0.64
PA: Philadelphia/Baxter	17.1	2.0 5.0	1.0 6.6	
PA: Philadelphia/Belmont	46.6	3.7 2.9	1.9 5.5	
PA: Philadelphia/Queen	28.0	8.0 5.7	0.4 7.6	
PA: Pittsburgh	36.7	3.0 2.7	0.7 4.3	
RI: Providence	39.3	0.8 1.3	0.9 2.3	0.06 0.33
SC: Barnwell	22.7	1.5 1.2	1.1 1.6	
SC: Columbia	36.4	3.6 1.3	0.2 1.7	
SC: Jenkinsville	81.0	4.1 1.5	6.6 4.4	
SC: Seneca	17.4	1.6 1.1	0.2 1.3	
TN: Chattanooga	3.4	3 24	3 28	
TN: Knoxville	64.6	2.1 1.3	0.8 2.8	
TN: Oak Ridge/#360	25.3	2.5 2.7	0.2 3.7	−0.06 0.38
TN: Oak Ridge/#371	35.6	1.6 2.7	0.8 4.3	0.11 0.34
TN: Oak Ridge/#4442	32.5	2.8 2.8	−0.3 4.0	0.23 0.36
TN: Oak Ridge/#768	34.8	1.9 2.7	1.8 4.5	0.01 0.38
TN: Oak Ridge/#772	32.4	2.2 2.8	0.8 4.2	0.07 0.28
TX: Austin	71.7	3.9 1.7	−0.3 3.5	
VA: Ashland	43.9	3.6 1.4	0.4 2.0	
VA: Lynchburg	30.4	2.0 1.2	1.1 1.8	
WA: Richland	39.6	0.7 1.4	0.6 2.4	0.16 0.30
WI: Madison	36.8	1.3 5.2	6.5 9.5	

Table 12
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
AK: Fairbanks	0.041 0.064	NA	Co-60	−0.1 4.2
			Cs-137	0.22 0.96
			K-40	11 14
			Ra-228	6.2 5.0
AL: Dothan	NA	NA	Co-60	0.23 0.72
			Cs-137	0.02 0.88
			K-40	−9 14
			Ra-228	−0.7 3.9
AL: Montgomery	NA	NA	Co-60	−0.1 2.8
			Cs-137	0.52 0.90
			K-40	3 11
			Ra-228	−2.9 7.6
AL: Muscle Shoals	NA	NA	Co-60	−0.01 0.66
			Cs-137	0.0 8.7
			K-40	−5 12
			Ra-228	0.4 3.6
AL: Scottsboro	NA	NA	Co-60	−0.3 4.5
			Cs-137	0.41 0.86
			K-40	8 11
			Ra-228	−1.0 4.3
AR: Little Rock	NA	NA	Co-60	−0.6 1.2
			Cs-137	−0.1 1.8
			K-40	8 11
			Ra-228	−1.1 4.3
CA: Los Angeles	0.025 0.093	NA	Co-60	−0.1 4.2
			Cs-137	−0.02 0.94
			K-40	3 11
			Ra-228	−1.6 5.7
CA: Richmond	NA	NA	Co-60	0.04 0.82
			Cs-137	0.31 0.89
			K-40	7 13
			Ra-228	1.5 3.4
CO: Denver	0.046 0.087	NA	Co-60	0 29
			Cs-137	−0.17 0.94
			K-40	−3 15

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
CO: Denver	0.046 0.087	NA	Ra-228	2.2 4.5
CT: Hartford	0.000 0.029	NA	Co-60	−0.3 3.6
			Cs-137	0.38 0.83
			K-40	−14 20
			Ra-228	−0.8 4.0
DE: Dover	NA	NA	Co-60	0.42 0.74
			Cs-137	0.12 0.94
			K-40	−9 14
			Ra-228	−1.0 4.5
FL: Tampa	NA	NA	Co-60	0.27 0.66
			Cs-137	0.15 0.94
			K-40	5 11
			Ra-228	−0.6 4.0
GA: Baxley	2.13 0.42	NA	Co-60	0.14 0.79
			Cs-137	0.35 0.82
			K-40	1 12
			Ra-228	−1.8 5.5
GA: Savannah	NA	NA	Co-60	0.20 0.75
			Cs-137	0.32 0.91
			K-40	−2 11
			Ra-228	3.5 4.1
HI: Honolulu	NA	NA	Co-60	−0.4 1.6
			Cs-137	0.49 0.88
			K-40	−10 16
			Ra-228	−2.2 6.8
IA: Cedar Rapids	NA	NA	Co-60	−0.3 2.9
			Cs-137	0.00 0.78
			K-40	−8 13
			Ra-228	−0.4 3.8
ID: Boise	NA	NA	Co-60	−0.2 2.5
			Cs-137	0.0 1.2
			K-40	16 12
			Ra-228	−1.4 5.4
ID: Idaho Falls	NA	NA	Co-60	0.28 0.68
			Cs-137	0.09 0.93

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
ID: Idaho Falls	NA	NA	K-40	−6 13
			Ra-228	−0.8 4.5
IL: Morris	1.08 0.28	NA	Co-60	−0.7 1.6
			Cs-137	−0.31 0.99
			K-40	−6 12
			Ra-228	0.7 3.3
IL: W. Chicago	0.39 0.16	NA	Co-60	−0.3 3.8
			Cs-137	0.0 1.0
			K-40	9 12
			Ra-228	−2.4 6.9
KS: Topeka	NA	NA	Co-60	0.41 0.71
			Cs-137	−0.22 0.94
			K-40	−5 12
			Ra-228	−4 13
LA: New Orleans	0.044 0.059	NA	Co-60	0 39
			Cs-137	0.13 0.86
			K-40	−1 14
			Ra-228	−2.2 6.1
MD: Baltimore	NA	NA	Co-60	−0.1 5.0
			Cs-137	0.27 0.71
			K-40	−17 19
			Ra-228	−1.0 4.5
MD: Conowingo	0.28 0.13	NA	Co-60	0.13 0.56
			Cs-137	−0.41 0.91
			K-40	−2 15
			Ra-228	−1.5 5.1
MI: Detroit	0.060 0.068	NA	Co-60	−0.3 3.0
			Cs-137	−0.4 1.0
			K-40	−16 20
			Ra-228	−1.2 4.9
MN: St. Paul	NA	NA	Co-60	0.05 0.82
			Cs-137	−0.65 0.99
			K-40	2 12
			Ra-228	2.3 4.5
MN: Welch	1.01 0.27	NA	Co-60	−0.2 7.4

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
MN: Welch	1.01 0.27	NA	Cs-137	0.26 0.88
			K-40	9 13
			Ra-228	1.9 3.8
MO: Jefferson City	NA	NA	Co-60	−0.3 3.7
			Cs-137	0.09 0.64
			K-40	−1 11
			Ra-228	0.4 3.7
MS: Jackson	NA	NA	Co-60	0.14 0.64
			Cs-137	0.20 0.64
			K-40	−4 12
			Ra-228	−0.5 4.2
MS: Port Gibson	NA	NA	Co-60	−0.4 1.2
			Cs-137	−0.1 1.5
			K-40	−8 14
			Ra-228	−1.3 5.2
MT: Helena	NA	NA	Co-60	0.03 0.66
			Cs-137	−0.11 0.90
			K-40	0 11
			Ra-228	1.6 4.1
NC: Charlotte	0.065 0.083	NA	Co-60	0.2 2.0
			Cs-137	0 380
			K-40	−33 43
			Ra-228	−1.8 9.3
			Th-227	9.1 9.0
ND: Bismarck	NA	NA	Co-60	−0.2 2.6
			Cs-137	−0.67 0.98
			K-40	−0.5 9.0
			Ra-228	−1.4 5.3
NE: Lincoln	0.15 0.12	NA	Co-60	0.14 0.83
			Cs-137	−0.01 0.68
			K-40	5 13
			Ra-228	2.3 4.5
NH: Concord	NA	NA	Co-60	1.8 2.1
			Cs-137	−1 20
			K-40	−30 43

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
NH: Concord	NA	NA	Ra-228	−5 15
NJ: Trenton	NA	NA	Co-60	0 17
			Cs-137	0.02 0.71
			K-40	0 12
			Ra-228	4.4 5.0
NJ: Waretown	NA	NA	Co-60	−0.4 2.1
			Cs-137	0.16 0.64
			K-40	−8 13
			Ra-228	0.3 3.4
NM: Santa Fe	NA	NA	Co-60	0.8 2.1
			Cs-137	−0.9 6.2
			K-40	−24 36
			Ra-228	1.3 7.9
NY: Albany	NA	NA	Co-60	−0.4 1.2
			Cs-137	−0.2 3.2
			K-40	17 13
			Ra-228	1.2 4.0
NY: New York City	NA	NA	Co-60	−0.5 1.8
			Cs-137	−0.09 0.77
			K-40	−5 13
			Ra-228	−0.2 3.5
NY: Niagara Falls	NA	NA	Co-60	0.02 0.74
			Cs-137	−0.25 0.93
			K-40	2 11
			Ra-228	−3.3 8.3
NY: Syracuse	NA	NA	Co-60	−0.4 2.2
			Cs-137	0.06 0.94
			K-40	−11 17
			Ra-228	−0.1 3.5
OH: Cincinnati	NA	NA	Co-60	0.01 0.72
			Cs-137	0.06 0.89
			K-40	−16 21
			Ra-228	−4 12
OH: Columbus	NA	NA	Co-60	0.12 0.81
			Cs-137	−0.8 1.0

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
OH: Columbus	NA	NA	K-40	−9 15
			Ra-228	1.2 4.0
OH: E. Liverpool	0.014 0.053	NA	Co-60	−0.2 9.8
			Cs-137	−0.51 0.96
			K-40	2 12
			Ra-228	−4 11
OH: Painesville	NA	NA	Co-60	−0.4 2.0
			Cs-137	−0.13 0.75
			K-40	7 11
			Ra-228	−2.9 7.7
OH: Toledo	NA	NA	Co-60	−0.6 1.8
			Cs-137	−0.01 0.92
			K-40	6 13
			Ra-228	−3.0 7.1
OR: Portland	NA	NA	Co-60	0.20 0.76
			Cs-137	0.10 0.81
			K-40	−9 16
			Ra-228	1.0 3.3
PA: Columbia	NA	NA	Co-60	0.42 0.79
			Cs-137	0.40 0.87
			K-40	−11 15
			Ra-228	−1.7 5.5
PA: Harrisburg	NA	NA	Co-60	0 360
			Cs-137	0.59 0.96
			K-40	−16 20
			Ra-228	1.6 3.8
PA: Philadelphia/Baxter	NA	NA	Co-60	0.00 0.81
			Cs-137	0.44 0.93
			K-40	4 12
			Ra-228	0.7 3.3
PA: Philadelphia/Belmont	NA	NA	Co-60	−0.6 1.8
			Cs-137	0.03 0.92
			K-40	−14 17
			Ra-228	1.2 3.5
PA: Philadelphia/Queen	NA	NA	Co-60	0.22 0.76

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
PA: Philadelphia/Queen	NA	NA	Cs-137	−0.60 0.99
			K-40	−2 12
			Ra-228	0.4 3.4
PA: Pittsburgh	NA	NA	Co-60	−0.3 3.6
			Cs-137	0.79 0.96
			K-40	−20 28
			Ra-228	−2.4 6.9
RI: Providence	NA	NA	Co-60	0 34
			Cs-137	0.34 0.85
			K-40	3 13
			Ra-228	−2.8 7.3
SC: Barnwell	NA	NA	Co-60	0.46 0.84
			Cs-137	−0.4 6.7
			K-40	12 13
			Ra-228	0.8 4.4
SC: Columbia	NA	NA	Be-7	600 550
			Co-60	0.06 0.73
			Cs-137	0.53 0.93
			K-40	−16 22
			Ra-228	−3.5 9.2
SC: Jenkinsville	0.19 0.15	NA	Co-60	0.19 0.76
			Cs-137	0.24 0.80
			K-40	−9 18
			Ra-228	−1.9 5.8
SC: Seneca	NA	NA	Co-60	−0.01 0.88
			Cs-137	−0.4 1.0
			K-40	−21 30
			Ra-228	−1.0 4.4
TN: Chattanooga	0.14 0.25	NA	Co-60	−0.5 7.2
			Cs-137	1.2 2.2
			K-40	−11 36
			Ra-228	−7 16
TN: Knoxville	NA	NA	Co-60	−0.2 7.7
			Cs-137	0.18 0.96
			K-40	−4 13

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides	
			Nuclide	pCi/L ± 2*u*
TN: Knoxville	NA	NA	Ra-228	1.7 4.7
TN: Oak Ridge/#360	NA	NA	Co-60	0 41
			Cs-137	−0.47 0.99
			K-40	−2 13
			Ra-228	1.3 4.1
TN: Oak Ridge/#371	NA	NA	Co-60	−0.1 1.7
			Cs-137	0.03 0.95
			K-40	−4 16
			Ra-228	0.8 4.1
TN: Oak Ridge/#4442	NA	NA	Co-60	0.05 0.79
			Cs-137	−0.22 0.98
			K-40	−2 13
			Ra-228	−1.6 5.2
TN: Oak Ridge/#768	NA	NA	Co-60	0 39
			Cs-137	−0.12 0.91
			K-40	−3 11
			Ra-228	1.3 3.8
TN: Oak Ridge/#772	NA	NA	Co-60	0.06 0.74
			Cs-137	−0.40 0.93
			K-40	−1 14
			Ra-228	1.0 4.0
TX: Austin	NA	NA	Co-60	0 11
			Cs-137	−0.14 0.98
			K-40	11 12
			Ra-228	0.8 4.3
VA: Ashland	NA	NA	Co-60	−0.1 2.3
			Cs-137	0.29 0.88
			K-40	13 12
			Ra-228	−2.2 5.6
VA: Lynchburg	NA	NA	Co-60	−0.4 2.0
			Cs-137	0.25 0.86
			K-40	−4 16
			Ra-228	−1.1 4.5
WA: Richland	NA	NA	Co-60	0 48
			Cs-137	0 12

Note: ND = Not Detected
NA = No Analysis

Table 12 (continued)
Drinking Water
Radium and Gamma-Emitting Radionuclides
Composites
January–December 2012

Location	^{226}Ra pCi/L ± 2*u*	^{228}Ra pCi/L ± 2*u*	Gamma-Emitting Radionuclides Nuclide	pCi/L ± 2*u*
WA: Richland	NA	NA	K-40	−3.3 7.3
			Ra-228	1.7 3.3
WI: Madison	1.31 0.31	NA	Co-60	−0.1 1.9
			Cs-137	0.24 0.63
			K-40	−15 11
			Ra-228	2.5 3.9

Note: ND = Not Detected
NA = No Analysis

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3. Milk Program

Pasteurized Milk

Milk is a reliable indicator of the general population's intake of certain radionuclides since it is consumed fresh by a large segment of the population and can contain several of the biologically significant radionuclides that result from environmental releases from nuclear activities. A primary function of this program is to obtain reliable monitoring data relative to current radionuclide concentrations and determine any long-term trends.

Milk samples are collected quarterly at each of the sampling sites. The samples are analyzed for gamma-emitting nuclides, including iodine-131, barium-140, cesium-137, and potassium-40. Total potassium concentrations in g/L are determined from potassium-40 activities assuming natural isotopic abundances. During the third quarter collection, one-fourth of the samples are also analyzed for strontium-90 on a four year rotating schedule.

Table 13

Radionuclides in Pasteurized Milk

July–September 2013

Location	Date Collected	K g/L ± 2*u*	^{137}Cs pCi/L ± 2*u*	^{140}Ba pCi/L ± 2*u*	^{131}I pCi/L ± 2*u*
AR: Little Rock	07/29/13	1.62 0.19	ND	ND	ND
AZ: Phoenix	07/17/13	1.63 0.19	ND	ND	NR
CA: Los Angeles	09/25/13	1.55 0.18	ND	ND	ND
CA: San Francisco	07/15/13	1.90 0.22	ND	ND	NR
CT: Hartford	09/04/13	1.61 0.19	ND	ND	ND
DE: Wilmington	07/15/13	1.70 0.20	ND	ND	NR
FL: Plant City	07/23/13	1.64 0.19	ND	ND	ND
HI: Hilo	07/10/13	1.65 0.20	ND	ND	ND
IA: Des Moines	08/19/13	1.60 0.19	ND	ND	ND
KS: Wichita	08/29/13	1.68 0.20	ND	ND	ND
KY: Louisville	07/08/13	1.66 0.20	ND	ND	ND
MA: Boston	09/12/13	1.65 0.20	ND	ND	ND
MD: Baltimore	07/08/13	1.61 0.19	ND	ND	ND
MO: Jefferson City	08/06/13	1.64 0.19	ND	ND	ND
NJ: Trenton	07/12/13	1.60 0.19	ND	ND	ND
NM: Albuquerque	08/30/13	1.52 0.18	ND	ND	ND
NV: Las Vegas	08/12/13	1.80 0.21	ND	ND	ND
NY: Buffalo	08/07/13	1.62 0.19	ND	ND	ND
NY: Syracuse	07/16/13	1.65 0.20	ND	ND	NR
OH: Cincinnati	08/19/13	1.69 0.20	ND	ND	ND
OH: Cleveland	08/02/13	1.69 0.20	ND	ND	ND
OR: Portland	09/17/13	1.60 0.18	ND	ND	ND
PA: Pittsburgh	07/23/13	1.66 0.19	ND	ND	ND
TN: Chattanooga	09/25/13	1.61 0.19	ND	ND	ND
TN: Knoxville	08/09/13	1.67 0.20	ND	ND	ND
TN: Memphis	07/08/13	1.58 0.19	ND	ND	ND
TX: Dallas	08/20/13	1.64 0.19	ND	ND	ND
TX: San Antonio	07/08/13	1.65 0.20	ND	ND	ND
VT: Montpelier	07/17/13	1.70 0.19	ND	ND	NR
WA: Spokane	08/07/13	1.79 0.20	ND	ND	ND
WA: Tacoma	09/28/13	1.63 0.19	ND	ND	ND
WV: Charleston	07/10/13	1.64 0.19	ND	ND	ND

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

Table 14
Strontium-90 in Pasteurized Milk
July–September 2013

Location	Date Collected	^{90}Sr pCi/L	± 2*u*
CA: Los Angeles	09/25/13	0.33	0.41
CA: San Francisco	07/15/13	−0.33	0.40
FL: Plant City	07/23/13	0.25	0.46
MO: Jefferson City	08/06/13	0.08	0.65
NY: Syracuse	07/16/13	0.64	0.94
PA: Pittsburgh	07/23/13	0.46	0.51
TN: Chattanooga	09/25/13	0.83	0.53
VT: Montpelier	07/17/13	0.35	0.45

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For More Information

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